



**Annual Report**  
**2018**





**Plantwise** is a global programme, led by CAB International (CABI), that aims to increase food security and improve rural livelihoods by reducing crop losses. Working in close partnership with relevant actors, Plantwise strengthens national plant health systems from within, enabling countries to provide farmers with the knowledge they need to lose less and feed more.

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## Abbreviations

ACIAR	Australian Centre for International Agricultural Research
AIR	American Institute of Research
CHAP	Centre for Crop Health and Protection
CMS	Crop Management Simulator
DAS	Diagnostic and Advisory Service
DCA	Data Collection App
DFID	Department for International Development – UK
DGIS	Directorate General for International Cooperation of the Netherlands
FAW	Fall Armyworm
FFS	Farmer Field School
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
ILRI	International Livestock Research Institute
IPM	Integrated Pest Management
LIO	Local Implementing Organisation
MEC	Mass Extension Campaign
NAF	National Agro Foundation – India
NRO	National Responsible Organisation
PDS	PestSmart Diagnostic Simulator
PHS	Plant Health Systems
PEAT	Progressive Environmental & Agricultural Technologies
PMDG	Pest Management Decision Guide
POMS	Plantwise Online Management System
PRISE	Pest Risk Information Service
RCT	Randomized Control Trial
SDC	Swiss Agency for Development and Cooperation
SOP	Standard operating Procedures
TM	Twigire Muhinzi
ToT	Training of Trainers
VFM	Value for Money





# Introduction

## Plantwise: helping farmers lose less and feed more

Plantwise is a global programme, led by CABI, to increase food security and improve rural livelihoods by reducing crop losses. Working in close partnership with relevant actors, Plantwise strengthens national plant health systems from within, enabling countries to provide farmers with the knowledge they need to lose less of what they grow and to feed more.

This is achieved by establishing networks of locally owned plant clinics where farmers can receive practical plant health advice, which are run by extension staff trained as plant doctors. Plant clinics are reinforced by the Plantwise Knowledge Bank, a gateway to online and offline actionable plant health information, including diagnostic resources, pest management advice and basic pest data for effective global pest surveillance.

The donors contributing to Plantwise in 2018 included the UK Department for International Development (DFID), the Swiss Agency for Development and Cooperation (SDC), the Directorate General for International Cooperation (DGIS, Netherlands), the International Fund for Agricultural Development (IFAD), the Australian Centre for International Agricultural Research (ACIAR) and the Ministry of Agriculture and Rural Affairs (MARA) of the People's Republic of China. Others contributing to support plant doctors with training, tablet computers and/or through spinoff projects specific to the Plantwise Knowledge Bank activities include Koppert Foundation, the Centre for Crop Health and Protection (CHAP), the UK Space Agency, Corteva Agriscience Hunger Solutions Network and the contribution from the St Andrews Prize for the Environment awarded to Plantwise in 2017.

Plantwise is managed by a Programme Board comprising senior management from CABI and implemented in participating countries through partners working on three interconnected components:

- **Plant Health Systems Development**
- **The Knowledge Bank**
- **Monitoring and Evaluation, including Gender**

This report presents an update on Plantwise implementation between January and December 2018. It lists key highlights from the reporting period and provides a narrative on progress, lessons learned and next steps for each of the three programme components. Gender is embedded in activities under all programme components but is presented as a standalone section because of its unique requirements. There are also updates on donor engagement and finances, as well as medium-term opportunities. The report is accompanied by three annexes: Annex 1 gives the finalized programme milestones report for 2018; Annex 2 provides the new programme milestones for 2019; and Annex 3 consists of one-page country reports showing highlights, challenges and lessons learned.

**Table 1 Plantwise countries by year of programme launch**

Pre-2009	2009–2011	2012	2013	2014	2015
Bangladesh	India	Afghanistan	Brazil	Costa Rica	Jamaica
Bolivia	Kenya	Barbados	Burkina Faso	Myanmar	
DR Congo**	Nepal	Cambodia	Ethiopia		
Nicaragua	Pakistan	China	Malawi		
Sierra Leone**	Peru	Ghana	Mozambique		
Uganda	Rwanda	Grenada	Thailand		
Vietnam	Sri Lanka	Honduras	Zambia		
	Suriname*	Tanzania**			
		Trinidad & Tobago			

\* exited in 2014; \*\* Limited activities since 2015



# Executive summary

Plantwise has continued to grow and develop strongly during 2018 such that it has now reached an estimated 31 million farmers cumulatively, established 3,700 plant clinics and trained over 10,000 plant doctors. Only 3% of the plant doctor trainings conducted in 2018 were led by CABI; the rest (97%) were conducted by local trainers, with CABI staff present only in a few cases to backstop training. Particular highlights include the following:

- significant progress towards sustainability, as evidenced in some countries by the adoption of the Plantwise approach into national agricultural strategies and extension officer job descriptions, absorption of running costs within national budgets, with partner financial allocations of over £1 million
- a substantive body of evidence has been built for the positive impacts of Plantwise on crop yields and farmer incomes, which has been demonstrated through both quantitative and mixed method studies in Africa and Asia
- innovation within the core concept through use of Information Communication Technology (ICT) tools and social media as well as experiments with different partnership and business models to support Plantwise
- a plan to evolve the Plantwise model for the future so as to address needs and opportunities in relation to value chains, production and supply systems for safe food and increased resilience to climate change

Priority activities under Plantwise in 2018 continued to focus on:

- improving results measurement to strengthen the evidence of outcomes and impact of the programme
- embedding gender in programme activities to enhance equity
- use of ICT tools and applications in agro-advisory services to enhance reach and efficiency
- exploring how to improve in-country use of plant clinic data
- designing concepts for the evolved Plantwise, with business models that enhance opportunities for engagement with private sector organizations
- providing opportunities for employment creation, especially for women and youth



As Plantwise continues to grow, the metrics of its reach improved to enable a good estimation of the number of farmers reached by the programme. On the basis of these metrics, a total of 12.9 million farmers were reached in 2018 through plant clinics (c. 258,000), plant health rallies (c. 72,000), mass extension campaigns (MECs) (c. 2.2 million) and farmer to farmer sharing of information (c.10.2 million). The MECs targeting fall armyworm (FAW) were implemented jointly by the Plantwise and Action on Invasives programmes. These achievements in 2018 bring the number of farmers reached by Plantwise to 31 million (cumulative) since inception. Plantwise has now been proven, through Monitoring and Evaluation studies, to be an innovative extension approach that works through partnerships to strengthen plant health systems and farmers' adoption of technologies. The independent assessment of Plantwise's impact in Kenya by the American Institutes of Research (AIR), which used a randomized control trial (RCT) design, ran from 2014 to 2017 and was published in 2018, showed that the programme contributes to improvements on crop yields, crop-based household incomes and reductions in cases of non-judicious use of pesticide by farmers. The main finding from this assessment is that the monetary benefits of Plantwise outweigh the costs of its implementation threefold (**benefit-cost ratio of 3:1**) and an initial investment in the programme would be fully recovered within two years (**internal rate of return of 54%**). Findings from two quasi-experimental Monitoring and Evaluation studies conducted in Rwanda and Bangladesh in 2018 provide further supporting evidence of the positive impact of Plantwise on farming households. Another detailed assessment of Plantwise that commenced in Pakistan during the year will be concluded in 2019 and is expected to give further insights into the kinds of outcomes and impact that can be realized in a country where the programme is highly advanced and is sustainably operated by in-country partners. All pieces of evidence of outcomes and impact of Plantwise have been compiled through a systematic analytical review that will be published in 2019.

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the programme contributes to improvements on crop yields, crop-based household incomes and reductions in cases of non-judicious use of pesticide by farmers

Concerning equity in access to information resources in Plantwise countries, one observation that stands out from activities conducted in eight countries (Afghanistan, Bolivia, Costa Rica, Honduras, Pakistan, Peru, Rwanda and Uganda) in 2018 is that the achievement of gender equity requires deliberate and targeted interventions that respond to the needs of women, youth and minority groups, such as tailored information, targeted trainings and information delivery mechanisms. As Plantwise evolves, it will be necessary in 2019 and beyond to test models that enhance gender equity under specific projects, which should be run jointly with the gender units within various government departments in selected countries. This has been taken into consideration in the concepts developed in 2018 under the Plantwise Forward Plan presented in this report under the section on Medium Term Opportunities.

For sustainability, a commercial e-learning product (PestSmart Diagnostics) – which was developed over the past two years from Plantwise training modules– was launched in October 2018. This will initially target universities as the main users but has the potential for wider uptake across regions by countries and organizations that want to embed Plantwise training into their capacity development activities. Sustaining interventions made in a number of countries through Plantwise continues to grow at varying degrees of ownership of programme activities by local implementing organizations. By the end of 2018, three countries (Pakistan, China and Sri Lanka) were placed in the sustainability phase using the criteria in the sustainability road map for the

programme. A further 13 countries were in scale-up and 13 others in the consolidation phases, with only one in the pilot phase. One of the best indicators of potential for sustainability is ownership of Plantwise activities and processes with concomitant budgetary allocations by the governments of implementing countries. In 2018, significant contributions totalling £1.1 million were realized from 24 countries.

CABI also engaged with private sector entities in several Plantwise countries (e.g. China, India, Nepal and Vietnam) to pilot business-based plant clinics with partial or full value chain services and to integrate Plantwise training content into university or company curricula for in-service training (China, India); to link commercial mobile messaging services with plant clinics (Sri Lanka, Vietnam); to establish private sector run plant clinics (12 countries cumulative); and train plant doctors in using biological control as part of integrated pest management (IPM), for example through a pilot in Kenya in partnership with Koppert Biological Systems. A new collaboration between CABI and Progressive Environmental & Agricultural Technologies (PEAT) was also initiated to support the evaluation of the diagnostic capabilities of image recognition software called Plantix. Using principles of pattern recognition, artificial intelligence and biometrics, tools like Plantix could provide diagnostic assistance to extension service providers and farmers.

The development of ICT and data driven processes supporting agricultural production continued in 2018 and was given further impetus through the establishment of 600 additional e-plant clinics, bringing the cumulative total of such clinics to 1,000. Redesign of the online Knowledge Bank and Plantwise Online Management System (POMS) was undertaken to support users of mobile devices and futureproof the sites, while the rebuilding of the data collection app (DCA) will be finalized in early 2019. The use of such apps as Telegram, WhatsApp, Facebook, Messenger, Line and WeChat continues not only to link plant doctors to in-country diagnostic support but also to provide novel channels for communication between plant doctors and CABI. The UK-based Plantwise Diagnostic and Advisory Service (DAS) established links with 16 country Telegram and WhatsApp groups to monitor the queries posted, providing support to diagnosis for 57 queries from eight countries during the year. Knowledge Bank users continued to increase in number, with 380,000 visits to the online version in 2018 (53% of them female), bringing the cumulative total to 1.9 million by the end of the year. At the programme level, the development of a pesticide recommendation dataset from POMS that began in 2017 continued throughout 2018. A detailed analysis carried out using this dataset showed the existence of a few but important cases of recommendations to farmers to use restricted pesticides on a few crops in some countries. As a result, partners in these countries were alerted of this potential risk, whilst CABI has also incorporated activities on pesticide risk reduction into the Plantwise Forward Plan.

There was an increase in the number of countries using plant clinic data from 15 in 2017 to 20 in 2018. Data uses were similar to those reported in 2017, i.e. in decision making for plant protection and extension activities such as factsheet development, extension campaigns or research in 12 countries, plant doctor assessment to understand the quality of diagnosis and advice, and to identify training needs in eight countries, monitoring of the distribution and prevalence of pests in five countries, student thesis research at universities in five countries, basic activity monitoring and reporting in four countries and in making decisions on farmer subsidies related to use of 'green' agro-inputs in one country. The programme will continue its focus on addressing barriers to data access and sharing in order to increase its use by partners in the coming years.

To better align with the global need for resilience on the part of farming communities to the adverse effects of climate change, CABI participated in various international meetings/conferences at which plant health and pest management were discussed as critical components for climate adaptation (and mitigation). Plantwise was presented at a high-level roundtable discussion chaired by the former UN Secretary-General during the launch of the Global Commission on Adaptation. This was in addition to the continuous engagement between Plantwise and the CGIAR-CCAFS-led Climate Smart Village initiative in South East Asia. Elements of Plantwise were also integrated into other climate initiatives such as the BRACED (Building Resilience and Adaptation to Climate Extremes and Disasters) programme in Ghana. In collaboration with the Global Alliance for Climate Smart Agriculture, we developed the novel concept of Climate Smart Pest Management rooted in the Plantwise approach. This was further refined, leading to a scientific publication in the Journal of



Pest Science. Going forward, CABI will undertake a consolidated effort to ensure that climate adaptation and mitigation are embedded and reflected in Plantwise, with particular attention on the potential to develop data driven ICT decision support tools that make increased use of dynamic data (e.g. rainfall, temperature, water availability, etc.) and combine this with biological data to generate/support needs based advice provided by extension agents, thereby contributing to farming communities increasing their resilience to the adverse effects of climate change. This will be done as a crosscutting function of work components in the Plantwise Forward Plan.

Building on lessons learned so far, the Plantwise Forward Plan incorporates new concepts under Plantwise Plus in such a way as to sustain the programme using its demonstrated impact and value to stakeholders as well as setting its context to meet the evolving development and business needs of both public and private sector stakeholders in plant health management. It recognizes the potential of Plantwise to service stakeholder needs beyond plant health and incorporates activities addressing both public and private sector requirements under four areas:

1) the use of ICT and decision support tools in agro-enterprises, 2) gender and employment creation for youth and women in agricultural value chains, 3) safe and sustainable farming practices, and 4) agribusiness development. Opportunities to sustain Plantwise from 2019 onwards will be sought around these four areas, which themselves constitute the core elements of the Plantwise Forward Plan.

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A photograph showing two men in a rural setting. One man, wearing a light blue shirt and trousers, is leaning over a table, examining a plant sample. The other man, wearing a white cap and a dark jacket, is also leaning over the table, looking at the plant. In the background, there are bicycles and other people, suggesting an outdoor market or community gathering.

# Programme highlights

## Programme level

- 12.8 million farmers reached in 2018 (31 million cumulative) through partner-led plant clinics, plant health rallies, MECs and farmer to farmer sharing of information (details in Table 2).
- Impact assessment of Plantwise in Kenya by AIR completed, with results showing that Plantwise:
  - contributes to improvements on yields, crop-based household incomes and reductions in pesticide use for farmers living in plant clinic catchment areas
  - is improving institutional coordination in national plant health systems, generating more knowledge and improving the likelihood of detecting and responding to pest outbreaks
  - is an innovative and comprehensive approach that leads to plant doctors having improved knowledge and management of data that provides insights into where pest response interventions should be targeted
- Monetary benefits outweigh the costs of implementing the programme at a benefit–cost ratio of 3:1 and an internal rate of return of 54%
- A commercial e-learning product (PestSmart Diagnostics) launched, with universities as the initial key target audience
- Pest Risk Information Service (PRISE), a Plantwise spinoff project funded by the UK Space Agency to create an early warning service to forecast the risk of pest outbreaks, communicated pest alerts to 666 plant doctors and other extension workers in Kenya, Ghana and Zambia
- Private sector engagements piloted in several countries, with a focus on:
  - business-based plant clinics with partial or full value chain service (China, India, Nepal, Vietnam)
  - business model for integrating Plantwise training content into a university or curricula for in-service training (China, India)
  - linking commercial mobile messaging services with plant clinics (Sri Lanka, Vietnam)
  - private sector run plant clinics, now piloted in 12 countries cumulatively
  - collaboration with Koppert Biocontrol Systems to raise awareness of IPM and biocontrol in Kenya
- Hosted the seventh Plantwise Donor Forum at DFID in London



## Plant health systems development

- Signed seven new partnership agreements and four partnership statements with partners across 10 countries, with a total of 165 in-country partners actively engaged in Plantwise in 2018
- Significant contribution to annual budget allocations by partners for Plantwise activities (totalling £3.28 million from 27 countries during 2016–2018; £1.1 million from 24 countries in 2018 alone). These figures exclude staff salaries and in-kind contributions that vary from country to country
- Supported local partners and national plant protection organizations through the plant clinics and UK-based Plantwise DAS to identify four new pests (*Spodoptera frugiperda* – FAW, *Paracoccus marginatus* – papaya mealybug, *Achaea ablunaris*, and *Cosmopolites sordidus* – banana weevil) in three Plantwise countries
- Conducted training of trainers (ToT) for 94 in-country plant doctor trainers (29% female) in six countries
- Trained 1,555 plant doctors (30% female) across 23 countries, with 97% of trainings led by local trainers
- 295 new plant clinics established across 20 countries
- 175 Pest Management Decision Guides, 91 Factsheets for Farmers and seven photo sheets produced by local partners
- Trained 411 partner staff (28% female) on data management, analysis and use, and confirmed use of clinic data by local partners in 20 Plantwise countries
- 257,512 plant health queries handled at plant clinics (20% from women farmers), 72,100 farmers (30% women) reached through plant health rallies, and over 2 million farmers reached through MECs in 10 countries

## Knowledge Bank

- Over 2,000 plant doctors have now been trained on the use of digital devices at plant clinics (1,247 in 2018), operating nearly 1,000 e-plant clinics
- Over 540,000 sessions on the Factsheet app have been made, with 95% of these in Plantwise countries; nearly 70% of app users are under 35 years of age
- 1.9 million visits to the online Knowledge Bank to date; 380,000 in 2018 (53% of them female)
- Over 505,000 plant clinic records now available on POMS (plus an additional 78,500 in China on their own system), with evidence of use by partners in several countries
- Complete overhaul of the DCA initiated to resolve bugs and add features required for its proper functioning to be completed in 2019
- Self-service data management tools improved to help partners manage their own data with minimal support from CABI. Early experiments with machine learning to support automated harmonization of clinic data initiated
- Complete redesign of online Knowledge Bank and POMS to support users on mobile devices and futureproof the sites

## Monitoring and Evaluation, including gender

- A follow-up on-farm impact study with maize farmers in Rwanda demonstrated increase in maize yield (24%) and net income (30%) by clinic users as opposed to non-users for two seasons
- An on-farm impact study with Cucurbit farmers in Bangladesh showed a 33% higher net farm income for clinic users (BDT 6,631 (USD 79)) than non-users
- An assessment of farmer participation and motivation for repeat visits to plant clinics and factors influencing decisions to adopt advice on pest management showed that:
  - Farmers are aware of pest problems on key crops and proactively seek management information from various sources
  - 50% of farmers returned to seek more clarification on certain recommendations
  - 41% returned to bring a different crop or problem
  - Over 60% used pesticides for pest control
- ICTs and social media groups accelerated the speed of tracking the FAW outbreak in Kenya and Rwanda
- A total of 19 case studies to provide supporting evidence of impact were initiated/completed
- An analytical review to consolidate the outcomes and impact of Plantwise was completed
- Targeted approaches to reach women, youth and minorities were demonstrated to increase their participation at plant clinics in eight countries (Afghanistan, Bolivia, Costa Rica, Honduras, Pakistan, Peru, Rwanda and Uganda)



## Monthly highlights

FEBRUARY



Sri Lanka launches Skype service to further strengthen advisory support in plant clinics

MARCH



Plantwise trials image recognition app, Plantix, in India

APRIL



CABI joins Koppert to reduce the reliance on chemical use in pest management in Kenya

JULY



PRISE launches in Kenya with press visiting plant clinics and field test sites

AUGUST



Plantwise chair panel at the International Congress of Plant Pathology with USDA and Corteva Agriscience

OCTOBER



Plantwise impact in Kenya published in major report from the American Institutes for Research

NOVEMBER



Plantwise launches in Khyber Pakhtunkhwa province of Pakistan



# Plant health systems development

## Progress in 2018

The **annual assessment of the Plantwise implementation progress** using the sustainability roadmap provided evidence that most participating countries took further steps forward in integrating Plantwise elements into their work flows and scaling up associated activities to deliver benefits to more farmers. By the end of 2018, there were three countries in the final 'sustainability phase' (Pakistan, China and Sri Lanka), where there is a combination of strong integration of Plantwise concepts into the partners' service delivery and with no reliance on Plantwise donor funding to maintain basic activities. There were a further 13 countries across Africa, Asia and the Americas that were considered to be in the 'scale-up' phase, meaning that they are showing strong signs of local ownership of activities and are pushing forward to expand Plantwise related processes beyond the initial pilot. Two countries (Mozambique and Nepal) were considered to have slipped back from scale-up to consolidation due to internal challenges.

In the case of Mozambique, partners have previously demonstrated a strong interest in the Plantwise approach through significant investment in programme activities under a different agricultural development project between 2016 and 2017, and the situation is likely to improve under a new project on horticulture value chains. The challenge in Nepal (currently undergoing devolution of extension services, leading to confusion over funding, institutional mandates and manpower deployments) is similar to that of Kenya and is likely to be overcome as the administrative structures of devolved governments come into full operation. However, a significant effort will be required to build new partnerships with an increased number of implementing partners. In addition, 13 countries were deemed to be in the 'consolidation' phase and one in the 'pilot' phase. Partners in these 14 countries are still working out ways to properly anchor one or more of the elements of Plantwise into their work structure and job functions.

The way in which **Plantwise is adopted and implemented by local partners** varies from country to country. For instance, the approach in Pakistan and Sri Lanka, which have each trained over 1,000 extension workers in the plant doctor modules, is very strongly public sector driven. In contrast, the Beijing Plant Protection Centre and other partners in China have created strong links to the private sector, not only for plant clinic operations but also for training, data use and other aspects of Plantwise. In Kenya, members of the national steering committee have developed standard operating procedures (SOPs) that describe how plant clinics should work in the country, with a plan to gazette these as regulations. In Uganda, although plant clinics operate very infrequently as and when local funds are available, the operations have been included in the official job descriptions of local government extension staff. Over the coming years, CABI is going to evaluate how these contribute to sustaining Plantwise interventions in the two countries.



In 2018, a total of seven new partnership agreements and four new partnership statements (the latter being less formal declarations of partnership) were signed with new collaborators in various countries. During the year, Plantwise activities were conducted in 30 countries across Africa, Asia and the Americas, involving at least **165 public sector, private sector and civil society partners**. The figure does not take into account the numerous sub-national governmental bodies, which also play crucial roles in countries with decentralized agricultural advisory services. Data obtained from many of the active partners shows that, collectively, they contributed approximately GBP 1.1 million towards the implementation of Plantwise. This figure is based on reports of budget allocations from 56 of the partners across 24 countries. As in previous years, this investment is generally used to pay for training, tablets and other resources for plant doctors, transport and allowances for plant clinic operations, complementary extension activities, etc. The figures on the official budget contributions made by partners do not include the staff time of personnel involved in Plantwise activities, the latter being highly variable from country to country and difficult to quantify from the data that implementing partners can easily collate and share with CABI.

Besides cases where the private sector is represented on steering committees, private sector stakeholders were actively engaged in Plantwise implementation in 14 countries in 2018– eight of which are considered to have made significant contributions to Plantwise (five in Asia, two in the Americas and one in Africa). One of the most novel linkages with the private sector involves **connecting plant clinics to mobile messaging services** in Sri Lanka. Currently, the primary link is that the mobile messages inform farmers of upcoming plant clinic sessions in their areas; however, it is hoped that plant clinics could eventually feed more real-time plant health updates and information into the messaging service.

Another major development has been the **integration of Plantwise training content into fee based courses**. This approach has been discussed and partial progress made in Uganda over the last two years but the most recent lessons learned come from China. The first such training was piloted at Zhejiang Agricultural and Forestry University in 2018. While the feedback from trainees was positive, the business model for the course still requires some further analysis to determine how well these trainings satisfy the requirements of the curricula of the universities to warrant their full uptake as regular courses.

One of the most interesting models for private sector collaboration is where **plant clinic operations are integrated into farmer based organizations**, in some cases linked to specific value chains. The partnership with National Agro Foundation (NAF), the umbrella farmers organization in India, is one of the best examples of this model. By the end of 2018, there were 24 plant clinics operated under NAF, serving approximately 10,000 farmers across nine smaller farmer organizations. The clinics have been a welcome addition to the organization, filling a technical gap in the services it provides to farmers. In Nicaragua, farmer organizations and cooperatives have played an important role in Plantwise implementation for many years. In many cases, the cooperatives and farmers associations struggle to run sustainably but plant clinics continue to be important in providing greater stability to their operations. Even where there is staff mobility, the plant doctors may resume their role within new organizations, as was observed in two instances in Nicaragua in 2018.

Another form of private sector partnership is **linking plant clinics with agro-input shops**, either by having independent plant doctors operate at or near shops or by training the agro-input dealers themselves as plant doctors. This form of linkage has been tested most thoroughly in China but is now also occurring in a small number of cases in at least six other countries in Asia, Africa and the Americas. With the increasing integration of Plantwise training modules into existing courses, there are also opportunities to contribute to the standard training of agro-input dealers. In Costa Rica, for instance, some aspects of the plant doctor training have been embedded into a compulsory refresher course given to agro-input dealers by the Ministry of Agriculture as a requirement for renewing their credentials for handling and selling agrochemicals. This provides an opportunity to introduce resources like the Plantwise Factsheets Library, so as to increase their capacity to give good advice to farmers who look for technical support in agro-input shops.



In early 2018, **CABI and Koppert Biological Systems agreed to collaborate** to develop new plant doctor training content that would equip plant doctors with additional practical knowledge and skills related to IPM in smallholder farms. One of the motivations behind this small project, funded by the Koppert Foundation, was the observation of relatively infrequent recommendations by plant doctors of the use of biological control solutions as well as limited understanding of the negative interactions between pesticides and beneficial organisms by most farmers. The new two-day training was piloted with two groups of existing plant doctors in Kenya in 2018. An assessment involving both clinic data analysis and focus group discussions will be carried out in early 2019 to determine whether the training led to any changes in the recommendations that plant doctors make to farmers.

CABI also initiated a new collaboration with PEAT in 2018 to support and begin evaluating **image recognition software** called Plantix for its diagnostic capabilities. Using principles of pattern recognition, artificial intelligence and biometrics, tools like Plantix could provide immediate diagnostic assistance to extension service providers and farmers. CABI facilitated links to existing Plantwise partners in India with the key objective of 'training' the Plantix software to recognize selected key pests. In 2018, the trained 'photo hunters' collected more than 30,000 pictures of those pests. A group of trained 'photo validators' has been going through the images to confirm the identity of the target pests. These validated photos are now being used by PEAT to 'train' Plantix, after which it will be tested more rigorously in the field in 2019. Furthermore, CABI is also working with PEAT to assess the suitability of recommendations (e.g. regarding toxicity of pesticides) given in the advisory component of the Plantix app.

Through its diverse partnerships, Plantwise provided **capacity building for approximately 2,000 staff members of partner organizations** in 2018. Globally, there were over 100 Plantwise training events during the year, covering topics like plant clinic operations, ICT use, development of extension materials, Monitoring and Evaluation, and data management and use. The major contributor to this continues to be plant doctor training, with 1,555 personnel (30% female) from 23 countries trained in the Plantwise modules on field diagnosis and giving good advice. Only 3% of the plant doctor training in 2018 was led by CABI, with the rest (97%) being led by local trainers and with CABI staff present in a few cases in monitoring and backstopping functions. There was further ToT to build local capacity to train plant doctors, with 94 local trainers (29% female) attending ToT sessions in six countries in 2018. These and previous trainings helped drive or support a number of extension activities in the 30 active Plantwise countries, namely plant clinics, plant health rallies and MECs.

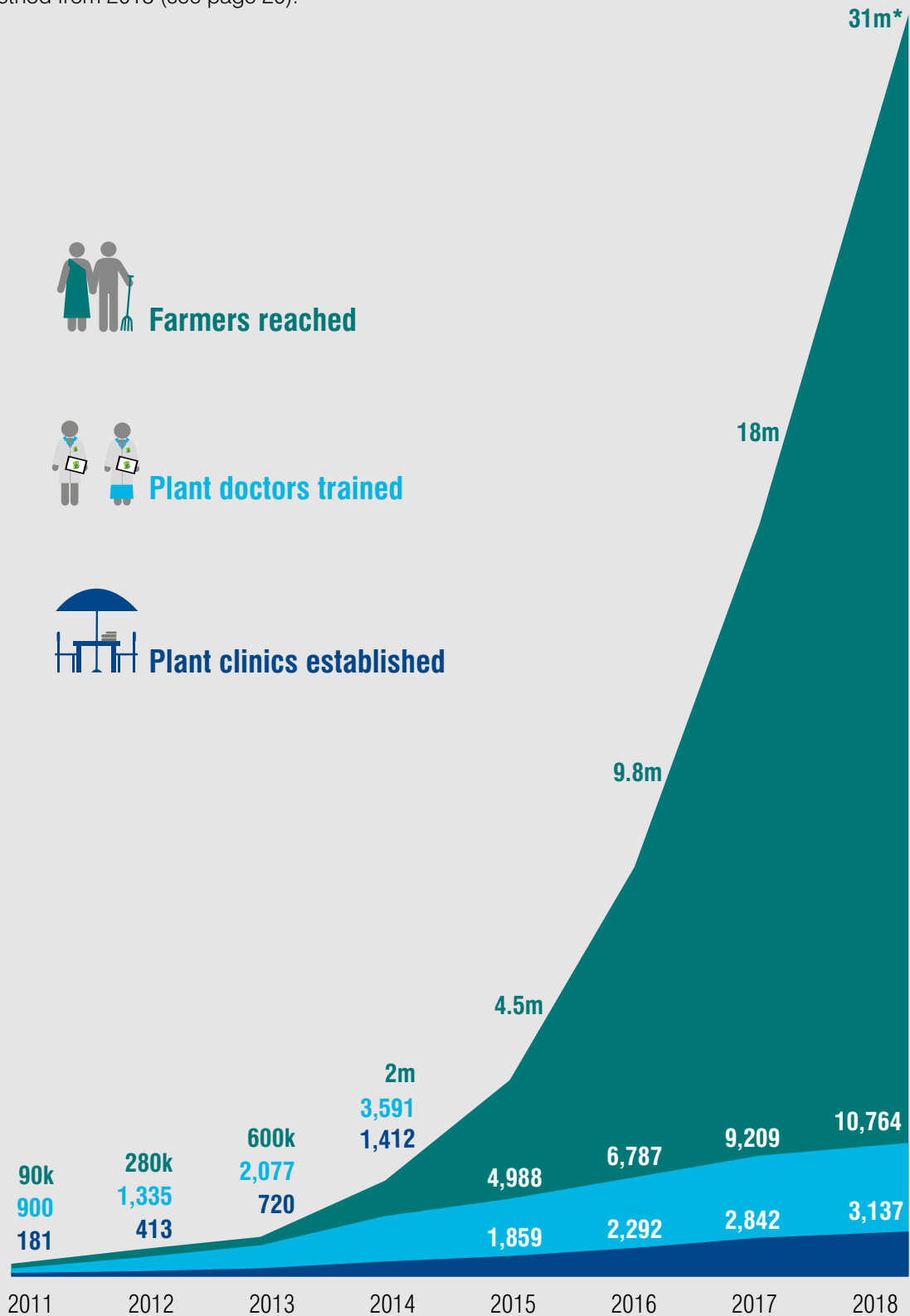
It is estimated that **2.6 million farmers were reached directly in 2018 through the combined activities of plant clinics, plant health rallies and MECs**. Based on plant clinic data recorded in POMS and supporting reports from partners, plant clinics handled 257,512 queries. This represents a 53% increase from 2017, with this expansion partly attributable to the 295 new plant clinics established in 2018. Approximately 20% of these queries were from women farmers globally but that proportion increases to 33% when the large dataset from Pakistan, which accounted for 31% of all clinic data in 2018, is removed. An estimated 72,100 farmers (30% female) received plant health advice through plant health rallies and similar outreach events like agricultural fairs and field demonstrations.

A number of MECs were also conducted as a way to reach larger numbers of farmers with information on common issues related to plant health. These **campaigns took place in 10 countries** in 2018 and varied in topic and approach. The communication methods used include radio, mobile messaging, community-based video screenings and social media. The reach could not be estimated for all of them due to limitations in the available data. However, based on what was possible, we estimate that these outreach activities reached around 2.2 million farmers. As in the previous year, radio was the most commonly used information dissemination channel, contributing to approximately 92% of the reach through MECs. While certain methods, such as radio, require broad reach estimates based on available national statistics, others such as mobile messaging and social media often allow for precise measurement of reach due to the availability of farmer profiles. Of the 178,592 cases where farmers' gender was known, 35% were women.

Based on studies conducted under Plantwise as well as other related literature, it is estimated that farmers share part or all of the advice they receive with an average of four farmers. This therefore means that the plant health advice delivered through plant clinics, plant health rallies and MECs reached a further 10,204,884 farmers through subsequent peer to peer sharing. The total reach in 2018 is 12,757,105, bringing the cumulative total reach since inception to 31.1 million.

## Delivering at scale

The programme's reach is determined through estimations of primary reach (farmers reached directly through Plantwise activities) and secondary reach (farmers reached indirectly, e.g. as a result of plant doctors operating outside of Plantwise and farmers receiving advice from peers who visited plant clinics). In addition to reporting cumulative numbers, reach will also be segregated by method from 2018 (see page 20).



\*Determined through estimations of primary reach (farmers reached directly through Plantwise activities) and secondary reach (farmers reached indirectly, e.g. as a result of plant doctors operating outside of Plantwise and farmers receiving advice from peers who visited plant clinics). Diagram not to scale.

**Table 2. Plantwise farmer reach in 2018 segregated by extension method**

Extension method	Farmers reached
Plant clinics	257,512
Plant health rallies and similar advisory activities	72,100
MECs	
Radio	2,042,677
Mobile messaging	133,350
Community-based video screenings	41,803
Social media (digital)	3,979
<b>Sub-total (direct reach)</b>	<b>2,551,421</b>
Farmer to farmer sharing (indirect reach)*	10,205,684
<b>Total (direct and indirect reach)</b>	<b>12,757,105</b>

\* Direct reach multiplied by four

By the end of 2018, 27 Plantwise countries were confirmed to have at least one **peer support group for plant doctors** facilitated by messaging apps (Telegram, WhatsApp, Facebook, WeChat, etc.). These groups were initially formed to enable plant doctors to interact with one another but in many cases the networks quickly expanded to include diagnostic experts and subject matter specialists for increased technical support. CABI often helps to establish one central social media group for a country. These groups can become quite large, such as has been seen in Kenya (355 members), Pakistan (528 members) and Bangladesh (1,036 members). A common development is that the plant doctors tend to also create more localized groups. Individuals with membership in multiple groups are able to share information across those groups. In some cases, such as in Costa Rica and China, plant doctors establish digital networks with farmers for effective, targeted communications. In China, a total of 4,283 queries was submitted to the social media group from the public in 2018, 60% of which were about pest control on vegetables and fruit trees.

There was only a small increase in the **use of plant clinic data by partners** from 2017 to 2018 in terms of the number of countries, with a total of 20 countries in 2018 compared to 15 in 2017. The known cases of use of plant clinic data include:

- **decision making for plant protection and extension activities**, such as factsheet development, extension campaigns or research in 12 countries (Afghanistan, Barbados, Burkina Faso, Costa Rica, Grenada, India, Jamaica, Kenya, Malawi, Peru, Rwanda and Trinidad & Tobago)
- **plant doctor assessment** to understand the quality of diagnosis and advice, and to identify training needs in eight countries (Bolivia, Cambodia, China, Costa Rica, India, Malawi, Myanmar and Pakistan)
- **monitoring the distribution and prevalence of pests** in five countries (Afghanistan, Burkina Faso, Ghana, Kenya and Uganda)
- **student thesis research** at universities in five countries (India, Kenya, Malawi, Rwanda and Uganda)
- **basic activity monitoring** and reporting in four countries (Ghana, Nicaragua, Peru and Uganda)
- **making decisions on farmer subsidies** related to use of 'green' agro-inputs in one country (China)

While the list of plant clinic data users is gradually increasing, data accessibility appears to remain a major barrier to wider and more varied use. Issues and activities around data sharing are discussed in the Knowledge Bank section below.







## Lessons learned

There have not been many significant changes to the **in-country coordination of Plantwise**. One country (China) set up its first national steering committee, while Myanmar and Pakistan held their first national level multi-stakeholder events. In total, 17 countries held national steering committee meetings or stakeholder forums in 2018. For the rest of the countries, reviews of progress and planning for 2019 activities were conducted through meetings with smaller groups of lead implementers. Plantwise activities were heavily scaled back in DR Congo and Sierra Leone in 2018 due to weak partnerships. The performance of the programme in the two countries will be reviewed further in 2019 for possible future re-engagement. In Latin America, minimal activities took place in Honduras, primarily due to lack of consistent and committed national leadership. However, there has been interest from stakeholders in using the Plantwise approach to reach indigenous people in remote regions of La Mosquitia in 2019. The reduction in budgets from donor funds resulted in fewer activities in countries such as Vietnam and Burkina Faso.

**Social media networks** continue to be attractive and effective information exchange methods among plant doctors. However, it is difficult for CABI and national partners to follow the use of social media by plant doctors and understand why some groups are inactive. Telegram, which is the messaging app preferred for use in Plantwise due to advantages such as high numbers per group and the ability to add 'bots' to extract the conversation narrative for analysis, has a higher cost of participation given the large numbers of photos posted. This makes it unpopular with plant doctors in some countries such as Uganda.

Besides linking plant doctors to in-country support, social media networks also provide a **novel channel for communication between plant doctors and CABI**, through which the UK-based Plantwise DAS established links to 16-country Telegram and WhatsApp groups. This allows for the monitoring of queries posted and provision of support where needed. In 2018, the DAS reviewed these groups on a weekly basis and provided support for diagnostic queries that had a photo attached and went unanswered for four days. Using this approach, the DAS dealt with 57 queries from eight countries.

Building on this precedent of CABI's diagnostic experts linking directly with plant doctors, CABI decided in 2018 to test a concept based on an earlier innovation reported by plant doctors in Ghana: to **provide training through the social media groups**. Rather than merely disseminating information, this was seen as an opportunity to test a new system for measuring plant doctor competence through an enjoyable and rewarding approach while also providing ongoing capacity building. A series of diagnostic 'quizzes' was initiated in mid-2018, with links to the SurveyMonkey site shared via the messaging app groups. The quizzes currently test plant doctors with diagnostic challenges involving a photo and a multiple-choice question. To make the experience rewarding for plant doctors, the correct answer to each question is given immediately after a response has been entered, with explanations of why each option was either correct or incorrect. A new quiz is issued each month with approximately 10 questions per quiz (initially only in English but now being translated into Spanish to increase reach and participation).

The main aim of the **plant doctor quiz** pilot is to test how well plant doctors respond to this approach of combined assessment and training, and whether it could become a reliable performance measurement tool. From the plant doctor networks initially included in the pilot, the number of plant doctors taking the quiz started off at around 200 but then subsequently dropped and held steady at around 100. Only five respondents actually took all five quizzes between August and December 2018. While the overall response rate is considered fairly average by social media standards, it has been lower than anticipated. CABI will continue to study the quiz results and user statistics in 2019 to see how this method could be used or adapted, e.g. to identify and respond to plant doctor training needs.

## Broader uptake and use of Plantwise information

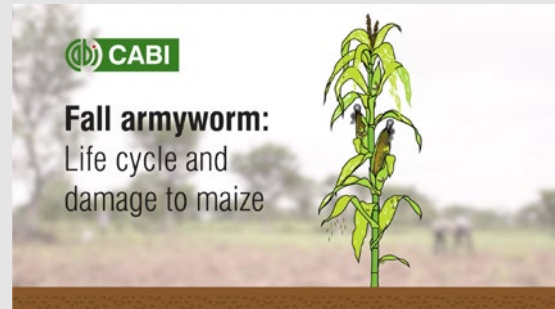
Beyond the primary and secondary reach Plantwise tracks and reports on (see Table 2), plant health advice generated by the programme is accessed and used by far more than just the target audience. For example, 55% of Knowledge Bank users in 2018 were based in non-Plantwise countries. Below are four examples of the programme's indicative reach via third-party organisations.

### Posters



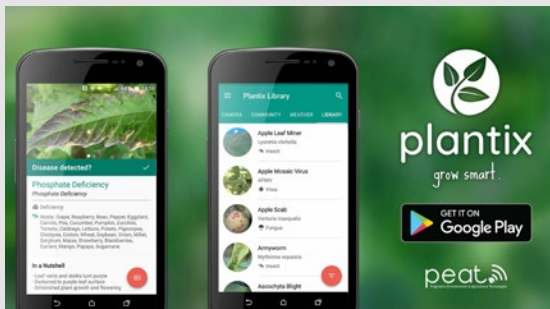
FAW identification posters and management guides are being distributed to **hundreds of thousands** of Sub-Saharan African farmers by FAO and USAID

### Videos



The 'Lifecycle of fall armyworm' animated video is being translated into Bangla by CIMMYT and will be used to train **hundreds** of agro-input dealers in Bangladesh

### Apps



Progressive Environmental & Agricultural Technologies (PEAT) uses Plantwise PMDGs in its Plantix crop advisory app, which has been downloaded over **5 million** times

### Mobile messaging



Precision Agriculture and OneAcreFund are using Plantwise recommendations for their interactive SMS messaging service for **300,000** farmers in Kenya



The plant doctor quizzes described above were conceptualized as a complement to the data validation process, i.e. as a way of introducing a **cost-effective quality assurance mechanism**. Data validation, in its current form, is a costly, time and knowledge intensive activity, which is the likely reason for its poor uptake by national partners. Most cases of partners using clinic data to assess plant doctor performance appear to involve a less rigorous process than the formal validation protocol. In nearly all cases, there is no reporting of the validation results or uploading them to POMS. The growth of many country data sets has made it difficult to keep pace with the amount of data that can be validated. CABI has been exploring avenues to streamline the manual process of data validation, such as sampling small numbers of queries from the clinic data or doing photo based validation using photos taken by the plant doctors. In some countries, the data validation process has been decentralized to spread the workload, based on the effective system of district-level validation in Pakistan. Unfortunately, this solution is not necessarily transferable to all other countries because the in-country experts with the relevant technical skills to do data validation are often too senior and too busy to invest any significant amount of time in this work.

However, it is clear that the ultimate solution would be to **automate the data validation process**. Producing algorithms that can mimic human expertise and replicate the results of an experienced human validator is extremely challenging, although certain aspects of validation would be easier to automate than others. Despite these difficulties, the benefits of an automated system are considerable and making it a reality continues to be a main area of focus. Various iterations of an automated system for validating diagnoses have been produced, with mixed results. The most successful model was one in which the sensitivity settings can be adjusted to establish a pass/fail threshold that matches a desired standard. However, for an automated tool to be able to assess a diagnosis, the name of the problem has to be entered into the system along with all the potential symptoms and descriptors associated with it. Therefore, there is currently only a subset of diagnoses that can be auto-validated. To date, auto-validation of recommendations has not been attempted beyond this initial trial.

Related to the subject of capacity building and quality assurance, an analysis of the **new dataset on pesticide recommendations** made it possible, for the first time, to have a large scale overview of the specific pesticides plant doctors were recommending to farmers and how well this conformed to the principles promoted through Plantwise and relevant international conventions. CABI conducted an initial analysis of this data set in 2018 to establish a benchmark for subsequent changes in the frequency with which plant doctors recommend any Plantwise 'red list' pesticides (<https://www.plantwise.org/RedList>). The various pesticide names (and their misspellings) were then used in 2018 to drive an automated search for the same terms in the 167,000 plant clinic records in a more recent portion of the global data set (June 2016 to May 2018). A comparison of these two periods showed that, overall, the proportion of recommendations that included one or more red list pesticides actually increased from 3.6% to 4.4% (a total of 13,483 cases of red list pesticide recommendations over the entire 6.5 year period). It is interesting to note, however, that this overall increase was driven mainly by very few countries that dominate the data set. Moreover, in some countries there tends to be a small number of plant doctors who recommend the majority of red list pesticides. In total, there were only four countries that had increases in frequency of recommendation with red list pesticides, each by 2 to 3 percentage points. In contrast, there were 11 countries that showed marked decreases in recommendations of these highly toxic control measures. The remaining countries had little or no change. Since red list pesticides continue to appear in recommendations to farmers by plant doctors in some countries, an exercise was launched in 2018 to work with partners to further reduce recommendations that involve the use of these pesticides. This activity will continue in 2019 and beyond.

## Next steps

A major theme for Plantwise going forward will be **quality assurance**, with a key focus on advisory services operating under the Plantwise banner. In addition to building the capacity of local partners to think critically about quality and put in place measures to perform quality checks, CABI will continue to test new ways of detecting and responding to knowledge gaps. In general, this is expected to go hand-in-hand with ICT development as digital technology use creeps deeper into the organizations involved in Plantwise. Concepts described above (plant doctor quizzes and automated validation of diagnoses and recommendations using low toxicity products), as well as other new tools (e.g. e-learning) and processes (e.g. streamlined data systems), will be gradually built through user-centred design processes.

While Plantwise has traditionally endeavoured to provide training and tools to cover a wide range of crops and associated problems – in line with the job descriptions of plant doctors – linking with **specific target groups and value chains** will necessitate more tailored support systems and services. This will likely mean a certain shift from 'broad tools for a specific user group' to 'specific tools for a broader user group', i.e. Plantwise interventions not only becoming less heavily focused on the formal advisory services but also including other key actors, such as stakeholders in agro-input supply and crop value chain operators and businesses.

With the frequent requests for Plantwise partnership by organizations both in and outside of the current programme countries, CABI will continue to test **new models of offering Plantwise** to meet emerging needs. The development of e-learning courses based on Plantwise principles and customizable service packages, including training and specific follow-up, are such examples. CABI will also continue its engagement with the private sector at the country and international levels, especially focusing on the needs for Plantwise sustainability. In relation to reducing the frequency of recommendations of solutions to plant health problems that include highly toxic pesticides, CABI will explore opportunities for engaging with agro-input supply chain actors and pesticide regulatory authorities to jointly identify and overcome barriers to making safer, higher quality products readily available to smallholder farmers.

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CABI will continue  
to test new ways  
of detecting and  
responding to  
knowledge gaps



# Knowledge Bank

## Progress in 2018

The focus of 2018 was to lay a solid foundation for the sustainability of the Knowledge Bank from 2020 onwards. A complete review of the 2014 Plantwise Knowledge Bank sustainability plan was undertaken, and the plan was updated in light of lessons learned over the course of the past four years. Major activities in the year were around commencing delivery to the Plantwise Knowledge Bank 2020 vision as identified in 2017 and included: a complete self-service data management system (collection, harmonization, validation, analysis and use); every Plantwise country being equipped with adequate tools to collect plant clinic data and access extension materials (i.e. the online Knowledge Bank and Factsheet app) and to develop and submit their own content (automated as much as possible); improved capacity for generating, curating and using data and information in everyday workflows throughout the plant health system, with increased recognition of the importance and usefulness of data and information in agricultural advisory service delivery; and use of available data and content linked to other CABI products and services (e.g. pest forecasting and support to pest surveillance).

In particular, ICT developments in 2018 focused on 1) building self-service data management tools, 2) troubleshooting the DCA, 3) designing/building mobile responsive online Knowledge Bank and POMS sites, 4) investigating automation of the quality assessment of plant clinic data, and 5) automation of workflows.

**Self-service data management tools** offered as part of POMS were improved to allow partners to fully control data management and enable 'consolidation' as per the criteria in the Plantwise sustainability roadmap. A new tool was also launched that allows users to re-harmonize data after submission to POMS and manage libraries of country specific clinic data, data quality and data analyses. This followed a user-centred design based on an internal analysis of re-harmonized datasets received from national data managers for manual processing, plus feedback on user requirements collected from national data managers via surveys on Telegram, Survey Monkey and/or face-to-face interviews in 2017.

An exploration of the possibility of automating harmonization of a portion of plant clinic data via **machine learning was initiated**. A series of structured experiments to assess the viability of this approach and compare the different cloud-based machine learning services will continue in 2019.



Over 2,000 plant doctors have now been trained to run over 1,000 **e-plant clinics** in 25 countries, including three Latin American and Caribbean countries (Grenada, Peru, Trinidad & Tobago) and Vietnam in South East Asia in 2018. All plant clinics in Kenya, Ghana and Bangladesh are now fully equipped with tablets. In nine countries (Bolivia, Costa Rica, Ghana, Grenada, Honduras, Jamaica, Malawi, Uganda and Zambia), some plant doctors also use their own digital devices for Plantwise work and required only training to get them set up to operate e-plant clinics. Over 47,000 plant clinic records and 46,000 photographs were submitted through tablets in 2018, with nearly 20,500 records submitted from the desktop version of the DCA. Despite submission of data through these digital processes, the inability to submit records using the DCA was reported by some plant doctors in the field. Assessment of the reported issues resulted in the ongoing rebuild of the app to allow greater flexibility and enhance its use. Four practical improvements (refresh button & progress bar; in-app update notification; upload existing photograph from gallery; implementation of Google Analytics) were also built into the revised app.

The continued increase in number of plant clinics leads to an increase in the number of plant clinic records submitted to POMS. This body of data offers several use cases, and efforts to promote **data sharing** by countries continue. In 2018, several Plantwise countries were assessed against a set of criteria to determine the best candidates for exploring how to promote data sharing. The tools and models, developed by CABI from another project supported by the Bill and Melinda Gates Foundation, were used to map data ecosystems in workshops conducted in two countries (Bangladesh and Pakistan) with the aim of identifying challenges and incentives for sharing data. A report from the workshop in Bangladesh was shared with partners at a subsequent national forum, resulting in the Additional Secretary in the Policy Planning and Coordination Wing of the Ministry of Agriculture emphasizing the need to review the national policy to identify any shortcomings that hinder data use and sharing and incorporate changes that would facilitate the use of data.

The use of digital devices to access content in the **online Knowledge Bank** continued to grow. In 2018 nearly 50% of online Knowledge Bank visits were via mobile devices – 60% from Plantwise countries. In parallel, emphasis was given to deploying digital services for use in plant clinics, with a vision to ultimately put a tablet into the hands of every plant doctor. As part of the vision to match digital growth, focus in 2018 was given to gathering user requirements to assess whether these warrant a redesign of the online Knowledge Bank.

Over 13,700 factsheets are now available through the online Knowledge Bank, with 3,250 specifically written within Plantwise available through the Factsheet library app. The Plantwise **Pest Management Decision Guide (PMDG)** model is an attractive information resource that is continuously used to develop spinoff projects, some supporting the development of more PMDGs for priority pests and countries or regions (e.g. the United States Agency for International Development's 'Feed the Future' initiative funding for a series of PMDGs on FAW, implemented under CABI's Action on Invasives programme).

As part of the plan to automate content workflows, automation of the **pest alert service** was completed in 2018. There were 218 new subscribers to the pest alert service, which represents a 70% increase from 2017. A link to this service was included on CABI's upgraded Invasive Species Compendium launched in September 2018, renewed by the Action on Invasives programme, as a result of which the number of Invasive Species Compendium subscribers increased significantly.

The largest spinoff project, the **UK Space Agency** funded PRISE, continues to generate much excitement and positive feedback from various stakeholders. Version 2, 'Knowledge', was released in November 2018, and the system has sent pest alerts on maize, tomato and bean to nearly 670 plant doctors and other extension workers in Kenya, Ghana and Zambia via an automated bot on Telegram – a tool already widely used by plant doctors – who then communicate the alert to farmers and provide associated diagnostic and management advice. Plant doctors also use plant clinics as an opportunity to get answers from farmers on the presence/life stage/impact of pests targeted by PRISE for reporting back to implementing teams via the Telegram bot. In addition, research is underway to create, calibrate and validate a variety of earth observation and pest models that drive the PRISE alert outputs. A number of field and laboratory trials are being conducted in all PRISE countries to create models for new pests and calibrate/validate models

already in use. PRISE partners Kings College London and Assimila are working on continual improvements to the satellite data downscaling and data sources driving the environmental parameters, which also include field trials on land surface temperature validation in partnership with ILRI and the Kenya Meteorological Department and, in the near future, the Zambia Meteorological Department will also be included. Deliverables of the PRISE project include annual releases of new versions with new features each time.

## Lessons learned

Challenges with data use by partners necessitated conducting a workshop in Bangladesh that identified some of the blockers even in a country that had signed an open data sharing agreement. As a result, a memorandum of understanding was developed to enable sharing of data between the Department of Agricultural Extension in the Ministry of Agriculture and the Department of Environment in the Ministry of Environment & Forests. Any improvements arising from this will be monitored in 2019.

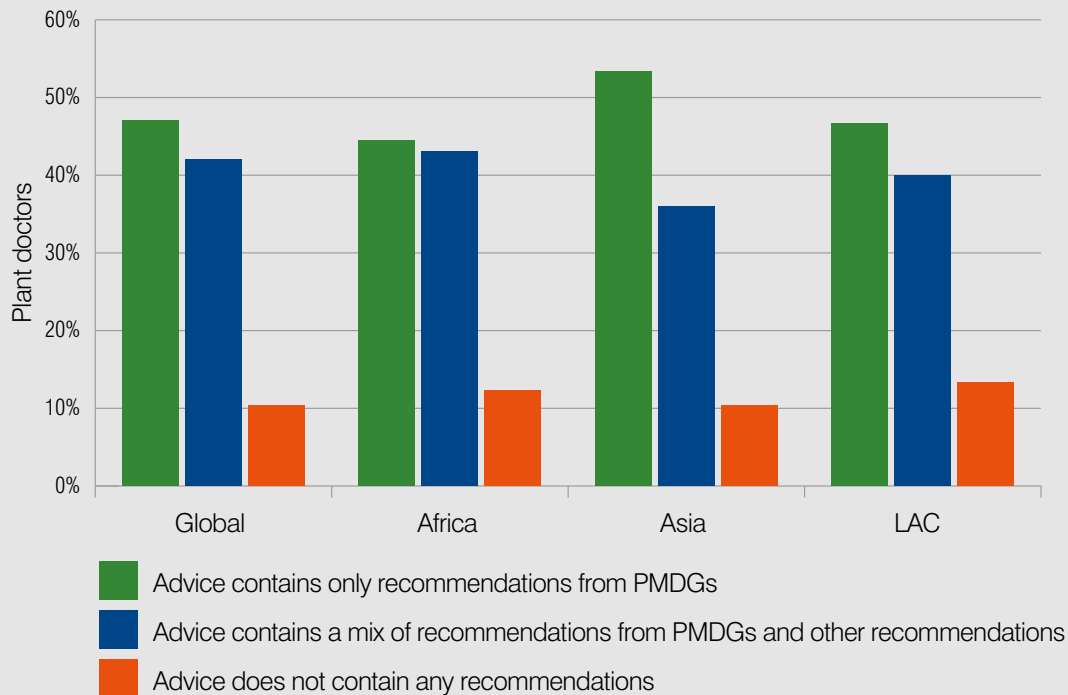
In 2019 there will be significant changes to the online Knowledge Bank site in response to the lessons learned about how users interact with tools that have been developed to support their work. By gathering user experience data on the Plantwise Knowledge Bank, CABI identified existing features that could be removed in the new design. Google Analytics enabled the identification of common entry points to the site. Users' main point of entry to the site is on Technical Factsheets, via a search for a pest or crop in a search engine. This information was used to create a new site for an enhanced user experience, decommissioning the previous home and country 'landing' pages.

In PRISE, a series of country level case studies continue to generate insights into how the service is used. Results of the studies will be used to shape the evolution of PRISE and feed into the upcoming midterm evaluation. Initial monitoring fieldwork carried out in Zambia and Kenya in late 2018 demonstrated how plant doctors are leveraging a variety of existing trusted information pathways (such as block agricultural supervisors, cooperatives and lead farmers) to share the pest alerts with farmers. Awareness of these pathways is informing future dissemination channels under PRISE in order to better address farmers' needs. In addition, qualitative findings from both countries demonstrate that farmers' awareness of pest life stages is encouraging them to undertake the thorough scouting and management practices necessary for reducing the damage caused on their crops.

## Plant doctor advice

Plantwise aims to equip plant doctors with information and resources that assist them in making accurate diagnoses and providing sound advice. The Plantwise Pest Management Decision Guides (PMDGs), which provide a full spectrum of prevention, monitoring and control measures for specific pests, have been very well received by plant doctors, who often demand information on latest technologies and best practice. A comparison was made of plant doctors' recommendations in plant clinic data with the content of PMDGs. In total, 23 PMDGs on invasive pests from 15 countries were analysed alongside 457 corresponding plant clinic records from those countries.

## Adoption of PMDG recommendations by plant doctors



## Highlights

**48%**  
of plant doctors  
included only  
recommendations  
from PMDGs in their advice



**62%**  
of recommendations from  
plant doctors who gave advice  
from mixed sources were  
aligned with the PMDG content



**81%**  
of all the specific recommendations  
given by plant doctors were according  
to the advice in the PMDGs





## Next steps

In 2019, CABI will deliver the Plantwise Knowledge Bank 2020 vision, and work alongside the rest of the Plantwise programme in developing the strategy and securing funding to sustain it as a core component of new projects.

Major activities include:

- rolling out the revamped DCA to all plant doctors running e-plant clinics. A matching desktop version of the app will also be rolled out to Plantwise countries
- launching the redesigned Knowledge Bank site
- building and releasing the new mobile responsive POMS
- continuing to experiment with machine learning, with a view to integrating any successful results into the resources for diagnostic support and data collection, including
  - expanding and deepening work on analysing and resolving blockers to data sharing, applying appropriate tools in additional countries
  - supporting partners through the full process of unlocking constraints to using their data, working with country partners to review and update extension materials, starting with the oldest content that has been on the Knowledge Bank since inception. Emphasis will be given to updating recommendations and improving monitoring/description sections as necessary and developing Knowledge Bank associated projects to sustain its activities, focusing in particular on projects that are complementary to Plantwise

For PRISE, the activities will include:

- developing additional dissemination channels
- reaching broader audiences
- developing both government and commercial partnerships to ensure the sustainability of the PRISE system so that it can be run as an independent, self-sustaining service after the project's funding ends
- introduction in two additional countries in sub-Saharan Africa

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In 2019 there will be significant changes to the online Knowledge Bank site in response to the lessons learned about how users interact with tools that have been developed to support their work

A photograph showing two men in green jackets sitting at a table. The man on the right is writing on a document with a pen. The man on the left is looking at the document. There are other documents and a map on the table. The background shows a window with a view of greenery.

# Monitoring and Evaluation

## Progress in 2018

In 2018, Monitoring and Evaluation work continued to focus on gathering evidence of the outcomes and impact of Plantwise along (i) the plant clinic advice adoption pathway and (ii) the plant health system change pathway. Several activities were undertaken, including finalization of an assessment using RCT design in Kenya, quasi-experimental studies in Rwanda and Bangladesh and various small-scale impact studies and impact stories from our partners in several countries. The major studies completed/initiated, including an independent quasi-experimental study in Pakistan that will be completed in March 2019, are outlined in Table 3.

An **analytical review** of the evidence of Plantwise outcomes and impacts was conducted and compiled into a single report. This has provided a **single document** that analyses the evidence of changes resulting from Plantwise interventions as an information resource. It presents an assessment of the reasons why these changes took place and lessons we can learn for future implementation. The report is currently being finalized and will be released in April 2019.

**Table 3. List of key studies based on plant clinic advice adoption and plant health system change pathways**

Pathway	Study	Indicator	Completion date
Plant clinic advice adoption	Impact study (RCT) (Kenya)	Change in crop loss through reduced pest damage Change in pesticide use Change in farmers' productivity Change in farmers' incomes	September 2018
	On-farm impact study (panel data) (Rwanda)	Change in crop loss through reduced pest damage Change in farmers' productivity Change in farmers' incomes	November 2018
	On-farm impact study (Bangladesh)	Change in crop loss through reduced pest damage Change in pesticide use Change in farmers' productivity Change in farmers' incomes	January 2019
	Assessment of motivations for repeat plant clinic visits (Kenya)	Change in pesticide use	December 2018
	On-farm impact study (Pakistan) (external evaluation)	Change in crop loss through reduced pest damage Change in pesticide use Change in farmers' productivity Change in farmers' incomes	March 2019
Plant health systems change	Role of Plantwise interventions and digital innovation in early detection and rapid response to pests and diseases (Uganda, Rwanda, Kenya)	Adoption of Plantwise approach (integrated extension response; data management)	January 2019
	Economic model of costs of FAW under different control regimes (Ghana)	Adoption of Plantwise approach (integrated extension response, use of plant health information for management strategies)	March 2019
	Analysis of use of ICTs in mass media dissemination of agricultural information (Uganda)	Adoption of Plantwise approach (integrated extension response and delivery)	April 2019



## A. On-farm impact study in Kenya

Final results from the 2014–2017 assessment of the impact of Plantwise by AIR consist of both quantitative and qualitative metrics and were delivered in 2018. Key findings were:

- Plantwise contributes to improvements in yields, crop-based household incomes and reductions in indiscriminate use of pesticides for farmers living in plant clinic catchment areas (i.e. within a radius of 1.5 km from a plant clinic)
- Plantwise is improving institutional coordination in national plant health systems, generating more knowledge and improving the likelihood of detecting and responding to pest outbreaks
- the process through which Plantwise is implemented is innovative and comprehensive, with programme interventions improving the knowledge of extension agents and the management of data, providing insights into where actions should be targeted in order to address plant health problems
- the monetary benefits of the Plantwise approach outweigh the costs of its implementation threefold (a benefit–cost ratio of 3:1) and an initial invested in in the programme would be fully recovered within two years (an internal rate of return of 54%)

This RCT was designed in such a way that all farmers within the catchment area of a clinic, of which only some (18% in the year preceding data collection) participated in clinics, were defined as the treatment group and farmers growing similar crops but outside clinic catchment areas or in areas with no plant clinics as the control group. The results in the infographic on page 35 show the positive effects on maize production for those living within the clinic catchment area. The control group is those farmers who grew maize but were not in a clinic catchment area.

**The 13% increase in the value of production** was mainly due to the increase in quantity produced, either due to increased production or a reduction in crop losses. The RCT demonstrated that farmers within plant clinic catchment areas are 4 percentage points more likely to practice IPM techniques such as crop rotation, removal of volunteer crops, plant health monitoring and removal of infested or damaged plant material. These farmers are also 8 percentage points less likely to use pesticides and 7 percentage points more likely to avoid chemical drift when they do spray pesticides. There was also an increase in the use of personal protective equipment by plant clinic catchment area farmers.

Qualitative evidence against the plant health system change pathway indicated that there is **improved institutional coordination** in the management of plant health, and it is the primary route for tracking pest and disease occurrences. The study concluded that the processes through which Plantwise is implemented are **innovative and comprehensive** and that the direct contact with farmers and the shifts identified in the plant health system are consistent with strengthening in the capacity of institutions to manage plant health.

## B. On-farm impact study in Rwanda (using panel data)

The quasi-experimental study conducted in Rwanda in 2017 concluded that plant clinic attendance significantly increased maize yield and productivity for farmers. In order to ascertain whether this was a one-off effect possibly related to the outbreak of FAW that occurred in the country during the cropping season under investigation, the study was repeated in 2018 with the same plant clinic users and the same group of farmers. The analysis used the data from both the 2017 and 2018 household surveys to allow assessment over time rather than just one cropping season. The attrition rate was only 1% and the study found that attendance at plant clinics significantly increased the appropriate use of crop protection technologies, which in turn resulted in **significant gains in both maize yield (24%) and net income (30%)**, calculated through a correlated random effect regression model. An assessment was also made of the likelihood of a household falling below the extreme poverty level, which concluded that there was a 5% reduction in this likelihood due to benefits arising from the use of plant clinic advice. Level of poverty was analysed through the Progress out of Poverty Index, an asset based poverty assessment tool. The analysed data from which these conclusions are drawn is presented in the infographic on page 34 Table 4.

**Table 4. Impact of plant clinics on maize yields and income in Rwanda**

Indicator	2017		2018	
	Clinic users	Non-users	Clinic users	Non-users
Adoption of pest control practices (1=yes)	0.99***	0.86	0.99***	0.95
Maize yield (kg/ha)	2061.44***	1502.97	3050.59***	2574.89
Maize production costs (RWF 1,000 /ha)	127.34***	87.16	223.64**	179.66
Net maize income (RWF 1,000/ha)	561.65***	374.53	429.91	418.95

Notes: Mean values between clinic users and non-users in the same year were tested for statistically significant differences. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively.

All the monetary values for 2018 were deflated to 2017 using the consumer price index obtained from the National Institute of Statistics of Rwanda.

RWF = Rwanda Franc. The exchange rate at the time of the survey was USD 1 = RWF850

### C. On-farm impact study in Bangladesh

The previously conducted quasi-experimental studies to measure the outcomes and impact of Plantwise focused on African countries but in 2018 one of the studies was undertaken in Bangladesh, with a focus on cucurbits, as the most common crop brought to plant clinics. A household survey was conducted with a total of 602 female and male respondents who had used plant clinics (n=226) and those who had not (n=376). Through the use of propensity score matching and nearest neighbour matching, the study concluded that users of plant clinics applied crop management practices that used a significantly higher number of pest control practices than non-users, potentially meaning that clinic users have an improved ability to manage plant pest and diseases. The study also concluded that the **average net farm income for clinic users growing cucurbits was about BDT 6,631,6631 (USD 79) higher than non-users (significant at 1% level).**

The study went on to explore household dietary scores and willingness to pay for plant clinic services. Dietary scores are often used as an indicator of the nutritional wellbeing of a household, providing a livelihood indicator beyond income. No significant variations were found in household dietary scores between users and non-users. However, there were significant differences in what households were prepared to pay for plant clinic services, with **clinic users being willing to pay slightly more (BDT 19/USD 0.23) than non-users (BDT 17/USD 0.20).** This was mainly due to their previous positive experiences in using plant clinics (88% of households fully implemented the plant clinic advice and 86% of users said they found the plant clinic advice very helpful). More male farmers than female farmers were willing to pay.

### D. Farmer participation at plant clinics

A study conducted in 2017/18 sought to, among other factors, determine through the use of quantitative metrics **farmer participation at plant clinics, motivation for repeat visits and factors influencing decisions on adoption of pest management.** Results showed that farmers were aware of pest problems on key crops and proactively sought management information from various sources. Key farmer motivations for repeat plant clinic visits are to seek more clarification on certain recommendations (50%) and to bring along a different crop/problem following the success of a previous recommendation (41%). Pest management was largely done by use of pesticides (over 60%) which was also reported to be on the increase due to pest outbreaks. Farmers presented current pest problems on their farms at plant clinics; therefore, it is understandable that plant doctors mainly recommend curative rather than preventive measures. However, results also show that a good proportion of farmers (36%), particularly clinic users, integrated cultural practices into their pest management practices. Similarly, model results with respect to decisions by farmers to adopt pest management practices showed a higher likelihood of preference for a combination of pesticide use and cultural methods by the more frequent users of plant clinics than one-time and non-users. This is an indication of the impact of the plant clinics in recommending sustainable pest management solutions.

## Plantwise impact in Kenya

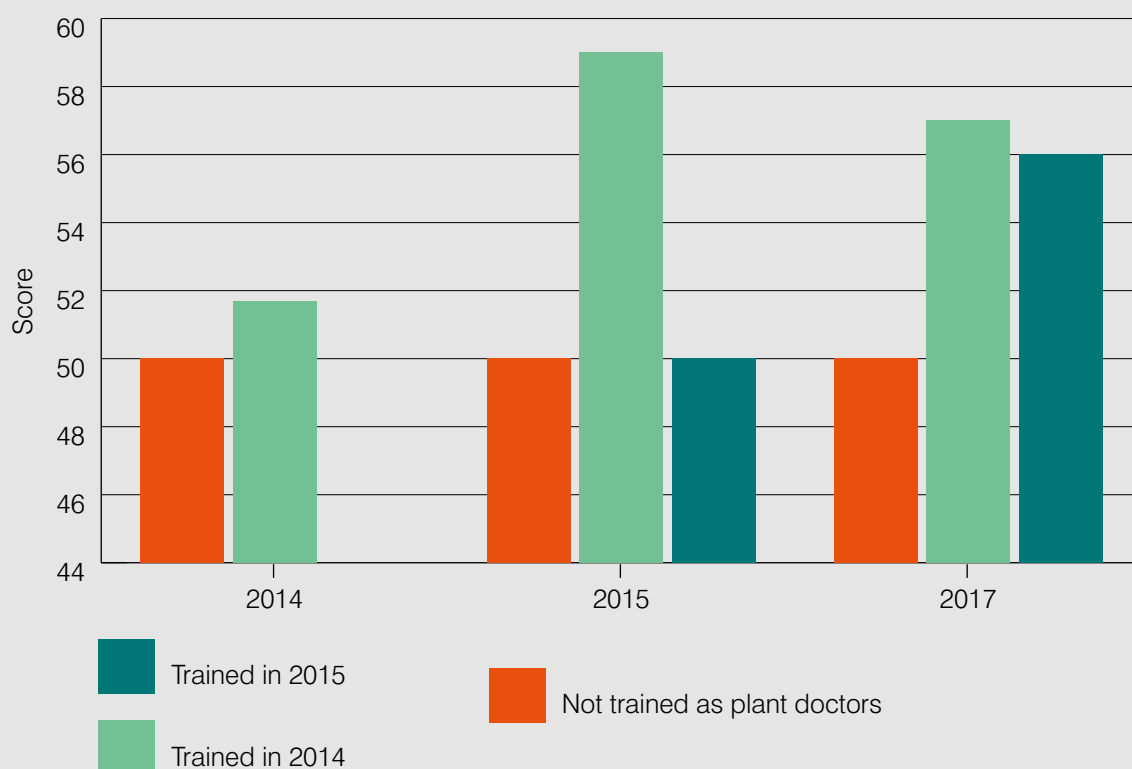
Results from AIR study in Kenya show that Plantwise contributes to improvements on yields, crop-based household incomes and reductions in pesticide usage for farmers living in plant clinic catchment areas. The study also demonstrated that that Plantwise training has a large effect on knowledge of extension officers. Those trained as plant doctors scored significantly higher than untrained extension agents.

### Impact on maize at 36 months

	Impact difference	Control median	Treatment median
Production	12%*	540 kg/ac	604 kg/ac
Value of production	13%*	16,200 \$/ac	18,306 \$/ac
Costs of production			
Seed	4%	2,360 \$/ac	2,454 \$/ac
Inorganic fertilizer	-11%	3,933 \$/ac	3,500 \$/ac
Pesticide	-18%	1,100 \$/ac	902 \$/ac
Labour	-3%	3,000 \$/ac	2,910 \$/ac

Notes: ac = acres. Monetary values in Kenyan Shillings. Programme impacts estimated in natural logs. Treatment median calculated from impact difference and control median. N = 1,460. \*p < .10

### Impact on plant doctor knowledge





#### E. Role of Plantwise interventions and digital innovation in early detection and rapid response to pests and diseases

The use of ICTs and social media networks by plant doctors has resulted in certain innovations that were not envisioned at the inception of the Plantwise concept as an agricultural extension model. Some of these arose as e-plant clinics were introduced. There has been some anecdotal evidence that the social networks that have been developed around the use of ICT tools and apps at plant clinics were allowing quicker diagnosis of emerging pests and diseases and enabling faster response by the plant health system in getting information to farmers. A study conducted in Uganda, Rwanda and Kenya sought to investigate these networks further and systematically gather evidence on outbreaks of three pests: maize lethal necrosis disease, tomato leaf miner (*Tuta absoluta*) and FAW. The findings showed that the adoption of ICTs and social media by actors within the plant health system **increases the speed at which information flows through the system, enabling new communication pathways besides also creating new data sources for tracking pest outbreaks**. In particular, the use of Telegram or WhatsApp groups by plant doctors has enabled horizontal communication between them to get assistance in diagnosis and pest management and allowed plant doctors to communicate vertically with researchers to report new pest situations and request diagnostic support. The social media groups in Kenya and Rwanda also helped plant health staff to understand how FAW was spreading through the countries. In Uganda, the use of image based recognition on maize lethal necrosis disease reduced the time taken to get information to the farmer from six weeks to three days. The study demonstrated that not only did the use of ICTs and social media reduce the time taken for information to flow through the plant health system but also enabled quick access to expert support and prompt feedback, as well as a reduced timescale for farmers to receive pest management advice. Such fast feedback and rapid system response can help farmers to avoid major crop loss.

A smaller scale study in Kenya looked at how Plantwise had become integrated into the agricultural systems of county governments and whether Plantwise had contributed to changes in agricultural extension and linkages between plant health stakeholders. The study will be finalized in 2019 but preliminary findings show that Plantwise has contributed to varying degrees of change among different counties covered by the study, also showing:

- enhanced interactions between extension staff who work at the same level, as well as with their superiors
- the provision of tablets to plant doctors has revolutionized how they work, encouraging them to seek information from wider sources for various uses (including academic training)
- the collection, analysis and use of plant clinic data is new to many extension staff but has made crop health reporting easier, with information readily available at hand
- the Plantwise approach has demonstrated the need to have a well-organized system for planning work

#### F. Results monitoring

In 2018 results monitoring was introduced in Plantwise activities in a small number of countries, with the aim of undertaking routine monitoring of key outcome and impact indicators. This had been previously demanded by some in-country partners. Results monitoring tracks the likelihood of impact by assessing intended changes brought about by Plantwise and will be implemented on an annual basis to enable the assessment of changes in indicators at particular points in time and over time through repeat measurements. An example of data from results monitoring in Malawi is presented in Table 5.

**Table 5. Indicator summary disaggregated by plant clinic use**

	Users	Non-users
Pesticide use (%)	65	21
Fertilizer use (%)	96	85
Manure use (%)	64	44
Used improved seed (%)	78	56
Cost of production (USD)/acre – partial		
Maize	126	66
Tomato	401	240
Value of production/acre (USD)		
Maize	179	141
Tomato	4724	2651
Value of sales/acre (USD)		
Maize	98	41
Tomato	3818	2314
Gross margin/acre (USD)		
Maize	52	75
Tomato	4322	2411
Yield (kg) /acre		
Maize	1546	1172
Tomato	18022	11979
Difficulty satisfying household needs (months)	1.3	2.4

This data shows a high proportion of plant clinic users apply chemical pesticides on their crops as compared to non-clinic users. The main reason for this is that by the time farmers seek advice at plant clinics, the crop health problem has reached an advanced stage such that applying pesticides is the only feasible and effective option. However, 77% of clinic users also applied cultural practices, as opposed to 49% of non-users.

## Lessons learned

The internal rate of return demonstrated by the RCT in Kenya was found to be higher than that achieved by similar research and extension programmes, showing that Plantwise is a cost-effective way to deliver advisory services to farmers. However, it also showed the need for further work to strengthen plant health systems, in particular in relation to data management and the institutionalization of data driven processes and decisions. One flaw in the methods used for this study was that detailed data were only collected for plot sizes larger than 0.032 acres, meaning that there were too few data points to analyse for crops such as tomato and kale, which are frequently brought to clinics. Other studies show that farmers which bring those high-value crops to clinics experience similar positive impacts as reported for maize in the AIR study.

In 2019, quasi-experimental studies, such as those in Rwanda and Bangladesh, will specifically target farmers bringing a particular crop to the clinic and therefore provide a method to collect data on those crops.

While a number of quantitative and mixed methods studies have now demonstrated the impact of Plantwise through the plant clinic adoption pathway, it is still challenging to demonstrate the effect on the system changes that are being reported. Further effort will be focused on capturing the effects of these changes, and assessing whether they are sustainable.

## Next steps

Monitoring and Evaluation work will continue its focus on providing evidence on the outcomes and impacts of Plantwise. However, due to the completion of the RCT designed study in Kenya that has provided comprehensive evidence of the impact of Plantwise, in 2019 the focus will be on more nuanced areas of impact. A detailed intra-household impact study will be undertaken, focusing on whether there are gendered differences in the impact of Plantwise. Previous studies have not shown any differences among genders, possibly because they have not focused on metrics at an intra-household level. There will also be a focus on demonstrating the value for money (VFM) in Plantwise, based on a few key indicators, and building on the cost-effectiveness work already undertaken. Building on preliminary work carried out in 2018 on the optimal coverage of plant clinics, attention will further be given to producing a comprehensive analysis of a selection of countries. This work will commence with a determination of what 'optimal clinic coverage' means for Plantwise's implementing countries. Work will also be conducted in the area of determining how plant doctors are using social media with the aim of better understanding the motivations for its rapid expansion in the area of plant health and identifying opportunities to improve it as a system for plant health information management. The ongoing studies will be completed, including the impact assessment in Pakistan that focuses both on change at farmer level as well as institutional changes with the aim of providing better measurement of the cost-effectiveness of Plantwise. The comprehensive analytical review to be finalized early in 2019 will be published and will provide one document where all pieces of evidence of Plantwise outcomes and impact can be easily sourced. The document will also highlight the key lessons learnt and the challenges that we have faced in implementing the programme.

Other studies will continue at country level to provide country specific evidence to complement what has been gathered by studies that have been conducted at programme level, as a way of enhancing local ownership and sustainability of the approach.

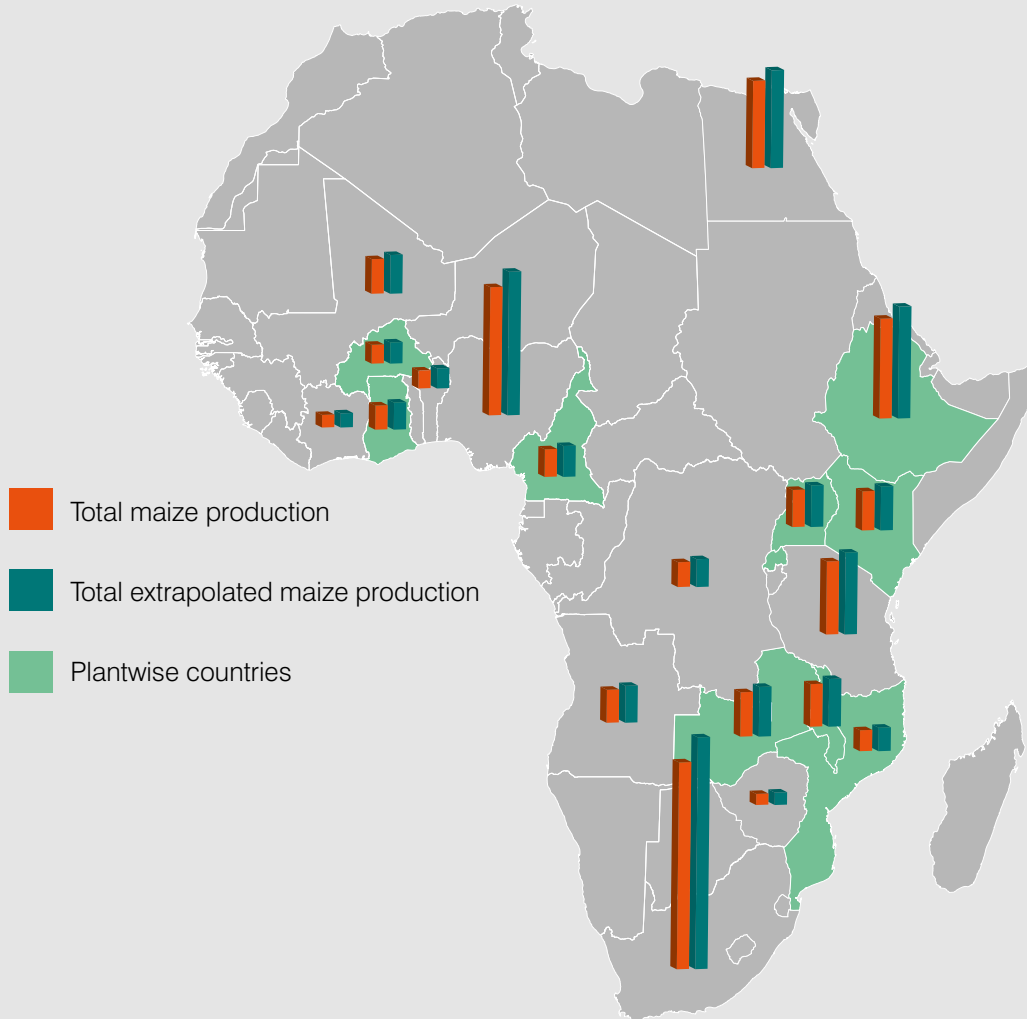
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Plantwise contributes to improvements in yields, crop-based household incomes and reductions in pesticide usage for farmers living in plant clinic catchment areas



## Extrapolating impact

Using the increase in maize production determined in the Plantwise Kenya impact study by AIR, the hypothetical increase in production can be extrapolated to all of Africa. This equates to an additional 3,233,947 tonnes of maize produced if all African Plantwise countries\* were to experience the same increase in productivity. This increase can be extrapolated further to include non-Plantwise African countries or all Plantwise countries globally.



\*Countries with maize production below 1m tonnes per annum not represented on map.

**Extrapolation for  
African Plantwise  
countries**

**+3.2m  
tonnes**

**Extrapolation for  
non-Plantwise  
African countries**

**+6.6m  
tonnes**

**Extrapolation for all  
Plantwise countries**

**+8.6m  
tonnes**



# Gender focused activities

## Progress in 2018

The gendered approach to the implementation of Plantwise continued in 2018, complemented by some research and analyses in the areas of increasing reach, training, working with national gender institutions and research. These focused on reaching more women, youth and minority communities, training women and youth in a variety of roles and working with national gender institutions.

### Increasing reach of Plantwise

In Pakistan and Afghanistan, the social norms in society strongly influence the way plant clinic services are delivered to female farmers. The five female only clinics that have been running in **Afghanistan** since 2017 continue to be the only place where female farmers can go to get plant health advice and so far have reached over 400 women. Two such plant clinics were launched in **Pakistan** in 2017 and three more were added in 2018, with a further three planned for 2019/20. These clinics have been found to provide female farmers with plant health advice besides empowering women in making decisions about agriculture, including the use of productive resources, time and farm income.

In **Rwanda**, Plantwise has started to link the plant clinics with the Farmer Field School/Twigire Muhinzi (FFS/TM) extension model, an innovative participatory and interactive learning approach that emphasizes problem solving and discovery-based learning and is particularly relevant for reaching women and young farmers as the key targets of the TM groups. In this arrangement, plant doctors run clinic sessions at the FFS or TM groups where they provide advice on plant health. This approach reaches multiple farmers in a short period of time and has the advantage of engaging with farmers when they are in their regular 'working' environment, as opposed to marketplaces. It also provides an opportunity **for plant doctors to reach a large number of farmers easily** where they are gathered for their TM group. Through working with these groups, the proportion of women farmers reached has increased from an average of 38% across all plant clinics in 2017 to 45% in the clinics that are working with the FFS/TM groups in 2018.

A similar approach has been taken in **Uganda** by working with existing groups to increase Plantwise's reach to women farmers. In the Uganda case, Plantwise is working with groups of women who produce quality seed of indigenous vegetables, using **plant clinic sessions tailored to provide advice needed for seed crop production**. In **Bolivia**, Plantwise has been working both with women's groups and indigenous groups to increase the reach and access to plant health advice in relation to specific crops that they grow, in particular potato.

## Training

CABI and its partners continue to involve youth and women in Plantwise in a number of ways and are increasingly exploring how to enhance employment opportunities and increase their knowledge and interest in agricultural enterprises. Plant doctors in **Peru** have encouraged **youth based plant clinics in areas with clinics by training them as ‘plant nurses’**, with the responsibility of using the tablet while the plant doctor talks to the farmer as a way of ensuring simultaneous attention to the farmer and entering his/her details in e-prescription forms. In **Cambodia** and **Thailand** Plantwise training also focuses on the **safe handling of pesticides by women farmers**, which is a key area of concern in South East Asia. In these trainings, practical demonstrations on the use of personal protective equipment are conducted. As a result, increased knowledge and awareness about the handling of pesticides, including designating storage areas and the effects on health, have been realized. In Bangladesh and Pakistan, the training of female extension staff has been transformative for them.

## Working with national gender institutions

As most countries in which Plantwise operates already have gender affairs offices or departments, including within their agricultural ministries, another approach to embedding gender within the programme has been to work with these institutions (e.g. women’s development and gender affairs offices in Ethiopia) to carry out targeted publicity about plant clinics coupled with siting clinics in areas that are suitable for women farmers to access and targeting crops that tend to be grown by women farmers.

## Research

Targeted gender research was undertaken in Sri Lanka to investigate the effect of Plantwise on female headed households in war affected zones. Analysis of the data generated is ongoing and results will be reported in 2019. Analysis of data in POMS is currently being carried out to assess attendance and cropping patterns and to determine if the notion that crops can be categorized by gender as women’s and men’s crops holds true. Preliminary results suggest that in some of the countries (Bangladesh, Nepal, Rwanda) women’s attendance at plant clinics is still well below their proportion of the agricultural labour force. In other countries (Vietnam and Thailand), the proportion of women attending clinics is almost equal to or higher than that of women stated to be working in agriculture. Our analysis has revealed that once plant clinics have been established in a country for a number of years, there is **a high correlation between male and female attendance**, meaning that any attempts to increase attendance numbers at clinics will affect both female and male farmers equally. An analysis of crops brought to plant clinics, segregated by the gender of the farmers, indicates that in all countries apart from Bangladesh there is **no difference in the crops brought by male and female farmers**. Generally, subsistence crops such as maize and paddy rice are more likely to be brought to plant clinics by women in some countries (e.g. maize in East Africa and paddy rice in India and Thailand) although it should be noted that opposite cases also exist, e.g. for maize in Ghana and rice in Nepal and Cambodia. A typical cash crop (e.g. cocoa) is also more likely to be brought to plant clinics by female farmers in Ghana. These analyses show the complexity of the gendering of crops and suggest that the assumption that some crops are associated exclusively with female or male farmers is erroneous.



## Lessons learned

From the work carried out in 2018, it is evident that a combination of approaches is necessary in endeavours to increase the reach of plant clinics to women and minority groups, with targeted clinic sessions with women or minority community groups increasing their access to plant health advice and knowledge of good agricultural practices. Once clinics are well established and functioning regularly in a country, any efforts to increase reach are likely to result in increased attendance of both female and male farmers.

On the other hand, engagement with youth seems to be more effective if it is approached from a training angle. Training youth to play a role in the delivery of services in plant health allows them to use their skills such as ICT knowledge for the benefit of farmers in various areas, and may be more attractive as an employment opportunity than direct involvement in farming.

## Next steps

Efforts will continue to be made to embed a gendered approach across all Plantwise activities. Learning about the best approaches to increase access to and involvement of women, youth and minority groups in Plantwise will be shared across countries to allow further testing and adaptation to local contexts. Engagement with in-country partners who are experienced in delivering gender focused change will continue and will be further developed, in addition to raising partners' awareness on the critical need to deliver services to women and minority groups working in agriculture.

the Plantwise blog (over 34,000) showed consistent growth year on year, while website visitors decreased slightly to 281,000.

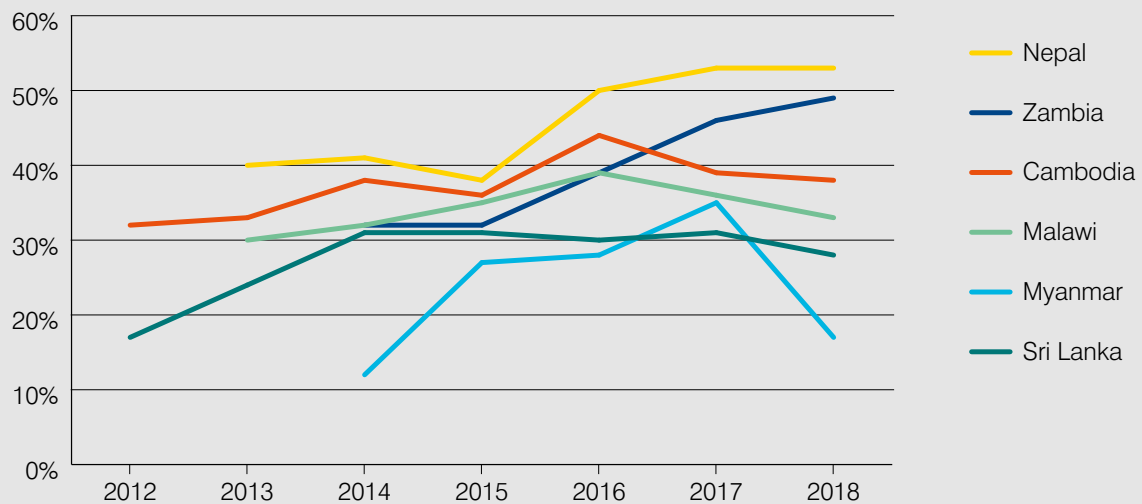
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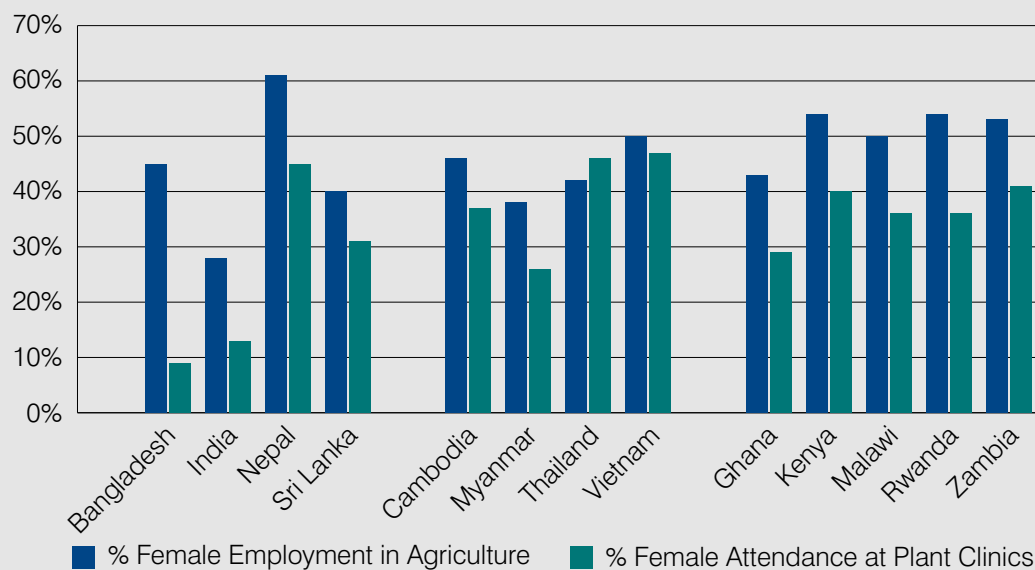
## Female attendance at plant clinics

Plantwise is not aiming for gender parity in plant clinic attendance but rather parity with the proportion of female employment in agriculture in each country. The first graph below demonstrate that thanks to gender focused activities, female attendance at plant clinics has been increasing. While it has even exceeded 50% in some countries, the second graph shows that further effort is needed. However, in some countries in Southeast Asia in particular, this parity with female employment has nearly been achieved.

### Proportion of female attendance



### Proportion of female farmers vs female attendance





# Medium-term opportunities

## The Plantwise Forward Plan

The Plantwise Forward Plan presents the approach proposed to sustain the programme using its demonstrated impact and value to stakeholders and also sets its context to meet evolving development and business needs. Building on lessons learned since 2011 and the potential of the Plantwise approach to service needs beyond plant health, the Forward Plan has incorporated activities addressing stakeholder needs (in both public and private sectors) under four conceptual areas:

### ICT and decision support tools in agriculture

Plantwise implementation has provided evidence that the use of ICT and decision support tools to disseminate information to farmers has the potential to transform small holder agriculture. Delivery of advice to farmers with concomitant data captured using ICT tools has enabled CABI to create an interactive database (Plantwise Online Management System) that provides a framework for pest alerts and rapid response. The tools also enable prompt delivery of information to large numbers of farmers when pest outbreaks occur, thus helping to minimize adverse effects on production. Using the tools to exchange information supports decisions for actions to manage new pest threats to agricultural production. Under the Plantwise Forward Plan CABI wishes to test the potential of these tools to benefit many more people under the expanded scope of Plantwise; this could include agro-inputs, soil fertility management, livestock production systems and nutrition. The scope will go beyond production to also consider applications that address interests in pricing of inputs and produce and needs of suppliers and logistics providers, thereby contributing to improved agri-food trade and food safety.

### Gender and employment creation for youth and women

Plantwise has continued to put effort into mainstreaming gender in its operations as one of the ways to respond to some of the challenges constraining realization of gender equity in access to resources. This has involved, in some cases, moving plant clinics to locations that are more suitable for access by women (e.g. in Ethiopia) and training female plant doctors to run women only plant clinics (e.g. in Afghanistan and Pakistan). However, a lot still needs to be done to achieve gender equity, despite women producing more than half of all food grown worldwide and constituting a large proportion of the global agricultural labour force. Despite being major contributors to household food security, nutrition, and dietary diversity, female farmers' yields tend to be 20-30% lower than male



farmers' due to skewed access to resources. Young people are similarly disadvantaged in a number of countries, with the greatest manifestation shown in their lack of decent employment. CABI will undertake initiatives specifically engaging in partnerships with other organizations already working with women and youth in agro-enterprises, for the purpose of introducing skills that positively impact gender equity in food security and poverty alleviation. Specific projects will be developed, building on some elements of Plantwise, to test opportunities in working with women and youth groups to scale up activities in technology based solutions and businesses in food supply systems.

## Sustainable and safe farming practices

Cognizant that inappropriate use of pesticides still poses health and environmental risks, Plantwise developed the Plantwise Pesticide Red List of pesticides that should not be recommended for use by farmers. The list contains high toxicity (World Health Organization class 1a and 1b) and/or other pesticides that have been banned or whose use is restricted through international conventions (i.e. the Stockholm Convention, Rotterdam Convention and Montreal Protocol). An analysis of plant clinic data in POMS has revealed that a few plant doctors in some countries still occasionally recommend pesticides with restricted use to farmers. Plant clinic data also show cases of plant doctors recommending the use of crude homemade concoctions to manage certain pests in some countries. Although the latter category may be popular with extension officers and farmers, these concoctions are generally of unproven efficacy and safety, besides lacking validated attributes as pest control products. Results of a baseline study revealed that nationally registered biocontrol products are not always included in the extension material compiled by national experts in the Plantwise programme. Even if biocontrol products are mentioned in the extension material used at the plant clinics, they are not frequently recommended to farmers by extension workers. In addition, extension officers, in their function as plant doctors, lack knowledge about biocontrol products and their use.

A plant protection baseline survey (funded by GIZ) in 14 countries (Benin, **Burkina Faso**, Cameroon, **Ethiopia**, **Ghana**, **India**, **Kenya**, **Malawi**, Mali, **Mozambique**, Nigeria, Togo, Tunisia and **Zambia**; Plantwise countries in bold) that studied the legal framework for pesticide management as well as practices for managing the major pests of selected crops in each country provided findings that confirm the continued availability of some of the restricted pesticides for use by farmers. Continued use of these pesticides results, among others, from inadequate awareness on the part of farmers and extension staff of the restriction on their use, lack of suitable alternatives in local markets and weak regulatory systems.

The unavailability of low toxicity alternatives, particularly biopesticides, in most countries is primarily due to low demand for them, occasioned by lack of awareness about their efficacy and unfavourable regulatory requirements that militate against their registration. As a result, there is little investment to develop business for the biopesticide industry in these countries.

CABI wishes to continue to work with stakeholders to facilitate registration of low-risk pest control products in some countries to improve access to these products by farmers. Information delivery to interested stakeholders on biological products will be further enhanced through promotion of the use of Biopesticide Portal.

## Agribusiness development

The risk to the in-country sustainability of Plantwise interventions, if these continue to rely solely on the public sector, has led CABI to explore partnerships that tap into the capability of private sector collaborators in implementing aspects of the programme or the use of some of its products to deliver some of the services in their businesses. CABI will test the potential for collaborators that see opportunities for Plantwise training of private sector agro-advisory service providers to build capacity for improved performance (e.g. in giving good advice to their customers). Under this arrangement, CABI will assess the potential to support the certification of agricultural production processes through quality assurance/audit for compliance with Good Agricultural Practice.



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**Lamontagne-Godwin J.**, Aslam, N., Dorward, P., Cardey, S. and **Ali, I.** An approach to understand local and national perceptions of a crop health advisory system in a decentralised setting. Submitted to *International Journal of Agricultural Sustainability*.

**Lamontagne-Godwin, J.**, **Williams, F.**, Dorward, P., Cardey, S. and Aslam, N. Institutionalising gender in rural advisory services through targeted extension initiatives. Submitted to *Journal of International Development*.

**Tambo, J.**, Uzayisenga, B., **Mugambi, I.**, **Bundi, M.** and **Silvestri, S.** Plant Clinics, Farm Performance and Poverty Alleviation: Panel Data Evidence from Rwanda. *World Development*.

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**Annex 1: Report on  
progress against 2018  
milestones**

General (2018)				
Key milestones	Timing	Status	Comments/progress	
Plantwise introduced in a total of 34 countries with at least eight countries in scale-up phase and a further 18 in consolidation phase	Q4	●	No introduction of the full Plantwise programme in more countries in 2018, so the cumulative total remains at 34; By end-2018, three countries in sustainability phase, 13 at scale-up, 13 in consolidation and one at pilot	
20 million farmers (cumulative, as measured through direct and indirect reach including plant clinics, plant health rallies and other extension campaigns) received plant health information	Q4	●	12,757,105 farmers reached in 2018; 257,512 through 2,887 active plant clinics (40,019 female, 161,926 male, 55,567 unknown), 72,100 through plant health rallies (16,712 female, 39,047 male, 16,341 unknown), 2,221,809 through MECs in 10 countries (gender unknown), and an estimated 10,205,684 through subsequent farmer to farmer sharing of information for a cumulative total of 31,107,105	
Plantwise private sector strategy implemented through pilot studies in four countries; Private sector plant clinics run in 11 countries (cumulative)	Q4	■	Key pilots for 2018 included: (1) business-based plant clinics with partial or full value chain service (China, India, Nepal, Vietnam); (2) business model for integrating Plantwise training content into a university or in-service curriculum (China, India); (3) linking commercial mobile messaging services with plant clinics (Sri Lanka, Vietnam); Private sector run plant clinics now piloted in 12 countries cumulatively (Nicaragua, Honduras, Bolivia, Jamaica, DR Congo, Sierra Leone, Ghana, Uganda, India, China, Vietnam, Nepal); Collaboration with Koppert Biocontrol Systems to raise awareness of IPM and biocontrol in Kenya	
Pilot and launch of paid for spinoff products/ services (e.g. Plantwise e-learning) – in at least three countries – to be agreed by EMT and Board – pilot H1 2018, launch H2 2018)	Q4	●	E-learning product (PestSmart Diagnostics) launched in October; signs of interest from several institutions, with universities as initial key target; market research launched in December for a complementary e-learning product: PestSmart Management	
2018 Plantwise annual report submitted to Plantwise donors	Q1	●	2018 Plantwise annual donor report shared with donors on 30 March	
Serious games – PestSmart Diagnostic Simulator (PDS) and Crop Management Simulator (CMS) disseminated to plant doctors through Google Play Store and uptake monitored	Q4	■	PDS now available on Google Play Store worldwide; Plant doctors with email addresses in POMS can access all levels for free by following a self-registration process while other users may play the first eight levels; Support contract in place with a third party development company overseen by CABI IT.  CMS was not playable due to a number of changes within the Play Store and some components being obsolete, but has been updated to make it playable again and is now available worldwide in the Play Store; Further investment will be required to be able to support CMS in the long term	



Annual Donor meeting and Plantwise implementation team meeting organized	Q2/4	●	Donor Forum meeting held in London, UK, on 3–4 May, with representation of DFID, SDC, DGIS, IFAD and the Chinese Ministry of Agriculture. Plantwise implementation team meeting held at Trademark Nairobi, Kenya, 12–16 November
15 publications submitted/published, five in journals with impact factor >2 (at least two of the papers having socio-economic focus; two with gender focus and three on ex post impact assessment)	Q4	●	11 published, two in press, three submitted and under review; of which, one in journal with impact factor >2, 10 with socio-economic focus, three with gender focus and two on impact assessment
One distinct MEC started in three countries; one m-Plantwise service launched and two services further scoped	Q4	●	MEC underway in Zambia on FAW using local and national radio and extension services; MEC also underway in Malawi using national radio on the topic of <i>Tuta absoluta</i> affecting tomatoes; MEC conducted in northern Ghana on FAW using village screenings and printed materials during the Jun–Aug planting season, with feedback assessed; MEC on FAW in one region of Uganda using video, radio and SMS completed with evaluation outcomes due in Q1 2019. m-Plantwise activities continuing in Kenya with ‘Precision Agriculture for Development’ on FAW, completed in Uganda with ‘Hamwe’ being scoped in Zambia with the government system ZIAMIS
Programme level analysis of Plantwise data conducted by CABI to generate further insights on gender, plant clinic operations, pesticide and alternative recommendations, etc.	Q4	●	Plant clinic data used to assess plant doctors’ recommendations for pesticides, particularly with regard to red list chemicals; country specific reports on red list chemical recommendations sent out to country coordinators in August with a request to work with country partners for solutions including the use of safer alternatives

## Knowledge Bank (2018)

Key milestones	Timing	Status	Comments/progress
Knowledge Bank funds of at least £500,000 generated with a net profit of £115,000 generated from affiliated projects for sustainability	Q4	●	£780,778 YTD (net revenue) – £128,141 net contribution from affiliated projects: EATH, STFC Integrating Advance Earth Observation, Cosmic STFC, GIZ Plant, Horizon Scanning tool, PMI, GCRF soils, Agri-Tech Centres Data Integration, BMFG AgDev Data, Parthenium, Aol, SciDev, CHAP, PRISE
Plant doctors and other relevant stakeholders using ICTs (e.g. tablets, POMS, Plant Doctor Simulation, Factsheets Library app) in 30 countries (cumulative). ICT use integrated into PHS responsibilities, e.g. for diagnosis, with appropriate follow-on plans	Q4	●	Cumulative to date: Factsheet app used in all Plantwise countries; POMS accessed from all Plantwise countries; plant doctors trained to use tablets in 25 Plantwise countries (four of these launched/piloted in 2018); Serious games used in several Plantwise countries; clear evidence of self-help communication groups being effective in improving diagnostics
Expanded business models developed through relevant engagement with planned CABl central content management system developments and initiatives	Q4	●	The Lucene search was turned off and the servers were decommissioned in January 2019; a new mobile responsive site will be launched in 2019 and all CABl products, including Knowledge Bank, will now use MarkLogic search profiles. So far, distribution database and UI development have commenced; linking to CABT and the structure of citations have been analysed and approved; phase 1 to be completed by Q1 of 2019
Tools and training provided to allow greater autonomy in data processing and analysis in 10 countries. Data harmonization occurring in 18 countries, data agreements signed with 25 countries; 450,000 plant clinic records on POMS being analysed in 20 countries	Q4	●	Build for self-service data management tools well underway and due to be completed by Q1 2019; data harmonized by 28 countries; 23 countries downloading clinic data; data sharing agreements signed with 30 countries (17 closed + 13 open); 505,120 plant clinic records on POMS (plus an additional 78,000 in China on their own systems)
High quality content supplied to all PHS actors in Plantwise countries using all appropriate means. 14,000 factsheets available on the online Knowledge Bank leading to 1.9 million visits and 500,000 sessions on the Factsheet app	Q4	■	13,790 factsheets available on the online Knowledge Bank; continuation of content development focusing on priority gaps, and publishing content produced and identified as part of the Action on Invasives programme; the Knowledge Bank's online visits now at 1.9 million visits; users are increasingly accessing the Knowledge Bank from Android and use on Windows is decreasing; 548,000 sessions on the Factsheet app to date

## Plant Health Systems Development (2018)

Key milestones	Timing	Status	Comments/progress
2017 country annual reports and 2018 country plans finalized for all active Plantwise countries	Q1	●	2018 country activity plans and associated budgets all finalized; 2018 country highlight reports all finalized; all multi-page country reports written
Action plans/studies developed with measurable outcomes to increase the involvement in and access to Plantwise by women and youth	Q2	●	Distinct gender focused activities were planned for most Plantwise countries; One outcome is measurable increases in female, youth and minority participation at plant clinics as a result of special interventions in Afghanistan, Bolivia, Costa Rica, Honduras, Pakistan, Peru, Rwanda and Uganda; There was an increase in training specifically for women and youth, in particular related to safe pesticide handling in Cambodia and Thailand; In countries like Bolivia, Brazil and Peru, youth were encouraged to participate in plant clinic operations and factsheet development, thereby increasing their knowledge and engagement
Partnership agreements signed with 32 key national partners (cumulative) and national coordination units (steering committee and/or national forum) operational in 25 countries (cumulative)	Q4	●	Seven new partnership agreements signed (ET, MW, HN, PE, IN, LK, PK) and four new partnership statements signed (BD, CR, NP, NI); In total, more than 40 partnership agreements signed with key implementing partners; 22 steering committee meetings and eight national forum meetings held in 17 countries since the start of 2018
Plantwise activities written into official governmental documents and/or supported by partners' official budgets in 29 countries (cumulative)	Q4	■	Official budget contributions totalling £3.28 million from partners in 27 countries during 2016 to 2018 (excludes partner staff time and other in-kind contributions) cumulative; £1.1 million from 23 Plantwise countries in 2018 alone; SOPs drafted by Kenyan partners and to be gazetted as good practice nationwide; Job descriptions for Ugandan government extension workers modified to include plant clinic duties
Analysis developed to determine optimum coverage levels for plant clinics in a country	Q1	●	Initial analyses done for India, Myanmar and Kenya to test different approaches for joint discussion with partners; General process for facilitating this joint process drafted; Actual spatial clinic coverage analysed using clinic data for 16 plant clinics across 10 countries as a starting point for assessing coverage
Plant clinic data used by national stakeholders for monitoring and decision making in 14 countries (cumulative)	Q4	●	Data use reported from 20 countries in 2018, with six broad categories of use: <ol style="list-style-type: none"> <li>1. decision making for plant protection and extension activities, such as factsheet development, campaigns or research (12 countries)</li> <li>2. plant doctor assessment to understand quality of diagnosis and advice, and to identify training needs (eight countries)</li> <li>3. monitoring distribution and prevalence of pests (five countries)</li> <li>4. student thesis research at universities (five countries)</li> <li>5. basic activity monitoring and reporting (four countries)</li> <li>6. making decisions on farmer subsidies related to use of 'green' agro-inputs (one country)</li> </ol>



Indicative evidence of responsible use of biopesticides for control of invasive pests, as indicated by the number of countries adopting PMDG advice	Q4	●	PMDG advice for the management of invasive pests taken up by plant doctors, with variation by country and by pest; 23 PMDGs were analysed from 15 countries addressing 16 invasive pests; From 457 POMS queries examined, 48% of the plant doctors gave advice fully aligned to the PMDGs while 10% gave advice with no overlap with the PMDGs; The remaining 42% of plant doctors gave advice that was partially aligned with the PMDGs, with roughly two-thirds of their specific recommendations matching PMDG recommendations; Final report is available
Plant clinic schemes consolidated and expanded with an additional 200 new plant clinics established (3,000 cumulative)	Q4	●	295 new plant clinics established (3,632 cumulative, of which 2,887 are considered active)
800 new plant doctors (10,000 cumulative) trained in Modules 1 and 2, increasingly through the ToT process	Q4	●	1,555 people (30% female) completed the plant doctor training, 97% of which was conducted by national trainers; This makes 10,101 cumulative, of which 5,016 are believed to be active in their original or similar roles
250 facisheets/PMDGs developed and locally validated	Q4	●	175 PMDGs, 91 facisheets for farmers and seven diagnostic photo sheets drafted by local partners. Centrally produced, comprehensive photo guides for key pests and diseases on 11 major crops finalized and uploaded to the Knowledge Bank
Two new approaches tested for assessing plant doctor knowledge and providing feedback to facilitate learning (as part of quality assurance)	Q4	●	(1) A series of monthly plant doctor quizzes designed to test and quantify the knowledge of plant doctors, with five issues released between August and December; Response rate of initial quizzes was around 10% but subsequently fell below this and remained steady at around 100 respondents per month. (2) An Excel-based tool designed to automate part of the data validation process was tested against the outputs of human-based validation of diagnoses, with results showing that the automated tool can provide similar results on most diagnoses, depending on the settings applied and the specificity of the diagnoses
Finalize content development for e-learning product based on Module 1; develop supplementary plant doctor training on pesticide risk reduction with Koppert Foundation and pilot in Kenya	Q2	●	Content development for the e-learning product completed and now undergoing thorough checking; Curriculum for training on pesticide risk reduction completed and piloted in two trainings in March/April, and project report shared with Koppert for follow-up

## M&E (2018)

Key milestones	Timing	Status	Comments/progress
Evidence of outcome and impact reported for male and female farmers on adoption of appropriate practices, including better pesticide use, productivity change, crop loss avoided, and income change through quasi-experimental study in two countries; further 20 CCC-led case studies conducted to provide supporting evidence of impact	Q3/4	●	Three on-farm impact studies utilizing quasi-experimental approach conducted: Rwanda (repeat study using panel data from 2017 and 2018, paper submitted for publication); Malawi (study from 2017 published as CABI Working Paper 11) and Bangladesh (preliminary analysis completed, write up to be finished early 2019). 19 case studies initiated/completed in: Asia – Myanmar case study complete; final drafts of two EoI studies from Nepal under review; results monitoring completed in Vietnam (write up will be done when more than one season of results measured); analysis completed for Sri Lanka study Africa – Ghana, Malawi and Zambia case studies complete; draft report of a second case study from Ghana to be finalized in Q1 2019; Kenya, Ethiopia, Uganda case study reporting to be finalized in Q1 2019 LAC – Nicaragua case study 21 finalized and published on the website; Bolivia, Jamaica and Peru case studies in draft; Data collection ongoing for Barbados, Nicaragua and Costa Rica
Cost-effectiveness and VFM of plant clinic extension approach studied and reported – one journal paper comparing Plantwise with other approaches completed	Q1/Q4	■	AIR-led cost-benefit analysis of Plantwise Kenya completed, showing a ratio of 1:2.9; submission of cost-effectiveness paper developed using ASHC funding delayed to 2019; collection of cost data for benefit-cost ratio estimations using data from Pakistan QE study initiated; cost data collected from Bangladesh as part of cost-effectiveness analysis. VFM specialist recruited and will start work in Jan 2019
IFAD special study conducted – outcome evaluation of Uganda MEC, including assessment of the potential to crowdsourcing data using ICT as part of media initiatives	Q3	●	Fieldwork in Uganda completed, descriptive analysis underway, further analysis and writing to be carried out in Q1 2019
Reports/paper completed on the impact of Plantwise interventions on plant health system performance and responsiveness in two countries	Q1	●	Evaluation reports from Nepal and Ethiopia completed and shared; journal paper drafted for submission in Q1 2019
Conduct two bioeconomic modelling studies to quantify the outcomes and impacts of loss prevention due to action on one pest	Q4	■	Economic model of costs of FAW under different control regimes in Ghana completed, paper drafted and shared for review; second study not possible this year

Evaluation of ICT use in data collection and use (IFAD study) conducted in East Africa with a focus on IFAD countries – Kenya, Uganda, Rwanda and Mozambique	Q4	●	Draft report with technical writer/editor, addressing varying contributions of Plantwise to pest detection including use of POMS data and Telegram networks
Plant clinic, special study and other data analysed to understand profile of farmers visiting clinics, disaggregated according to sex of farmers with estimated farm area addressed	Q4	●	Farmer profiling study complete and Research Brief8 produced; farm area addressed and note on land area extrapolation produced and shared
Analytical review to consolidate overall programme outcomes and impact since inception	Q4	●	Final draft with technical editor. Full report and summary version to be submitted for production late January 2019
Plantwise external impact assessment (by AIR) analysis and results available for the Plantwise Donor Forum Draft report of final data collection for AIR study and journal quality paper 1 (Plantwise Wisdom); paper 2 (data use) and paper 3 (impact) to be delivered by end Q3	Q2/Q3	■	Impact assessment completed; external summary document and final report published; results shared with Kenya steering committee in November; preliminary findings presented at the seventh Donor Forum meeting in the UK; papers to be delivered in 2019
Impact assessment underway in Pakistan according to Evaluability Assessment guidelines. Study progress report available for Donor's Forum. Complete findings by end of Q4	Q2/Q4	■	Fieldwork completed and analysis underway; draft report expected early March 2019
<p>● - on track    ■ - minor delay    - major delay</p>			



# Annex 2: 2019 milestones





<b>General (2019)</b>		Timing
<b>Key milestones</b>		
Plantwise introduced in a total of 34 countries and active in 29 with at least 16 countries in scale-up and sustainability phases and a further 13 in consolidation phase		Q4
40.5 million farmers (cumulative, as measured through direct and indirect reach including plant clinics, plant health rallies and other extension campaigns) received plant health information		Q4
Private sector plant clinics run in 13 countries (cumulative) including plant clinics operational for three value chains		Q4
2018 Plantwise annual report submitted to Plantwise donors		Q1
Annual Donor and core Plantwise implementation team meeting organized		Q2/4
15 publications (using gender disaggregated data) submitted/published; all in open access, 10 of which with a development focus, five in journals with impact factor >2		Q4
Three distinct MECs started in nine countries (cumulative); three m-Plantwise services launched (cumulative) and two services further scoped		Q4
Analysis of Plantwise data conducted to understand plant clinic coverage for more informed planning of clinic establishment		Q4
Use patterns in recommendations by plant doctors to design interventions on pesticide risk reduction from analyses of data in POMS		Q4
<b>Knowledge Bank (2019)</b>		
<b>Key milestones</b>		Timing
Integrate Knowledge Bank funding into Plantwise 2.0 project proposals; incorporate digital innovation to build support for infrastructure in new funding proposals to ensure the Knowledge Bank's sustainability; continue to seek spinoff projects that contribute to further development of Knowledge Bank products essential for effective delivery of Plantwise activities		Q4
Plant doctors and other relevant stakeholders using ICTs (e.g. tablets, POMS, Plant Doctor Simulator, Factsheets Library app) in 29 countries (cumulative). ICT use integrated into PHS responsibilities, e.g. for diagnosis, with appropriate follow-on plans		Q4
Tools and training provided to allow greater autonomy in data processing and analysis in 15 countries. Data harmonization occurring in 18 countries, data agreements signed with 29 countries; 620,000 plant clinic records on POMS being analysed in 25 countries		Q4
High quality content supplied to all PHS actors in Plantwise countries using all appropriate means. 14,000 factsheets available on the online Knowledge Bank, leading to 1.9 million visits and 500,000 sessions on the factsheet app		Q4

<b>Plant Health Systems Development (2019)</b>		
Key milestones		Timing
2018 country annual reports and 2019 country plans finalized for all active Plantwise countries		Q1
Gender disaggregated reporting and analysis in 29 (all) countries and gender specific activities initiated in at least two countries to further increase women and/or youth participation in delivering and accessing advisory services		Q4
Partnership agreements signed with 36 key national partners (cumulative); national coordination units (steering committee and/or national forum) operational in 25 countries (cumulative)		Q4
Plantwise activities written into official governmental documents and/or supported by partners' official budgets in all 29 countries where the programme is active		Q4
Aim to achieve the use of plant clinic data by national stakeholders for monitoring and decision making in 19 countries		Q4
Plant clinic schemes consolidated and expanded with an additional 200 new plant clinics established (bringing cumulative total to 3,500)		Q4
800 new plant doctors (11,000 cumulative) trained in Modules 1 and 2, increasingly through the ToT process		Q4
150 factsheets/PMDGs developed and locally validated		Q4
Improved measures for quality assurance of diagnoses and advice by plant doctors identified and tested		Q4
<b>M&amp;E (2019)</b>		
Key milestones		Timing
Evidence of outcome and impact reported for male and female farmers on adoption of appropriate practices, including sustainable pesticide use, productivity change, crop loss avoided, and income change through: One quasi-experimental study in one country: Further 10 CCC led studies conducted to provide supporting evidence of impact		Q4 (for all)
Cost-effectiveness of plant clinics and other extension approaches studied and reported: One journal paper addressing cost-effectiveness of different extension approaches Report on cost-effectiveness of MEC methods in Uganda in 2018 Cost-benefit analysis of clinics concludes from studies conducted in Kenya, Rwanda, Bangladesh and Pakistan		Q3
Publish Plantwise impact report		Q1
Impact assessment in Pakistan – complete final reports and publications		Q2

Complete technical editing of three evidence reports to produce outputs for the CABl series (working papers/case studies/research briefs). At least one as a Research Brief (IMPACT) contributing to indicator 2.3	Q4
Complete publication of journal paper on the AIR Plantwise impact assessment in Kenya	Q2
VFM analysis of a set of CABl key performance indicators conducted in a number of countries involved in Plantwise implementation; to include comparative VFM analyses reported for x1 country each in sustainability, scale-up and consolidation phases of sustainability roadmap	Q4
Complete bioeconomic modelling FAW study in Ghana	Q2
<b>Fundraising and Market Development (2019)</b>	
Key milestones	Timing
Plantwise and Action on Invasives programme funding of GBP 15 million for 2019–2021 secured from existing and new donors (inc. DEVCO-DeSIRA), under Plantwise Forward Plan	Q4
Plantwise 2.0 model used to secure funding from at least three public or private organizations paying for Plantwise services in existing/new countries	Q4
Awareness raising conducted with donor country desks in Africa and Asia to ensure ownership and linkages to other relevant initiatives as well as local support to Plantwise collaborators	Q4





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	50	212 (200)
Plant doctors trained	110	443 (401)
PMDGs drafted	10	43
Factsheets drafted	10	56

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Plant Protection and Quarantine Directorate (PPQD), Ministry of Agriculture, Irrigation and Livestock (MAIL) – National Responsible Organisation (NRO); also responsible for national data management and provides diagnostic support

National Horticulture and Livestock Project (NHLP), MAIL – Local Implementing Organisation (LIO)

Department of Agriculture, Irrigation and Livestock (DAIL) – LIO; also supports in data management and M&E

The Danish Committee for Aid to Afghan Refugees (DACAAR) – LIO

Agha Khan Foundation Afghanistan (AKF) – LIO

## 2018 highlights

- Funds (£23,000 and £5,000) allocated to Plantwise activities by the NHLP and AKF respectively
- National trainers conducted 'Module 1' (giving good advice) and Module 2' training (giving good advice) for 110 plant doctor trainees (two female, 108 male)
- National trainers conducted plant pest identification and management training for 15 participants from the MAIL call centre (three female, 12 male)
- Facilitated the establishment of 50 new plant clinics, for a total of 200 active plant clinics
- Conducted 'extension messages' training (producing extension materials) for 11 participants (11 male), leading to the development of 10 new PMDGs, 10 factsheets and five photosheets
- CABI trainers conducted 'monitoring plant clinic performance' training for 11 participants (11 male)
- CABI trainers conducted 'Data Management' training for eight participants (eight male)
- National partners taking the lead on clinic data management
- CABI trainers conducted 'e-plant clinic' training for 12 participants (12 male) to enhance data collection and improve access to extension materials
- Facilitated the establishment of an in-country governance system, with the national steering committee (NSC) meeting twice in the year
- CABI country coordinator conducted two data sharing and use workshops for 65 participants (65 male) from central and provincial departments
- Four plant clinic cluster meetings held with the participation of 110 plant doctors (110 male)
- Facilitated the entry of over 5,000 plant clinic queries into POMS
- Local partners are using the administrative information in POMS to track activities
- Promoted use of ICT tools (DAC, factsheet library, plant doctor simulator and crop management simulator) for PPQD, NHLP and DAIL
- Promoted gender awareness among partners and the participation of women and youth in the programme through the establishment of six women-led plant clinics that provided plant health advice to 442 female farmers

## Key challenges and lessons learned

- The introduction of e-plant clinics led to increased plant clinic activity, as well as increased use of tablets at field level
- The desktop version of the DAC supported the plant clinic data entry directly from the provinces, which contributed significantly in streamlining the data management process
- Despite the fact that data managers are facing infrastructural challenges such as lack of electricity and disrupted internet connections, they are very committed to ensuring a streamlined data collection process
- In order to increase plant clinic data sharing and use, the Plantwise steering committee decided that plant clinic data must be shared regularly with the PPQD, research, extension and statistic divisions, and various university departments
- Persistent precarious security conditions in some areas continue to jeopardize plant clinic operations and the feasibility of running plant health rallies (PHRs)



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	30 (30)
Plant doctors trained	16	236 (40)
PMDGs drafted	10	79
Factsheets drafted	0	50

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture (MoA) –NRO

Plant Protection Wing (PPW), Department of Agricultural Extension (DAE) – LIO

NATP2 (project implementation unit), DAE – Supports integration of Plantwise in Farmers Information Advisory Centres (FIACs)

Bangladesh Agricultural Research Council – Member of steering committee and National Forum

## 2018 highlights

- Obtained a signed partnership agreement from MoA and PPW (renewal)
- Obtained a signed data sharing agreement from PPW
- Obtained a signed partnership statement from NATP2 for the integration of Plantwise approaches in FIACs
- Conducted one national forum and one district director meeting to review progress and discuss implementation of the NATP2–FIAC collaboration
- National trainers conducted 'Modules 1 and 2' trainings for 16 staff (two female, 14 male) from NATP2
- National trainers conducted 'e-plant clinic' trainings for 18 staff (two female, 16 male) from NATP2
- Conducted 'e-plant clinic' training for 11 participants (two female, nine male) to introduce use of digital devices at plant clinics operated by PPW
- Conducted 'e-plant clinic' training for 51 NATP2 officials (15 female, 36 male) to introduce use of digital devices at FIAC plant clinics
- NATP2 facilitated training by national trainers on 'e-plant clinics' for 20 staff (nine female, 11 male) from the FIAC without financial support from Plantwise
- NATP2 provided 310 tablets to advisers at FIACs to support use of the Plantwise DAC and streamline the data collection process
- Conducted 'data into use' workshop for 21 participants (three female, 18 male) from multiple partners, with workshop report presented during National Forum
- Conducted 'extension messages' training (producing extension materials) for 13 participants (two female, 11 male), leading to the development of 10 new PMDGs (yet to be published on the Knowledge Bank)
- Conducted a refresher ToT for 20 local staff (five female, 15 male) on MPCP
- National partners taking the lead on clinic data management
- Facilitated the entry of plant clinic queries into POMS
- Promoted use of digital devices at all 30 plant clinics to enhance data collection and improve access to extension materials
- Promoted use of ICT tools like DAC and the factsheet library for DAE

- Special M&E study conducted to assess the satisfaction of plant clinic users, contribution of plant clinics to the knowledge base of farmers and adoption rates of improved farm management practices

## Key challenges and lessons learned

- Plant clinic operations continued even during a phase where there was no Plantwise agreement in place between CABi and the NRO/LIO; this demonstrates the importance of the plant clinic service and ownership of the approach on the part of national stakeholders
- The integration of Plantwise concepts into FIAC operation and skill building module training has shown great potential for both sustainability and outreach of the programme; it will be important to closely follow this activity due to its upscale potential in other districts
- Despite initial problems with the handling of handheld tablet devices for plant clinic data entry, after various follow-ups through cluster/review meetings plant doctors are now better skilled in managing digital information, which has entailed significant improvements in data collection and processing



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	5	47 (23)
Plant doctors trained	13	384 (38)
PMDGs drafted	0	29
Factsheets drafted	5	146

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Secretaría de Desarrollo Productivo de Santa Cruz (SEDACRUZ); Dirección de Sanidad Agroalimentaria (DSIA); Centro de Investigación Agrícola Tropical (CIAT); Agrochemical Companies Association (APIA); Fundación Swisscontact; Tecnológico Agropecuario de Tarata (TAT); ATRIA SRL – PETROBRAS (private sector) – LIOs

Instituto Tecnológico Agropecuario e Industrial de Tarata (ITAIT); PROINPA (potato project – NGO) – Provides diagnostic services

Local governments/municipalities (Comarapa, Quirusilla, Mairna, Valle Grande, Capinota, Sipe Sipe, Oruro, Challapata, etc.) – LIOs

## 2018 highlights

- Obtained partnership agreement from ATRIA SRL, supported by PETROBRAS, for the establishment of a model of plant clinics with the private sector
- The regional government of Oruro has renewed an agreement with the municipality of Challapata providing financial resources for plant clinics and included them in their annual operational plan
- Two new pests (*Cosmipolites sordidus* and *Achaea ablunaris*) identified in 2018 by plant doctors with the assistance of the Diagnostic Laboratory of Saavedra and DAS. A national alert and PHRs were organized with Senasag (NPPO) for the management of these pests
- Facilitated the contact with ATRIA SRL and its 'Clean Field' project to start the implementation of collection points for empty pesticide containers in Cochabamba
- National master trainer group conducted three refresher training courses in Capinota, Sipe Sipe and Challapata, reaching 27 technicians (nine female, 18 male)
- CABI and national trainers conducted one 'Module 1' training (field diagnosis and plant clinic operations) and 'Module 2' training (giving good advice) for 13 plant doctor trainees (three female, 10 male)
- Facilitated the establishment of one new plant clinic in partnership with the municipality of Caraparí and four mobile plant clinics led by four technicians from ATRIA SRL (private sector organization)
- Implemented 17 PHRs, reaching 880 farmers (208 female, 672 male) with targeted IPM messages
- Facilitated a MEC, reaching 3,700 farmers with targeted messages
- Facilitated use of plant clinic data to support planning, reporting and implementation using POMS to track activities and provide feedback to plant doctors
- Facilitated development of five new factsheets and one banner on integrated management of spider mites (yet to be published on the Knowledge Bank)
- Facilitated the creation of a WhatsApp support group to connect plant doctors from Santa Cruz, Cochabamba, Oruro, Chuquisca and Tarija
- Supported the development of a survey to investigate and learn lessons from agro-dealer run clinics and formulate strategies to improve the delivery of private sector run plant clinics in the future

## Key challenges and lessons learned

- The establishment of a data management system continues to face challenges because of difficulties in obtaining prescription sheets from plant doctors on time; however, the implementation of e-plant clinics has streamlined the data collection system
- In the past, the level of male attendance at plant clinics was far higher than female attendance. However, in more recent times it was observed that female attendance has increased, mainly in plant clinics where plant doctors speak native languages
- The sustainability of each plant clinic has its own particularity. However, in the case of the municipal plant clinics, sustainability is directly linked to the stability of the technical personnel hired by the Department of Productive Development, with frequent changes in personnel often representing a barrier to sustainability
- Private sector run plant clinics are considered more sustainable since the training they receive from Plantwise has a direct effect on their activities and incomes. Also, the combination of providing advice and inputs (pesticides, seeds, fertilizers, etc.) has been appreciated by many farmers. However, Plantwise Bolivia will need to ensure that these plant doctors do not only focus on chemical control options but also consider IPM approaches





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	1	8 (5)
Plant doctors trained	0	45 (5)
PMDGs drafted	4	22
Factsheets drafted	15	49

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

### Partnerships

Brazilian Research Corporation, Embrapa Mato Grosso – NRO and LIO

Ministério de Agricultura Pecuária e Abastecimento (MAPA) – LIO

Local government/municipalities – LIO

EMPAER (Empresa Mato-grossense de Pesquisa, Assistência e Extensão Rural); Instituto Federal de Educação, Ciência e Tecnologia de Mato Grosso – São Vicente; Universidade Estadual do Mato Grosso – Cáceres; Instituto Federal de Educação, Ciência e Tecnologia de Mato Grosso – Sorriso; Universidade Estadual do Mato Grosso – Alta Floresta – LIOs

Luiz de Queiroz College of Agriculture (ESALQ) and Universidade Estadual Paulista (UNESP) – Technical collaborator

São Carlos Federal University – LIO

### 2018 highlights

- Continued collaboration and support from the Agricultural Secretary of Mato Grosso for plant clinic implementation, coordinated by Embrapa
- Research group at the Plant Protection Department in Faculdade de Ciências Agronômicas (UNESP FCA) assisted the technical validation team in revising and developing extension materials drafted by Plantwise Brazil; this group has produced 15 new factsheets (yet to be published on the Knowledge Bank)
- Facilitated the establishment of one new plant clinic by Universidade Federal de São Carlos (UFSCar), for a total of five active plant clinics
- Renewed links with Federal Technological Institute of Mato Grosso (IFMT) for diagnostic support to plant clinics in Baixada Cuiabana
- Facilitated integration of activities between Embrapa, UNESP FCA and UFSCar for the development of technical material that can be used at national level

### Key challenges and lessons learned

- There was political instability that resulted in major budget cuts to public institutions; however, Embrapa Sinop managed to tap into alternative budgets (through a call from the National Development Bank) to support Plantwise’s implementation. The introduction of e-plant clinics can serve as an important support to push/accelerate data collection and its use in the country



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	56 (36)
Plant doctors trained	0	131 (72)
PMDGs drafted	1	11
Factsheets drafted	0	34

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministère de l'Agriculture et des Aménagements Hydrauliques (MAAH) – Mandates its directorates from the national to provincial levels to work with the Plantwise programme

Direction de la Protection des Végétaux et du Conditionnement (DPVC) – NRO

Direction Régionale de l'Agriculture et des Aménagements Hydrauliques (DRAAH) – Supervises plant doctors in their respective DPAAHs

Direction Provinciale de l'Agriculture et des Aménagements Hydrauliques (DPAAH) – LIO

Self Help Africa (SHA) – Supports plant clinics in two regions under the DFID-funded BRACED project

## 2018 highlights

- Facilitated training in data processing and analysis for eight regional coordinators (one female, seven male)
- Trained the regional coordinators and deputy data manager on analyses of plant clinic data as a way to sensitize them on the low number of queries recorded in POMS. Aspects of data validation were also introduced
- A six-man team set up by the director of DPVC drafted 10 PMDGs, including one on FAW (nine of which are yet to be published on the Knowledge Bank)

## Key challenges and lessons learned

- Funding from central government to run existing Plantwise activities and to upscale the programme remains a major challenge; CABI will continue to seek funding opportunities from existing in-country projects and programmes
- Some plant doctors standing in for others (who have been transferred) have not yet been officially trained; CABI will ensure plant doctors always operate in pairs to ensure the quality of the service according to Plantwise standards and policies
- Although no new plant clinics were established and out of the 56 plant clinics established only 36 regularly submit reports, the Plantwise team is aware that most plant clinics are operational; CABI will ensure that plant clinic data collection is improved, which will also provide evidence of plant clinic operations



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	3	34 (33)
Plant doctors trained	0	79 (77)
PMDGs drafted	0	65
Factsheets drafted	0	65

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Department of Plant Protection Sanitary and Phytosanitary (DPPSP), General Directorate of Agriculture (GDA), Ministry of Agriculture, Forestry and Fisheries (MAFF) – NRO

Three Provincial Departments of Agriculture (PDAs) – LIOs

Royal University of Agriculture (RUA) – LIO, also provides diagnostic support

Cambodian Agricultural Research and Development Institute (CARDI) – LIO, also provides diagnostic support

## 2018 highlights

- Held one NSC meeting with 12 officers (one female, 11 male) participating from the Department of Agriculture Extension, DPPSP, CARDI and RUA
- Facilitated the piloting of three new plant clinics at three FFS locations
- Facilitated one write-shop with five national experts (three female, two male), leading to the revision of 14 existing PMDGs and factsheets
- Conducted 'data validation and analysis' training for six participants (three female, three male)
- Conducted one cluster meeting with seven plant doctors and four national staff (three female, eight male) to seek feedback for the improvement of plant clinic operations and data management processes
- Facilitated three cluster meetings with seven plant doctors and five national staff (three female, nine male) to address red list chemicals reporting and use, create awareness among plant doctors and provide them with alternative control options
- National partners assigned personnel to help in plant clinic data management
- Local partners are using the administrative information in POMS to track activities
- Facilitated sharing of plant clinic data by the national coordinator as quarterly and six-monthly reports to relevant stakeholders, and collected feedback on the use of these reports
- Promoted use of ICT tools (Knowledge Bank and factsheet library app) for the extension, quarantine, World-Fish, FAO-IPM Programme and Royal University of Agriculture
- Observed and documented new interactions between plant health stakeholders such as piloting plant clinics in FFS by FAO-IPM trained plant doctors and through sharing Plantwise technical information (i.e. via PMDGs and factsheets)
- Special M&E study conducted to understand the change in knowledge, attitude and practices of farmers due to the impact of Plantwise interventions

- Promoted gender awareness through the training of 25 youth farmers (11 female, 14 male) on 'safe use and handling of agro-chemicals' and conducting a study to understand their knowledge, perceptions and practices on safe use and handling of agro-chemicals
- Showcased Plantwise activities through a poster and technical material at the National Farmer Fair on World Food Day

## Key challenges and lessons learned

- The commitment of MAFF to Plantwise activities needs to be affirmed; CABI will continue its high level engagement with key stakeholders and make the National Working Group functional to mainstream Plantwise and strengthen the national extension system
- Linkages within the various GDA departments and the LIOs need to be strengthened in order to ensure Plantwise's success; focus group discussions with key stakeholders and various heads of departments will be necessary to enhance within-country collaboration and sustainability





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	28 (22)
Plant doctors trained	41	300 (24)
PMDGs drafted	3	44
Factsheets drafted	0	87

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Jamaica: Ministry of Industry Commerce, Agriculture and Fisheries  
Rural Agricultural Development Authority  
Research and Development Division  
Plant Quarantine and Produce Inspection – NRO, LIO, LIOLIO

Trinidad and Tobago: Ministry of Agriculture, Lands and Fisheries  
Extension Training and Information Services Division  
National Agricultural Marketing and Development Corporation – NRO, LIO, LIO

Barbados: Ministry of Agriculture, Food Fisheries and Water Resources Management – NRO and LIO

Grenada: Ministry of Agriculture, Forestry, Fisheries and the Environment – NRO and LIO

## 2018 highlights

- National trainers conducted Module 1 and 2 trainings for 41 trainees (12 female, 29 male) in Jamaica
- National trainers delivered e-plant clinic training to 92 trainees (30 female, 62 male) in Jamaica. Coordinators and national trainers conducted monitoring meetings with plant doctors to observe the regularity and output from services in Jamaica (e.g. accuracy of diagnosis, quality of advice, etc.)
- A CABI trainer conducted a ToT for 10 national master trainers (seven female, three male) on how to plan and conduct PHRs in Jamaica
- A CABI trainer conducted tailored 'data quality assessment and management of plant clinics' training for 22 participants (12 female, 10 male) in Trinidad and Tobago
- A CABI trainer conducted 'e-plant clinic' training for six trainees (three female, three male) to introduce the use of digital devices at plant clinics in Grenada
- A CABI trainer, using plant clinic data, conducted a remote refresher training session on diagnosis and recommendations to five national master trainers (three female, two male) in Jamaica
- Conducted 'data management' training for one male data manager in Grenada
- National partners took the lead in plant clinic data management in Barbados, Grenada, Jamaica and Trinidad and Tobago
- Local partners now using the administrative information in POMS to track activities in all countries
- Facilitated sharing of plant clinic data for identifying training needs and farmers reached in the four countries in the Caribbean
- Conducted two PHRs to inform farmers in Jamaica on beet armyworm life stages, monitoring, pheromone trapping and early warning systems, reaching 89 people with targeted messages (48 female, 41 male)
- One PHR was conducted in Barbados on pests and integrated management in Bajan crops, reaching 75 people with targeted messages (19 female, 56 male)
- Conducted one PHR led by plant doctors in Trinidad and Tobago on the management of the giant African snail, reaching 54 farmers with targeted messages (23 female, 31 male)

## Key challenges and lessons learned

- The primary activity of Plantwise in the Caribbean was the full integration of the plant clinic concept into on-farm visits by plant doctors (especially in Grenada and Jamaica). The fixed plant clinic model has been found to be suitable for Trinidad and Tobago, while a mixed model is implemented in Barbados
- Implementation and financing of the e-plant clinic concept is being taken over by Jamaica; this was achieved by a mandate to plant doctors to incorporate the DAC into their daily routine duties
- The desktop and mobile versions of the DAC have streamlined the data collection process, leading to increased data flow and data use by national stakeholders. This can be demonstrated by the fact that 84% of plant clinic data collected during 2018 came from mobile devices



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	7	100 (89)
Plant doctors trained	123	557 (157)
PMDGs drafted	2	53
Factsheets drafted	4	147

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture (MoA) – Supports steering of the programme

Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPP-CAAS) – NRO; also provides diagnostic support

Beijing Plant Protection Station (BPPS) – LIO in Beijing area

Sichuan Plant Protection Station (SCPPS) – LIO in Sichuan province

Xing'an Plant Protection Station (XAPPS), Guangxi Province – LIO in Guangxi province

China Wisdom City Working Committee (CCIT) – Business middle-man to pilot Plantwise commercialization strategy

## 2018 highlights

- Funds (£153,000) allocated to Plantwise activities in Beijing and Sichuan province by BPPS and SCPPS
- Facilitated the establishment of an in-country governance system in Sichuan province, with one provincial steering committee meeting held in the year
- Facilitated the establishment of seven new plant clinics by SCPPS, for a total of 89 active plant clinics
- Plant doctors issued 37,952 prescription sheets; LIOs ensured data entry and harmonization, and validation of 10% of the records
- Conducted two ToT for 36 local staff in Sichuan and Zhejiang provinces on the plant doctor training Modules 1 and 2
- 27 of the 58 national trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) for 123 plant doctor trainees (49 female, 74 male)
- 27 of the 58 national trainers conducted 'Module 2' training (giving good advice) for 123 plant doctor trainees (49 female, 74 male)
- Facilitated the development of two new PMDGs, four new factsheets and the updating of three factsheets (all published on the Knowledge Bank) by local experts
- Conducted a 'data validation and clinic service quality monitoring' workshop in Beijing to facilitate plant clinic service quality supervision via plant clinic data validation, as well as standard plant clinic monitoring processes in the Beijing Pesticides Reduction Management System
- Facilitated plant doctor exchange visits and special trainings on the Chinese e-plant clinic app for more than 180 trainees
- Facilitated one MEC using mobile phones, reaching 3,979 farmers with targeted messages
- Piloted use of the plant clinic prescription sheet as a monitoring and supervision tool for local governments to promote rational use of pesticides via agri-shop operations in Sichuan province
- Special M&E study conducted to investigate the impact of plant clinics on compliance with agro-policies in the Beijing area
- Paper entitled 'Operating Plant Clinic Network to Crack the Problem of Green Control Technology Promotion' published in *China Plant Protection*

## Key challenges and lessons learned

- The plant clinic approach has been well integrated into partner operations in Beijing; however, further efforts are needed to ensure adoption of the approach at policy/regulatory level
- There has been use of plant clinic data by partners and, in order to encourage further use, CABI will further invest in demonstrating and monitoring the use of plant clinic data to support the implementation of governmental priorities (e.g. promotion of pesticide use reduction and green control policy)
- Private sector stakeholder engagement has been developed following diverse approaches such as fee-based plant doctor training or private sector run plant clinics. However, these partnerships progressed slowly because the mutual benefits between Plantwise and private sector businesses need further clarification. CABI and private sector partners will continue to explore different profitable business models that can deliver mutual benefits



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	13	25 (25)
Plant doctors trained	34	67 (64)
PMDGs drafted	0	37
Factsheets drafted	0	0

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Extension Department, Ministry of Agriculture (MAG) – NRO and LIO

Plant Health Department (MAG); APACOOOP RL (farmer cooperative) – LIOs

4S Clubs (Clubes 4S), MAG gender and youth division –Support gender and youth outreach

## 2018 highlights

- Obtained a signed partnership statement from APACOOOP RL cooperative
- CABI trainers conducted 'Module 2' training (giving good advice) for 24 plant doctor trainees (five female, 19 male)
- Facilitated the establishment of 13 new plant clinics, for a total of 25 active plant clinics
- Conducted a ToT for four local male staff on the plant doctor training 'Module 2' (giving good advice)
- Three of the four national trainers conducted 'Module 2' training (giving good advice) for 10 plant doctor trainees (two female, eight male) without assistance from a CABI trainer
- Conducted 'e-plant clinic' training for 32 participants (five female, 27 male) to introduce use of digital devices at plant clinics
- Local partners are using the administrative information in POMS to track activities
- Facilitated specific, needs based training on biocontrol options for 22 trainees (seven female, 15 male)
- Facilitated 21 PHRs, reaching 778 people with targeted messages
- Observed and documented new interactions between plant health stakeholders (gathering and sharing information, and developing strategies to tackle a serious problem affecting strawberry production)
- Piloted the use of digital devices at 10 plant clinics to enhance data collection and improve access to extension materials
- Promoted use of the DAC and the factsheet library app at MAG plant clinics, increasing the data collection volume by 400% compared to the previous year
- Promoted gender inclusion and awareness among partners by taking plant clinic support to indigenous farmers through MAG in collaboration with the Adventist church, as well as supporting female-farmer groups with technical advice
- Supported organized stakeholder groups (PITTA-Pejibaye and PITTA-Strawberry) on information gathering and research for management of *Palmelampus* weevil in peach palm and strawberry crown rot

## Key challenges and lessons learned

- The introduction of the DAC together with the encouragement of the regional directors of MAG resulted in a significant increase in plant clinic data uploaded to POMS; it is now necessary to continue demonstrating the value of plant clinic data at higher ranks of MAG to ensure that the collection of pest data becomes a priority in their pest management strategy
- Although the volume of data collected increased, the use of data analysis tools is still low among Plantwise partners; it is important to continue demonstrating the value of plant clinic data and to build the capacity of partners in data management to support the process
- Plant doctors are now using their own smartphones and computers for uploading plant clinic data, demonstrating acceptance of the DAC
- Engagement with higher-level authorities at MAG has been difficult, partly because it is their first year in government. However, the solid coordination structure with regional offices of MAG allowed for successful implementation. Efforts to involve new authorities to support expansion of Plantwise will continue in 2019
- WhatsApp groups have shown to be an important tool for speeding up information flow for diagnostic support to plant doctors and farmer groups
- Indigenous groups are becoming a priority for the new government. The work initiated by Plantwise in Grano de Oro-Chirripó has been a learning school on how to approach these minorities and has drawn the attention of the Vice Minister of Agriculture as a potential model to be applied in other indigenous communities





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	13	120 (112)
Plant doctors trained	131	437 (287)
PMDGs drafted	0	57
Factsheets drafted	0	10

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture (MoA), Plant Health Regulatory Directorate – NRO

Oromia, Amhara and Tigray Region Bureaus of Agriculture; Southern Nations Nationalities and Peoples' (SNNP) Region Bureau of Agriculture – LIOs

SHA – Provides financial support for plant clinics in SNNP region

## 2018 highlights

- Conducted a two-day National Stakeholder Forum with 32 participants to discuss progress and future directions, enabled through a financial contribution from the government (£3,600)
- Obtained funding (£80,000) for Plantwise activities through the MoA's Agriculture Growth Programme. Among other things, the ministry financially supported the procurement of 80 sets of clinic furniture and of 100 tablets and training activities
- SHA allocated £2,720 that supported two cluster exchange meetings in SNNP
- CABI trainers conducted a ToT on plant doctor Modules 1 and 2 for 11 trainees (one female, 10 male), supported by a government budget of £2,280
- CABI trainers backstopped/conducted four Modules 1 and 2 trainings for 131 plant doctor trainees (18 female, 113 male). Two of the trainings were fully funded by the ministry (£15,400), while the other two trainings received co-funding of £1,510 from the MoA
- Conducted MPPC course for 23 participants (two female, 21 male) and developed monitoring plans at different levels
- Facilitated the establishment of 13 new plant clinics, for a total of 120 plant clinics. Conducted two rounds of comprehensive two-day inter-regional cluster exchange visits for 61 plant doctors and experts (seven female, 54 male)
- Revised and updated the FAW PMDG; developed two custom-made posters, one mini-factsheet and one photosheet on safe use of pesticides and management of FAW for use in PHRs
- Conducted two rounds of 'e-plant clinic' trainings for 131 participants (18 female, 113 male) to introduce use of digital devices at plant clinics
- Conducted PHR training for 27 plant doctors and relevant experts (three female, 24 male), as well as ran three PHRs in two districts, reaching 171 farmers with targeted messages (36 female, 95 male)
- Promoted use of ICT tools (DAC, factsheet library, and Knowledge Bank) for multiple partners
- Promoted gender awareness among partners and participation of women and youth in the programme through: engagement with the gender affairs offices and with women's development and/or self-help groups; increasing the number of female plant doctors; targeted publicity; and by assessing the accessibility of plant clinic locations for minority groups
- Published a journal article entitled 'Bridging the gaps in plant health advisory services through community based plant clinics: Lessons and Prospects' in the Pest Management Journal of Ethiopia

## Key challenges and lessons learned

- Frequent turnover of plant doctors, trained experts and key officials (due to recent reforms, promotions, transfers and further education) continues to be a barrier to implementation. CABI, the ministry and the regions will further negotiate with zones and districts to minimize transfers of trained staff and to facilitate proper replacement with adequate briefing and trainings
- Lengthy government procurement procedures and processes have delayed the procurement of plant clinic facilities and the launches of new plant clinics; CABI will continue its close engagement with the procurement team to avoid delays
- Plant clinic data management, sharing and use remain an area that needs further attention. CABI will continue creating awareness about the usefulness of plant clinic data, build the capacity of partners in data management and start promoting the use of tablets at plant clinics to streamline the data collection process



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	8	161 (134)
Plant doctors trained	17	325 (195)
PMDGs drafted	0	104
Factsheets drafted	0	6

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Plant Protection and Regulatory Services Directorate of the Ministry of Food and Agriculture (MOFA) – NRO and LIO

USAID ADVANCE Project – LIO

International Development Enterprise (iDE) – LIO

Cocoa Rehabilitation and Intensification Program (CORIP) – LIO

Modernized Agriculture Ghana (MAG) and Market Oriented Agriculture Program (MOAP) – GIZ – Donors

## 2018 highlights

- Funds (£8,064) allocated to Plantwise activities by GIZ
- Funds (£6,451) allocated to Plantwise activities by MAG
- National trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) for 17 plant doctor trainees (two female, 15 male)
- National trainers conducted 'Module 2' training (giving good advice) for 17 plant doctor trainees (two female, 15 male)
- Facilitated the establishment of eight new plant clinics by MAG, for a total of 109 active plant clinics
- Conducted 'data management' and 'e-plant clinic' training for 17 plant doctors (two female, 15 male) to introduce use of digital devices at plant clinics
- Conducted 'data validation and analysis' training for 13 participants (13 male)
- Facilitated a MEC, reaching 41,803 farmers with targeted messages
- Facilitated the entry of 11,491 plant clinic queries into POMS
- Local partners are using the administrative information in POMS to track activities
- Facilitated sharing/use of plant clinic data for regional directors, district directors and staff of MOFA by cluster coordinators and plant doctors
- Expanded the use of digital devices to 16 plant clinics to enhance data collection and improve access to extension materials
- Facilitated linkage for GIZ and MAG to run private sector led plant clinics and provide support to existing plant clinics
- Promoted use of ICT tools (Plantwise DAC, factsheet library and Telegram) for MOFA, GIZ, MAG, USAID ADVANCE and iDE
- Conducted a case study to investigate the contribution of specialized training on cocoa pest and disease management on plant doctor performance and confidence
- Promoted gender awareness among partners and the participation of women and youth in the programme through the running of women-only plant clinics

## Key challenges and lessons learned

- The country has collected a lot of data and validated most of it but data analysis and sharing has been minimal. One of the steps initially taken up by the national team was the analysis of the plant clinic data of the previous year on individual plant clinic bases and sharing this with the regional coordinators for onward sharing with plant doctors and district directors. This was to be done on a quarterly basis but could not be achieved because there has been constant change in the Plantwise management team. CABI will continue to engage with the national team to ensure that it works more closely with cluster coordinators to improve the sharing and use of the analysed plant clinic data and will also continue to build the capacity of partners in data analysis
- There have been several issues with the DAC (e.g. delay with uploads to POMS or even data loss); in response to these, CABI has rebuilt the application, with the new version to be rolled out in early 2019



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	7	32 (15)
Plant doctors trained	36	116 (48)
PMDGs drafted	1	75
Factsheets drafted	0	21

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

SENASA – NRO and LIO

Instituto Obdulio Lezama (technical school) – LIO

SOLUTEC – Input supplier and LIO

Fundación Ayuda en Acción AeA (Help in Action Foundation) – Support organization and LIO

## 2018 highlights

- Facilitated linkage of new partner organization (Help in Action Foundation, AeA) to the programme to run plant clinics; a collaboration agreement was signed to introduce Plantwise to La Mosquitia, one of the country's most isolated and poor regions
- Funds (£9,800) allocated by AeA to cover training costs for plant doctors in La Mosquitia
- A CABI trainer conducted 'Module 1' training (field diagnosis and plant clinic operation) for 16 plant doctor trainees (three female, 13 male) in La Mosquitia
- A CABI trainer conducted 'Module 2' training (giving good advice) for 16 plant doctor trainees (three female, 13 male) in La Mosquitia
- Facilitated the establishment of seven new plant clinics (three by AeA and four by SENASA), for a total of 15 active plant clinics
- Conducted a ToT for four local staff (one female, three male) on the plant doctor training 'Module 2' (giving good advice)
- Two of the four national trainers conducted 'Module 2' training (giving good advice) for 20 participants (three female, 17 male) in collaboration with a CABI trainer
- One new PMDG on sorghum yellow aphid management drafted (yet to be published on the Knowledge Bank)
- Conducted 'e-plant clinic' training for 20 participants (three female, 17 male) to introduce the use of digital devices at plant clinics
- Facilitated 19 PHRs, reaching 1,000 people with targeted messages
- Promoted use of DAC, POMS, the factsheet library and serious games for SENASA in four new regions
- Published a blog post about the introduction of plant clinics to the Honduran Mosquitia
- Promoted gender awareness among partners and participation of indigenous farmers in the programme through the launch of Plantwise in La Mosquitia, training Misquito technicians and AeA Foundation personnel on improving access to technical advice

## Key challenges and lessons learned

- There is a clear interest from SENASA in promoting plant clinics but the reduced available personnel makes it difficult for them to cover all aspects of the approach and to ensure the regularity of the service. However, trained plant doctors have integrated the tools and materials into their daily activities
- Despite SENASA showing an interest in POMS as a complementary tool for improving their pest and disease dataset, plant doctors keep on using field visit forms instead of Plantwise prescription sheets; if POMS is to be further promoted, an official mandate from SENASA is necessary
- Even with a reduced budget, SENASA continued support for plant clinic operations for most of the year, assuming also the cost for PHRs; this demonstrates ownership of the programme by the NRO
- The partnership with AeA opened up new possibilities for Plantwise implementation, with AeA also allocating funds to cover training costs for minority groups in poor regions
- Working in La Mosquitia was challenging in terms of access to the location and limitations in accessing diagnostic support by plant doctors; it will be necessary for CABI to work with AeA to develop a plan to ensure better diagnostic support
- WhatsApp groups for diagnostic support have been found to be important tools, especially for those plant doctors in remote areas such as the Misquitos





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	12	82 (72)
Plant doctors trained	23	140 (42)
PMDGs drafted	17	87
Factsheets drafted	0	92

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Department of Agriculture, Jammu (DAJ); M.S. Swaminathan Research Foundation (MSSRF); DESEE Force (private sector/youth employment initiative) – LIOs

National Agro Foundation (NAF) – LIO; also coordinating the Farmer Producer Organization (FPO) partnership

## 2018 highlights

- Organized steering committee meeting with DAJ to review progress and plan for Plantwise activities
- Piloted the 'PEAT Plantix' application for image-based recognition for use by plant doctors and obtained 30,000 high quality pictures on selected pests identified from POMS
- Obtained a signed nondisclosure agreement with Tene Agricultural Solutions (Pvt.) Ltd.
- Conducted a data validation workshop to empower data managers from DAJ, MSSRF and NAF in data validation and uploading of plant clinic data to POMS
- Local trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) and 'Module 2' training (giving good advice) for 23 junior level officers (23 male) from five districts of Jammu to be used as back-ups for existing plant doctors
- Facilitated the establishment of 12 new plant clinics, for a total of 72 active plant clinics
- Conducted PHRs on Bud worm in jasmine, Bacterial leaf blight diseases and Gall midge in paddy and FAW in Maize, reaching 780 farmers (114 female, 666 male)
- Facilitated one 'extension messages' workshop (producing extension materials) with 10 participants (three female, seven male), leading to the drafting of 17 new PMDGs Completed data collection on a study to understand the complementarity role of Plantwise with the existing extensions system in plant clinic areas in Tamil Nadu
- Conducted a plant health stakeholder workshop with 27 participants (six female, 21 male), leading to the development of a monitoring plan for the three partners in the country
- Conducted a data validation workshop with 19 participants (one female, 18 male), leading to validation of 1,050 plant clinic queries
- Facilitated the entry of more than 5,900 plant clinic queries into POMS
- Local partners are using the administrative information in POMS to track activities
- Promoted use of ICT tools (DAC and factsheet library) for use by different stakeholders
- Promoted gender awareness among partners as routine work to increase the participation of women and youth in the programme through trainings, workshops and cluster meetings, and plant clinic visits
- Partners published a paper on 'The role of plant clinics in addressing pest and disease management'

## Key challenges and lessons learned

- Plantwise components (mainly plant clinics and trainings) are increasingly becoming integral components of the projects/ programmes or interventions of in-country partners; however, CABl also recognizes that continuous follow-up with LIOs to backstop plant doctors with technical support is still instrumental for the success of the intervention
- Plant clinic data is used for publications, monitoring of extension services, monitoring the quality of services and content creation; however, the use is mainly an effort by certain individuals. CABl will continue to promote wider use of plant clinic data by partners and also help build the capacity of partners in data management
- The use of plant clinic data by academia/universities has the potential to open up new spaces for using it for different purposes such as pest-modelling, forewarning or planned crop protection calendars, backed-up with Plantwise content like PMDGs; CABl will need to facilitate and assist interested stakeholders to have access to the plant clinic data and demonstrate the various uses of it
- PMDGs are highly appreciated by partner organizations, leading to a high demand; however, the external review process is relatively long, resulting in few publications. CABl will therefore explore approaches to speed up the process without negatively impacting on quality



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	63	229 (152)
Plant doctors trained	166	591 (350)
PMDGs drafted	38	226
Factsheets drafted	0	7

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

Ministry of Agriculture, Livestock and Fisheries (MoAL&F) – NRO, LIO

Kenya Agriculture and Livestock Research Organization (KALRO) – Member of NSC and of various technical subject teams; also provides diagnostic services, supporting clinic expansions

Kenya Plant Health Inspectorate Service (KEPHIS) – LIO; also member of NSC and of various technical subject teams

Pest Control Products Board; Agrochemical Association of Kenya (AAK/Croplife Kenya); University of Nairobi (UoN) – Member of NSC and of various technical subject teams

Katoloni Mission (community based organization) – LIO

SHA; GIZ Support plant clinic expansion

## 2018 highlights

- Funds (£150,714) allocated to Plantwise activities by six local governments, GIZ, SHA and KEPHIS
- CABI trainers and four national master trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) for 166 plant doctor trainees (69 female, 97 male)
- CABI trainers and four national master trainers conducted 'Module 2' training (giving good advice) for 166 plant doctor trainees (69 female, 97 male)
- 63 new plant clinics established in nine counties supported by DOW, GIZ, KALRO and KEPHIS, for a total of 152 active plant clinics
- Facilitated one write-shop with national experts, leading to the development of 38 new PMDGs (yet to be published on the Knowledge Bank)
- Conducted 'data management' training for 166 participants (69 female, 97 male)
- Conducted 'e-plant clinic' training for 166 participants (69 female, 97 male) to introduce use of digital devices at plant clinics
- Local partners are using the administrative information in POMS to track activities
- Facilitated a needs based refresher training on using tablets for 11 people (four female, seven male) in Kiambu County
- Facilitated the piloting of a supplementary curriculum on 'biological control as an IPM method' for 51 plant doctors (23 female, 28 male) with funding from Koppert Foundation
- Facilitated linkage of a private sector organization (Corteva) to the programme for strengthening Plantwise activities (running plant clinics sustainably through cooperatives and engaging youth)
- Facilitated linkage of a private sector organization (AcreAfrica) to the programme to promote farmer outreach by training farmer champions as plant doctors
- Facilitated one MEC on FAW, reaching 133,350 farmers with targeted messages

- Promoted use of ICT tools (DAC and factsheet library) for Kenya School of Agriculture, members of the AAK and agriculture staff in five counties
- Special M&E study conducted to investigate the integration of Plantwise into county government agricultural systems
- Facilitated development of five SOPs by partners to guide Plantwise operations in Kenya

## Key challenges and lessons learned

- Attrition of extension staff trained to be plant doctors continued with no tangible replacement plans. While some county governments sponsored new trainees, others are keen to explore alternative ways of delivering extension such as through ICTs. CABI will continue to strengthen and support national master trainers so that new plant doctors can be trained when needed
- Counties where senior government staff appreciate the role of extensions staff, are keen to address food security or have an agricultural background demonstrated good ownership and support to the programme; CABI will continue trying to identify and work with champions as it has a demonstrable impact on catalysing programme uptake



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	6	122 (110)
Plant doctors trained	19	417 (250)
PMDGs drafted	27	61
Factsheets drafted	7	37

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Department of Agricultural Extension Services (DAES), Ministry of Agriculture, Irrigation and Water Development (MoAI&WD) – NRO and LIO SHA – LIO; implements plant clinics in collaboration with DAES

Department of Agricultural Research Services, MoAI&WD – Provides diagnostic services and plant doctor backstopping

Department of Crop Development, MoAI&WD – Coordinates activities at district level and provides backstopping to plant doctors

United Purpose (UP) – LIO; implements plant clinics in collaboration with DAES

CropLife Malawi – Participates in developing PMDGs

Pesticide Control Board; Agriculture Extension Trust (ARET) – Members of steering committee, and contribute to writing PMDGs

Lilongwe University of Agriculture and Natural Resources (LUANAR) – Bunda and Natural Resources Campuses – Participates in training of plant doctors and writing PMDGs

## 2018 highlights

- Held two NSC meetings
- Held a National Stakeholder Forum with 19 stakeholder representatives (four female, 15 male)
- Facilitated the establishment of six new plant clinics, for a total of 110 active plant clinics
- National trainers conducted Modules 1 and 2 training for 19 plant doctor trainees (seven female, 12 male)
- Conducted 'e-plant clinic' training for 44 participants (15 female, 29 male) to upscale use of digital devices at plant clinics
- Carried out nine needs based trainings on a number of plant health problems for a total of 213 farmers (76 female, 109 male)
- Conducted 'data validation' training for 17 new and previously trained cluster coordinators (four female, 13 male) in order to validate plant clinic data at district level for giving feedback to plant doctors
- Carried out an extension materials write-shop for 14 experts (four female, 10 male) and developed 27 new PMDGs and seven factsheets, as well as reviewing and updating two current PMDGs
- Local partners are using the administrative information in POMS to track activities
- Facilitated PHRs reaching 6,176 people (1,768 female, 2,949 male, 1,459 youth) with targeted messages
- Facilitated MECs, reaching 1,363,000 farmers with targeted messages
- Promoted use of ICT tools (DAC, factsheet library and serious games) for trainees and during Plantwise meetings
- Facilitated linkage of a private sector organization (UP) that provided financial support to hold two cluster meetings for plant doctors (10 female, 18 male)

- Completed study on assessment of uptake of plant clinic advice among tomato farmers with results showing that clinic users adopted advice from plant clinics and recorded higher yields on tomato per acre compared to non-users
- New World Bank supported a research project on FAW initiated by national partners to find solutions to crop problems identified through plant clinic data

## Key challenges and lessons learned

- Some districts were affected by a lack of trained plant doctors due to the retirement of some personnel. Plantwise Malawi will work with its partners to ensure a smoother transition and lobby for the replacement of plant doctors to minimize interruption to plant clinic activities





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	1	75 (75)
Plant doctors trained	2	88 (86)
PMDGs drafted	20	37
Factsheets drafted	11	19

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture and Food Security (MASA) – PSP (Projecto de Apoio a PRONEA) – NRO

Departamentode Sanidade Vegetal (DSV) – MASA – LIO; also provides diagnostic services and data management support

## 2018 highlights

- Obtained signed data sharing agreement from the new National Director of Agriculture and Forestry
- The plant clinics approach was incorporated as a strategy to improve pest control in the country within the National Phytosanitary Program
- The main national television station (Telvisao de Mocambique) aired a programme about the role of plant clinics and broadcast news about the ToT refresher on plant doctor Modules 1 and 2
- Plant clinics in Moamba took part in a video on FAW management and the role of plant clinics in pest control
- 11 technicians (five female, six male) developed 20 new PMDGs and 11 new factsheets
- CABI trainers conducted refresher ToT on Modules 1 and 2 (field diagnosis and plant clinic operation, and giving good advice) for 12 national trainers (seven female, five male)
- Six of the 12 national trainers conducted refresher Modules 1 and 2 training (field diagnosis and plant clinic operation, and giving good advice) for 33 plant doctors (11 female, 22 male)
- Facilitated the establishment of one new plant clinic, for a total of 75 active e-plant clinics
- Facilitated a cluster meeting attended by 17 plant doctors (three female, 14 male)
- University Eduardo Mondlane designed a website to support their plant clinic project

## Key challenges and lessons learned

- The termination of the PSP project by IFAD (previously supporting Plantwise activities) and the substantial budget cut by the Government to MASA negatively influenced plant clinic scale-up and jeopardized plant clinic follow-up activities by national stakeholders. CABI will work with the national government to identify alternative funding models to sustain the operation that was built up with the support of the PSP project



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	10	32 (32)
Plant doctors trained	21	71 (36)
PMDGs drafted	0	10
Factsheets drafted	9	19

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Plant Protection Division (PPD), Department of Agriculture (DoA), Ministry of Agriculture, Livestock and Irrigation (MoALI) – NRO and LIO

Yezin Agricultural University (YAU) – Provides technical support

Department of Agricultural Research (DAR) – Provides technical support

East West Seed (EWS) – Private sector customer

## 2018 highlights

- A collaboration between Plantwise Myanmar and the MoALI led Fostering Agricultural Revitalisation in Myanmar (FARM) project to strengthen the plant health system was officially launched
- CABI conducted training on 'Modules 1 and 2' for 21 plant doctor trainees (12 female, nine male)
- The establishment of 10 new plant clinics by DoA and PPD was facilitated, for a total of 32 active plant clinics
- A group of trained data validators was established, which validated 100% (1,079) of the plant clinic queries from 2017
- Conducted 'e-plant clinic' training for 14 PPD staff (seven female, seven male) and distributed seven tablets for plant doctors to promote the use of digital devices at plant clinics
- Conducted one extension workshop with 16 PPD staff (12 female, four male) to review factsheets and PMDGs
- Shared Myanmar plant clinic data during the International Conference on Biological Control in Bangalore (India)
- Conducted one 'data into use' workshop with 23 participants (15 female, eight male) from key stakeholders (i.e. PPD, DAR, YAU and agro-input dealers) to facilitate the sharing and use of plant clinic data
- Initiated the 'Red list, red flag' game to sensitize plant doctors to CABI's red list pesticides policy
- Organized a FAW workshop with 35 participants (27 female, eight male) to draft an early detection plan for FAW at plant clinics
- Facilitated the entry of 1,108 plant clinic queries into POMS
- Promoted the use of ICT tools (Knowledge Bank) and CABI's factsheets on invasives (i.e. FAW) for PPD and DoA staff
- PPD promoted the use of the Plantwise Facebook chat group for their plant doctors to exchange information
- Conducted an M&E study to investigate the response and acceptance of the Plantwise extension model by different stakeholders in relation to the Myanmar Plant Health System Strategy

## Key challenges and lessons learned

- With e-plant clinics, the data management process has been improved and supported more data uploads into POMS. The collaboration with FARM will support the use and purchase of new tablets in the Nay Pyi Taw area. Plantwise Myanmar expects to deliver more e-plant clinic trainings and support more ToT to ensure the sustainability of the current model
- Myanmar's agriculture is highly affected by the misuse of pesticides. Together with partners, CABI will explore various interventions (e.g. the 'Red list, Red flag' game with plant doctors) to reduce recommendations of red list pesticides by plant doctors. More M&E work will help to understand the adoption of climate-smart practices and to determine the appropriateness of plant doctors' recommendations for climate change adaptation (and mitigation)



# Nepal

Quick Stats	New in 2018	Cumulative Total
Plant clinics established	18	58 (35)
Plant doctors trained	38	338 (45)
PMDGs drafted	0	30
Factsheets drafted	0	41

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Plant Quarantine and Pesticide Management Centre (PQPMC) –NRO

Plant Protection Laboratories (PPL); Provincial Agriculture Directorates (PAD); Farmer IPM associations (FFS); International Development Enterprise (iDE) – LIOs

## 2018 highlights

- Signed a partnership statement with iDE for Plantwise implementation in iDE project areas as part of private sector linkage through farmer entrepreneurs (i.e. community based facilitators: CBFs)
- Obtained a signed data sharing agreement from iDE
- Funds (£31,500) allocated to Plantwise activities by Government of Nepal for trainings on Modules 1 and 2, and for plant clinic operations
- Two of the 12 national trainers conducted 'Module 1' (field diagnosis and plant clinic operation) and 'Module 2' training (giving good advice) for 38 plant doctor trainees (18 female, 20 male), of which 18 were officials from the government extension system and 20 from iDE-CBFs
- Conducted cluster exchange meeting with 17 plant doctors (one female, 16 male) involving three clusters and invited the Secretary of Local Government
- Conducted coordination meeting with provincial heads, all seven secretaries from the seven provinces, the national ministry of agriculture, chief NPPO and other important officials
- Drafted M&E report on comparison between FFS plant clinics and 'regular' plant clinics
- Facilitated a MEC for *Tuta absoluta*, reaching 7,000 farmers with targeted messages
- Facilitated the entry of 6,512 plant clinic queries into POMS
- Facilitated the use of plant clinic data for two publications prepared for the first International Conference on Biological Control in India
- Conducted PHR on *Tuta absoluta*, reaching 700 farmers at seven locations with targeted messages
- Facilitated study on impact of climate variations on insect populations (focus on *Tuta absoluta*) by using POMS plant clinic data
- Facilitated internship focusing on use of plant clinic data to understand the economic significance of farmer advisory through plant clinics
- Held a review workshop on Modules 1 and 2, and data management training with CBFs and plant doctors
- Conducted Asia regional workshop on FAW with participation from nine countries
- Conducted MPCP workshop with CBFs and plant doctors and staff of iDE (13 female, 19 male)

## Key challenges and lessons learned

- Administrative restructuring in Nepal is affecting resource allocation (funding, change in staff mandates, etc.) and therefore the implementation of Plantwise activities; this has also affected other projects/programmes within the country. CABI will continue to work closely with local and provincial governments to seek solutions that will ensure continuity of Plantwise activities
- The 'data into use' workshop provided valuable insights on the benefits of validated data; however, national partners did not fully adopt the approach despite it being agreed that only a subset of plant clinic data should be validated. CABI will encourage partners to adopt this approach once restructuring activities are concluded and will also explore the use of artificial intelligence in data validation
- The use of plant clinic data for publications, internships and other small studies is getting more attention compared to other uses such as MPCP; CABI expects that these complementary uses have the potential to gradually trickle down to provincial level and lead to wider use of plant clinics' data at field level
- With the new federated structure, CABI feels that more involvement of provincial stakeholders is needed to ensure strong buy-in during the initial phase. Together with the NRO, CABI will either conduct provincial level steering committee meetings that report to a national forum or hold one big national forum wherein provincial authorities will participate and contribute





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	1	33 (14)
Plant doctors trained	0	140 (28)
PMDGs drafted	5	129
Factsheets drafted	2	42

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Universidad Nacional Autónoma de Nicaragua (UNAN-León) (university) – NRO and LIO; also provides diagnostic support

Universidad Católica del Trópico Seco (UCATSE) (university) – LIO; also provides diagnostic support

Cooperativa de Servicios Múltiples Campesinos Activos de Jalapa (CCAJ), Cooperativa Juan Francisco Paz Silba, Cooperativa Santiago, Central de Cooperativas de Pueblo Nuevo (CECOOP), Association of Communities for the Development of the Peninsula of Cociguina (ACODEPEC) (cooperatives); ABONATURA (agro-input supplier); American-Nicaraguan Foundation (ANF); Paisaje Urbano (private initiative); Instituto de Promoción Humana (NGO), Norwalk/Nagarote, Humboldt Centre (NGO) – LIOs

## 2018 highlights

- Obtained a signed Partnership Statement from ANF
- The plant doctor from Norwalk/Nagarote (an NGO) left the organization and opened his own plant clinic 'Paisaje Urbano' as part of a private initiative offering maintenance services for urban agriculture and landscaping
- Facilitated the production of five PMDGs, two factsheets and one photosheet to be used during PHRs (yet to be published on the Knowledge Bank)
- Continued piloting the use of digital devices at 10 plant clinics to enhance data collection and improve access to extension materials
- Plant doctors used POMS and Excel for analysing their data and presentation during the midterm review meeting; the objective of the meeting was to evaluate the performance of plant clinics during the first six months of running e-plant clinics and compare it to the time of the paper based prescription sheet. Results show that plant clinic data collection increased 10-fold
- Local coordinators analysed plant clinic data and shared reports with plant doctors and partner organizations to encourage the use of data
- The National Coordinator presented on Plantwise at the [fifth Agroforestry Symposium](#) in Leon
- Facilitated six PHRs, reaching 119 people with targeted messages
- Facilitated linkage of a private sector organization (ACODEPEC) to the programme to run plant clinics
- Promoted use of the DAC, factsheet library and POMS for all active plant clinics, and [distributed a guide on the use of Plantwise ICT tools](#)
- Presented Plantwise tools (Factsheet library, Plantwise webpage) to three agro-input suppliers in Leon (Agro Servicio San José, Foragro and Disagro), which all found the tools useful. UCATSE included Module 1 training of Plantwise as part of a Diploma on Agroecological Production and Adaptation to Climate Change; the Diploma was obtained by 32 promoters from UNAG-Somoto (National Union of Farmers and Cattle Ranchers)

## Key challenges and lessons learned

- Despite the interest of MEFCCA and IPSA in incorporating plant clinics into government-led initiatives, the political situation continues to jeopardize progress. CABI will revisit the conversation when the situation returns to normal
- The initial idea of creating a joint diploma for plant doctors with the participation of UCATSE, UNAN Leon and UNA Managua turned to be challenging because of the different rules on obtaining a degree. However, UCATSE decided to include Module 1 content in a diploma course for agricultural promoters
- Coordinating the implementation of Plantwise with a high number of organizations participating as LIOs continues to be complicated but ICTs like WhatsApp and the DAC have helped to improve communication and networking among participants



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	50	906 (874)
Plant doctors trained	131	1,782 (1,739)
PMDGs drafted	3	60
Factsheets drafted	2	76

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of National Food Security and Research (MNFS&R) – NRO; coordinating body at national level

Directorate General of Agriculture Extension and Adaptive Research, Punjab; Directorate General of Pest Warning and Quality Control of Pesticides, Punjab; Department of Agriculture Extension, Sindh – LIOs; also provide trainings and technical expertise and invest funds for scale-up

Department of Agriculture Extension, Balochistan – LIO; also provides trainings and technical expertise

Department of Agriculture Extension Gilgit Baltistan and Khyber Pakhtunkhwa – Provide technical field staff for plant doctor training; master trainers for plant doctors, MPCP and data management

## 2018 highlights

- Obtained a signed partnership agreement and data sharing agreement from the departments of agriculture of Gilgit Baltistan and Khyber Pakhtunkhwa
- Funds (£86,657) allocated to Plantwise activities by Directorate General of Agriculture Extension Punjab
- Department of Agriculture Sindh received funds (£42,376) to scale up Plantwise activities
- Department of Agriculture Balochistan received funds (£7,247) to facilitate Plantwise activities
- Facilitated the establishment of 50 new plant clinics, for a total of 874 active plant clinics
- 12 of the 26 national trainers conducted Module 1 and 2 trainings for 131 plant doctor trainees (15 female, 116 male)
- Conducted MPCP training for five participants, leading to the development of a plant clinic monitoring system with the support of MPCP national master trainers
- Conducted two in-district 'data management' trainings for 55 participants (15 female, 40 male) Conducted two in-district 'online data management' trainings for 51 participants (17 female, 34 male) E-plant clinics have been established in 21 districts of Punjab and 107 paper based plant clinics have been converted to e-plant clinics, with more than 7,255 queries recorded so far; further, the use of digital devices was piloted in 10 other regions Successfully conducted the first 'data sharing and use' workshop involving 41 participants (three female, 38 male) from multiple public/private sector stakeholders
- Facilitated the entry of 80,389 plant clinic queries into POMS
- Facilitated one write-shop with national experts in Gilgit Baltistan, leading to the development of three new PMDGs and two factsheets (yet to be published on the Knowledge Bank)
- Conducted M&E planning workshop in Punjab with five participants, leading to the establishment of mechanisms for M&E in the district
- Conducted PHR training for 12 participants (12 male) and facilitated two PHRs, reaching 152 participants with targeted messages
- Programme upscaled in Punjab with LIO procuring 600 desktop computers and 3,600 tablets for plant doctors to streamline the data management process
- Promoted gender awareness among partners and participation of women and youth in the programme through the launch of five female-led plant clinics, from which 377 plant clinic queries were collected

## Key challenges and lessons learned

- Delay in release of funds allocated by central government and complex procurement processes within the national system caused delay of approvals due to new government policies in Punjab
- Implementation of a monitoring strategy at district level helped to improve local level monitoring; however, the establishment of an M&E system at national level remains a challenge. CABI will work with local partners to develop an appropriate rollout plan that will provide the vision, policy guidance and decision-making processes to catalyse the establishment of a nationwide M&E system
- The only means of communication with farmers living in remote areas is television; Plantwise will explore using these communication channels to advertise plant clinics and promote new agricultural technologies



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	3	41 (27)
Plant doctors trained	0	370 (25)
PMDGs drafted	0	34
Factsheets drafted	13	95

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

National Institute for Agricultural Innovation (INIA) NRO and LIO

National Service for Agricultural Health (SENASA) – LIO

Local government/municipalities – LIOs

Regional direction for Agriculture San Martín – LIO

'La Molina' Agricultural University; Entomological Society of Peru; International Potato Centre (CIP); National Program for Social Inclusion: Tambos  
Technical collaborators

## 2018 highlights

- Renewed a partnership agreement with INIA, reinforcing the activities in the eight areas implementing plant clinics
- Three bilateral agreements signed between INIA and public entities (municipalities, universities and local extension offices) to support plant clinic operations and scale-up
- INIA is now coordinating a total of 22 active plant clinics at national level and initiated the expansion to one new area. INIA is linking with key local partners like local governments and research/technical institutions
- Conducted 'e-plant clinic' training for 23 participants (six female, 17 male) to introduce use of digital devices at plant clinics
- Implemented 49 PHRs, reaching 2,265 farmers (1,135 female, 1,130 male) with targeted messages and facilitated the development of two banners to support PHRs
- Conducted 82 field visits as a follow-up on plant problems brought to plant clinics, reaching a total of 117 farmers (33 female, 84 male)
- INIA has trained 323 farmers and community leaders (124 female, 199 male) in several topics using Plantwise training material and tools
- Local partners are using the administrative information in POMS to track activities and for the development of new technical documents (e.g. factsheets)
- Successfully implemented the national M&E plan led independently by INIA in all experimental stations running plant clinics
- Facilitated the development of 13 new factsheets by plant doctors (yet to be published on the Knowledge Bank)
- Developed 'impact story' ('Protagonismo de la Mujer en las Clínicas de Planta del Perú') which presents gender sensitive approaches to attract more women to plant clinics implemented by a specific plant doctor in Cajamarca
- Facilitated participation of Plantwise in the '50 years of INIA' national fair with the participation of key partners

## Key challenges and lessons learned

- Plant clinic data is increasingly used in the country, especially now plant doctors got direct access to POMS. The information is now being used to develop new technical material and to identify PHR topics for national events
- Expansion of the approach and increased farmer outreach will depend on increasing partnerships. Existing experimental stations are a single base and do not reach all corners of their territories. Through partnerships with government agencies (national and regional), associations and universities, INIA can also play a role in tutoring plant clinics run by third parties
- The consolidation of the e-plant clinic pilot resulted in improved data flow into POMS. With external and internal financial support, most plant clinics are now collecting digital plant clinic data either via tablets, mobile phones or the desktop version of the DAC





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	66 (66)
Plant doctors trained	53	295 (223)
PMDGs drafted	10	46
Factsheets drafted	10	43

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Rwanda Agriculture Board (RAB), Ministry of Agriculture and Animal Resources – NRO and LIO; also providing diagnostic services

Various local districts, Ministry of Local Government (MINLOC) – LIO, implementing plant clinics in collaboration with RAB

Directorate of Agriculture and Livestock Inspection and Certification Services – Member of NSC and participates in development of extension materials and running PHRs

National Agricultural Export Development Board (NAEB) – Participates in the development of PMDGs related to export crops

Agro-input suppliers – Provide agro-inputs such as seed and pesticides when recommended by plant doctors

Farmer and community based organizations and FFSs – Participate in Plantwise activities and advise their farmers to utilize plant clinics

Imbaraga and Tubura (NGOs); FAO and IFAD (international organizations) – Members of steering committee

University of Agriculture and Technology Byumba (UTAB) – Running undergraduate course and in-service training based on Plantwise content

USAID/Feed the Future – Provides funding support for PHRs

## 2018 highlights

- Funds (£44,300) allocated to Plantwise activities by NAEB, UTAB and Musanze, Ngororero and Nyabihu districts for training on plant doctors Modules 1 and 2 for their sector agronomists
- Six of the 20 national trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) for 111 plant doctor trainees (21 female, 90 male)
- Six of the 20 national trainers conducted 'Module 2' training (giving good advice) for 53 plant doctor trainees (14 female, 39 male)
- Facilitated refresher training on plant doctor 'Modules 1 and 2' for 115 plant doctors (33 female, 82 male)
- Facilitated 'e-plant clinic' training for 30 participants to introduce use of digital devices at plant clinics
- UTAB embedded Plantwise training into the curriculum for teaching undergraduate students and in-service extension staff
- Held one review and planning meeting with the national coordination team
- Facilitated a write-shop with national experts, leading to the development of 10 PMDGs and 10 factsheets (yet to be published on the Knowledge Bank)
- Facilitated the entry of 3,006 plant clinic queries into POMS
- Facilitated FAW PHRs, reaching 1,700 people in six districts with targeted messages
- Facilitated one MEC using radio, reaching 297,630 farmers with targeted messages
- Piloted the use of digital devices at 12 plant clinics to enhance data collection and improve access to extension materials
- Promoted use of ICT tools such as DAC and the factsheet library for agronomists from local government
- Promoted gender awareness among partners and the participation of women and youth in the programme through increased linkages between Plantwise and FFS/TM, leading to increased female participation of up to 45% of total farmers reached

## Key challenges and lessons learned

- The recent restructuring of RAB is affecting Plantwise's implementation (e.g. at cluster level because logistical arrangements are yet to be put in place or at finance level because of the lack of a dedicated Plantwise accountant). In addition, newly appointed senior managers of RAB are yet to be introduced to Plantwise. CABI will make efforts to ensure appropriate processes are put in place and ownership is rebuilt within RAB



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	796 (458)
Plant doctors trained	242	1231 (528)
PMDGs drafted	17	121
Factsheets drafted	0	19

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture (MoA) – Top level programme steering

Seed Certification and Plant Protection Centre of Department of Agriculture (DoA) – NRO

Provincial and Inter-Provincial Department of Agriculture – LIO

Department of Export Agriculture – Supports plant clinic implementation

## 2018 highlights

- Funds (£45,865) allocated to Plantwise activities by the Provincial and Inter-Provincial Department of Agriculture
- Facilitated the establishment of an in-country governance system, with two NSC meetings held
- Plantwise national coordinator, national data manager and national M&E coordinator officially assigned by partners during the steering committee meetings
- National trainers conducted 'Module 1' training (field diagnosis and plant clinic operation) for 150 plant doctor trainees (63 female, 87 male)
- National trainers conducted 'Module 2' training (giving good advice) for 242 plant doctor trainees (89 female, 153 male)
- Facilitated one write-shop with national experts, leading to the development of 17 new PMDGs (yet to be published on the Knowledge Bank)
- Conducted an M&E and quality assurance workshop to introduce new approaches for data collection and to enable tracking of the performance of an intervention
- Facilitated five cluster meetings with 81 plant doctors (30 female, 51 male)
- Conducted two 'data management and harmonization' trainings for 33 participants (nine female, 24 male)
- Facilitated training of 233 plant doctors (91 female, 142 male) on e-plant clinics
- Facilitated the entry of 4,360 plant clinic queries into POMS
- Facilitated one PHR on FAW awareness, reaching 200 farmers with awareness messages
- Facilitated linkage with Dialog Axiata, a private sector telecoms organization, to support crop advisory development and dissemination under their existing agro-advisory service (GoviMithuru)
- Promoted the use of ICT tools such as DAC, factsheet library, serious games and quizzes
- Facilitated development of two case studies: 1) impact of plant clinics on women headed households in post-conflict areas; and 2) impact of e-plant clinics on data collection and management

## Key challenges and lessons learned

- Submission of plant clinic data has improved but still requires extra effort from partners; CABI will hold regular discussions with NRO/LIO to find practical solutions to submitting the data as well as its use
- The agriculture instructors are responsible for a large geographical area and extension activities other than running plant clinics. This has led to a shortage of staff and time for dedicated Plantwise activities. CABI will discuss this issue with the steering committee to find a lasting and acceptable solution that will ensure smooth implementation of Plantwise
- Technical difficulties in handling the digital data are leading to late submission and even data loss; CABI will ensure a software update and help build the capacity of partners in the use of digital devices
- Due to frequent staff changes and new recruitments, CABI will continue to work closely with NRO/LIOs to meet the demand for plant doctors



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	4	19 (14)
Plant doctors trained	163	277 (30)
PMDGs drafted	0	24
Factsheets drafted	0	27

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Rice Department (RD), Ministry of Agriculture and Cooperatives – NRO and LIO

Department of Agriculture Extension (DoAE), Ministry of Agriculture and Cooperatives – LIO

## 2018 highlights

- Funds (£25,600) allocated by DoAE to conduct six plant doctor trainings and pilot four e-plant clinics
- 24 of the 33 national trainers conducted six 'Module 1' trainings (field diagnosis and plant clinic operation) and six 'Module 2' trainings (giving good advice) for 163 DoAE plant doctor trainees (95 female, 68 male)
- Facilitated the establishment of four new e-plant clinics by DoAE, for a total of 14 active plant clinics
- CABI trainers conducted one 'e-plant clinic' training for 18 plant doctors and staff from RD and DoAE (17 female, one male)
- CABI trainers conducted one cluster meeting with a total 18 participants (12 female, six male) to address the use of red list pesticides, create awareness among plant doctors on alternative control options, seek feedback for improvement of plant clinic operations and provide support with DAC
- National partners officially assigned personnel to manage plant clinic data processes
- Facilitated the entry of 312 plant clinic queries into POMS
- Local partners are using the administrative information in POMS to track activities
- Facilitated sharing of plant clinic data by the national coordinator in quarterly and biannual reports to relevant stakeholders
- Piloted the use of digital devices at 13 plant clinics to enhance data collection and improve access to extension materials
- Promoted the use of ICT tools (Knowledge Bank and the Factsheet Library app) for RD and DoAE stakeholders
- Supported RD and DoAE to set up a chat group for diagnostic support and sharing of information with plant doctors, and supported RD to facilitate access to the Rice Knowledge Bank by plant doctors
- Special M&E study conducted to understand the impact of Plantwise on change in knowledge, attitude and practices of farmers
- Promoted gender awareness through conducting a study to understand female knowledge, perceptions and practices on rational pesticide use and by training of 33 women farmers on 'safe use and handling of agro-chemicals'
- Showcased Plantwise activities with posters and technical material during the National Rice Exhibition

## Key challenges and lessons learned

- High staff turnover (particularly of plant doctors) and low plant clinic attendance by farmers is leading to lower levels of plant clinic data. National partners and CABI will work to ensure that future plant doctors are linked with DoAE training programmes and plant doctors advised to integrate plant clinic operations in their daily advisory activities
- It remains difficult to scale up plant clinics with RD due to limited staff and budgets; CABI will continue strengthening the linkages with DoAE to scale up plant clinics in the country and will also explore in-country private sector linkages as a means to increase the reach and sustainability of the programme





Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	191 (152)
Plant doctors trained	138	833 (70)
PMDGs drafted	13	263
Factsheets drafted	6	69

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

Department of Crop Protection, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) – Chairs the NSC, funds plant doctor trainings and plant clinic operations

Directorate of Agricultural Extension Education, MAAIF; Uganda National Farmers' Federation; Uganda National Agro-Input Dealers Association; Members of the NSC

District Local Government (96 DLGs); Zirobwe Agaliawamu Agribusiness Training Association; SHA; Soroti Catholic Diocese Integrated Development Organization; Rwenzori Information Centres Network – LIOs

National Agriculture Research Organisation – Member of the NSC; also supports data validation and provides plant doctor training

Program for the Restoration of Livelihoods in Northern Uganda (IFAD project under Ministry of Local Government) – Co-funds Plantwise trainings

Uganda Christian University – Member of the NSC and provides plant doctor training

Makerere University – Member of the NSC, provides plant doctor training and diagnostic support

Gulu University and Bukalasa Agricultural College – Provide plant doctor training

Kibimba Limited (rice producing and processing company) – Facilitating training of its staff in tailored Modules 1 and 2

## 2018 highlights

- Obtained a signed partnership agreement with Bugisu Cooperative Union
- Funds (£59,000) allocated to Plantwise activities by MAAIF, DLGs and Ugandan Christian University
- CABI facilitated local trainers to conduct six Modules 1 and 2 trainings for 138 plant doctor trainees (35 female, 103 male)
- Conducted two Modules 1 and 2 ToT for 21 participants (five female, 16 male) from Gulu University and Bukalasa Agricultural College
- Agribusiness Initiative Trust contracted Plantwise to train 27 master trainers on management of FAW
- CABI and local master trainers conducted two 'e-plant clinic' trainings for 45 plant doctors (10 female, 35 male) to introduce use of digital devices at plant clinics (DAC, factsheet library and simulation games)
- Developed a FAW video for awareness creation on FAW identification, prevention and management
- Facilitated two MECs on FAW, using radio, mobile phones and videos and reaching 26,833 farmers 10 PHRs conducted in 10 sub-counties by Bulambuli DLG with an estimated reach of over 500 farmers
- Conducted four cluster meetings to assess the status of plant clinic operations in-country (e.g. clinic regularities, data submission, resource allocation), involving 60 extension staff (22 female, 38 male) Conducted one extension message development write-shop with 17 scientists (six female, 11 male) from NARO, Bioversity International and IITA's N2Africa, resulting in the development of 13 PMDGs
- Facilitated establishment of two WhatsApp platforms (one with 24 e-clinic plant doctors and another of 55 plant doctors) for troubleshooting, mobilization, networking and diagnostic support

## Key challenges and lessons learned

- The government has embraced the plant clinic approach and in 2018 provided funding of £56,899 to train plant doctors, run plant clinics and purchase plant clinic kits. It has also included plant clinic activities into revised staff job descriptions; however, the rollout remains slow due to irregular disbursement of funds
- Data collection and use still remains a weak area since plant clinics only run when financial resources are available. CABI will continue to support and encourage uptake of the Plantwise approach and build capacity on data management while demonstrating the value of plant clinic data to partners
- Plant doctors running plant clinics are inadequately supervised; CABI has identified the need for capacity building on plant clinic monitoring as a key challenge that will be addressed in 2019



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	0	25 (18)
Plant doctors trained	0	111 (36)
PMDGs drafted	0	35
Factsheets drafted	0	63

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Vietnam Academy of Agricultural Sciences (VAAS), Ministry of Agriculture and Rural Development (MARD) – NRO

Plant Quarantine Diagnostic Centre, Plant Protection Department (PQDC-PPD), MARD – LIO

Plant Protection Research Institute (PPRI) – LIO

Southern Horticultural Research Institute (SOFRI) – LIO

Western Highlands Agriculture and Forestry Science Institute (WASI) – LIO

AgriMedia Vietnam Provides climate information to plant clinics

## 2018 highlights

- Conducted one Plantwise National Seminar on the ‘Sustainability of the Plantwise Programme in Vietnam’ with the participation of 26 high level delegates (seven female, 19 male) from VAAS, PPD, MOST, WASI, SOFRI, PPRI, Hanoi University, AgriMedia and Sub-PPDs
- Conducted ‘e-plant clinic’ training for 25 participants (11 female, 14 male) to introduce the use of 15 digital devices at 12 e-plant clinics
- CABI trainers conducted one cluster meeting with 16 participants (five female, 11 male) to share plant clinic data analyses and progress, address red list chemical reporting and use, troubleshoot the DAC and seek feedback for improvement in plant clinic operations
- Promoted use of ICT tools (Knowledge Bank and factsheet library app) for VAAS, WASI, MOST and PPD
- Facilitated linkage of a private sector organization (Olam International) to the programme to train plant doctors and run plant clinics by building on the previously conducted peppercorn value chain assessment
- Completed data collection for a gender survey to collect information on women farmers’ willingness and ability to access plant clinic services
- Showcased Plantwise activities with a poster and other technical material during the ‘Coffee Day’ in Dak Nong

## Key challenges and lessons learned

- The scale-up of Plantwise requires financial commitment from national partners and stakeholders; CABI has launched an engagement process with PPD and VAAS to present the case at higher levels within the ministry to seek financial support and source funding from in-country private sector stakeholders
- Continuous support to the national data manager is needed to avoid delays in the uploading of plant clinic data; CABI will explore the possibility of decentralizing data management and coordination roles within departmental staff



Quick Stats	New in 2018	Cumulative Total
Plant clinics established	20	104 (64)
Plant doctors trained	38	297 (120)
PMDGs drafted	0	42
Factsheets drafted	0	51

Figures in brackets indicate number of plant clinics / plant doctors known to be active by end of 2017

## Partnerships

Ministry of Agriculture (MoA) – NRO

SHA; Golden Valley Agriculture Trust (GART) – LIOs

Department of Extension of MoA; Zambia Agriculture Research Institute (ZARI) – LIOs; also provide plant doctor training

University of Zambia – Provides plant doctor training

Natural Resource Development College; Conservation Farming Unit (CFU) – Participate in development of PMDGs, and are planning to integrate Modules 1 and 2 into their agriculture college training

Zambia National Farmer Union; Zambia Environment Management Agency; National Agriculture Information Services; Seed Control and Certification Institute (SCCI) – Members of the steering committee

World Vision Zambia – LIO; also funds training of plant doctors

Netherlands Development Organisation (SNV) – LIO; also supports training of plant doctors

Mulungushi University; Monze School of Agriculture – Preparation of extension materials, and potential for including Modules 1 and 2 in curricula

## 2018 highlights

- Facilitated two NSC meetings
- Held National Stakeholder Forum with 25 stakeholder representatives (four female, 20 male)
- Facilitated the establishment of 20 new plant clinics by the Department of Agriculture and SHA, for a total of 64 active plant clinics
- Implemented needs based training on a number of plant health problems for a total of 246 farmers (80 female, 166 male)
- Conducted 'e-plant clinic' training for 28 participants (six female, 22 male) to upscale use of digital devices at plant clinics
- 12 of the 14 national trainers conducted 'Module 1' (field diagnosis and plant clinic operation) and 'Module 2' trainings (giving good advice) for 38 plant doctor trainees
- Two partners (World Vision Zambia and SNV) used their funds to support the training of plant doctors and running of plant clinics, including the purchase of plant clinic materials
- Special M&E study conducted to investigate the benefits of plant clinics to farmers who visited them
- Attended nine national and local agriculture shows where plant clinics were showcased
- Facilitated the participation of members of the national Plantwise coordination team in six conferences, seminars and workshops
- Facilitated sharing and use of plant clinic data by ZARI, Department of Agriculture, University of Zambia and Zambia Environmental Management Agency

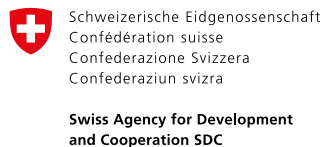
## Key challenges and lessons learned

- A Cholera outbreak and the resulting governmental directives on meeting restrictions negatively affected the pace of Plantwise activities. CABI will work with local partners to resume plant clinic operations as soon as the ban is lifted



# Plantwise is a global programme, led by **CABI**, to increase food security and improve rural livelihoods by reducing crop losses

Plantwise is supported by:



## Contact

To find out more and discuss how you can get involved in this exciting new initiative, contact either of the following:

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