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HTSPE

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HTSPE Limited



HTSPE Limited
Thamesfield House
Boundary Way
Hemel Hempstead
Herts HP2 7SR
United Kingdom
Tel: +44 (0) 1442 202400
Fax: +44 (0) 1442 266438
Email: htspe@htspe.com
Web: www.htspe.com



Stichting Dienst Landbouwkundig Onderzoek (Stichting DLO)
Droevendaalsesteeg 4
6708 PB Wageningen
THE NETHERLANDS
Tel: +31 (0) 317 486859
Fax: +31 (0) 317 486801
Website: www.wageningenUR.nl



Office for Economic Policy and Regional Development (EPRD)
Szkolna 36A Street
Kielce 25-604
Poland
Tel: +48 41 345 32 71 (to 74)
Fax: +48 41 345 25 87
Email: eprd@eprd.pl
Website: www.eprd.pl

Frans Doorman
Lionelle Ngo-Samnick

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1 EXECUTIVE SUMMARY

1.1 BACKGROUND AND METHODOLOGY

1. This is the final report of the mid-term evaluation of the support provided by the EU to the project “Plantwise: integrated plant health systems in Africa”, implemented by CAB International (CABI). The study is based on a review of the documents supplied by Plantwise and observation and interviews conducted with stakeholders during field visits to six of the nine countries in which the EU-supported component of Plantwise is implemented: Ghana, Zambia, Rwanda, Kenya, Malawi and Uganda.
2. The specific objective of this evaluation is to identify key lessons and propose practical recommendations for follow-up actions at three levels: a) At country level, in the six selected countries, b) At continental level – using a comparative approach leading to a coherent framework for follow-up, and c) At the level of EC visibility strategy implementation
3. The Plantwise end of programme vision is a situation of a) national networks of plant clinics providing improved agricultural services to farmers, b) strengthened national plant health systems, c) a global knowledge bank providing up-to-date information on crop pests, and d) a continuation of in-country activities with only limited external funding and support by CABI.
4. The evaluation was conducted in line with the requirements of the last phase of the project cycle, using the evaluation criteria endorsed by the OECD-DAC (relevance, effectiveness, efficiency, sustainability and impact), and focused on generating lessons learnt (what works, what does not, and why) as a basis for the formulation of follow-up actions.

1.2 OVERALL CONCLUSIONS

5. The Plantwise programme is a highly relevant and timely initiative considering the high percentage of crops lost to pest and disease problems, the impact these problems have on especially small farmer livelihoods, and the probability that in the future plant health problems will be enhanced by climate change and globalization.
6. The Plantwise approach, based on a) the reinforcing of plant health systems, b) the provision of advice to farmers through Plant Clinics, and c) the supply of on-line plant health information through a Knowledge Bank is sound and merits full donor support.
7. Minor adaptations and one important addition to the Plantwise strategy are needed to increase programme impact in terms of numbers of farmers reached with tailored plant health advice. Minor adaptations relate to making Plant Clinic operations more efficient and disseminating recommendations to farmer groups. A major addition to the Plantwise strategy would be to use, in addition to the Plant Clinics, the existing national extension system to provide demand-driven plant health advice.
8. The systematic use of existing extension systems to provide plant health advice would involve a major investment in training non-plant doctor extension staff as “junior plant doctors” or “plant nurses”. Donors are recommended to support such investment as it will be key to reaching the large numbers of farmers intended to benefit from Plantwise.

1.3 PLANT HEALTH SYSTEM

9. In all countries visited Plantwise has been integrated well into the national plant health system. In the visited countries linkages between stakeholders have been strengthened, cooperation has improved and thus, stronger plant health systems have emerged.
10. During the country visits it was observed and national Plantwise management indicated there is scope to further expand and intensify partnerships, notably with NGOs and other donor-funded projects and programs.
11. One type of linkage still to be strengthened is linkages with agro-input suppliers. Plantwise should promote active linking of Plant Clinics / plant doctors to agro-input suppliers at field level by plant doctors requesting suppliers to forward farmers with plant health problems to plant clinics and informing suppliers on the products they recommend.

1.4 PLANT CLINICS

12. The Plant Clinic – plant doctor concept has helped to focus extension services on plant health issues. In doing so Plantwise has also been successful in increasing the relevance of extension and the motivation of extension agents and their supervisors.
13. The Plant Clinic component is implemented satisfactorily with in many countries, significant growth in the number of plant doctors trained, clinics, and farmers served. Feedback from

- farmers interviewed during field visits was positive, with farmers reporting that past recommendations had helped avoid major crop losses and even total crop failures.
14. The Plant Clinic approach is relatively inefficient in terms of number of farmers reached because of the individual consultation involved (a Plant Doctor interacting one-on-one with a single farmer) and the fairly long time taken for such consultation (up to an hour).
 15. Present Plantwise strategies for scaling up focus on mass extension, e.g. campaigns based on so-called plant health rallies and the use of mass media, and on ICT solutions based on cell phones. Though relevant this is not enough. To optimize impact Plantwise will have to link systematically into the existing interactive extension models in particular countries.
 16. Integrating the Plant Clinic system in existing interactive extension systems can be achieved by creating what could be called a Plant Health Support Structure. This would entail three levels of plant health interventions towards farmers, ordered according to the intensity of interaction and number of farmers reached: Plant Clinics, Plant Health Extension, and Mass Plant Health Extension.
 17. Plant Health Extension would be the new element in the current Plantwise approach. It would entail the provision of first line plant health support through the existing extension system, with trained extension staff – plant nurses or junior plant doctors – providing plant health advice to farmers and refer to Plant Clinics when needed.
 18. A major challenge facing four out of the six countries visited is that the number of farmers attending the plant clinics is limited. Plantwise should make it a priority to assess the reasons of limited farmer assistance by surveying farmers living in the vicinity of the clinics, with findings being used to take remedial action.
 19. CABI reports on Kenya and Uganda, two countries with well advanced programmes indicate that knowledge and skills of plant doctors are frequently found to be inadequate. For most countries thus far no reliable and representative data are available on the quality of diagnosis and recommendations, a matter that Plantwise should address with urgency.
 20. As a result of deficiencies in the knowledge of plant doctors, lack of plant doctor back-up, and delays in the validation of diagnoses and recommendations, farmers may receive faulty diagnoses and recommendations. Plantwise does not have a mode of operation for correcting such plant doctor errors towards farmers. The absence of a system of immediate validation and correction, towards farmers as well as plant doctors, may lead to farmers taking inadequate, possibly costly measures, and to plant doctors perpetuating errors in both diagnosis and recommendations.
 21. The proposed Plant Health Support structure would promote timely validation through peer review and validation by immediate supervisors and validation by subject matter experts. This should allow plant doctors to correct faulty diagnoses and prescriptions given to farmers by getting in touch with the farmer involved and providing him or her with the correct information.
 22. Plant Clinic management needs to be improved in terms of efficiency of plant doctor – farmer interaction. Possible measures are to have non-plant doctors do intake of visiting farmers, to attend farmers with the same problem as a group, and to make available simple printed extension materials so as to avoid plant doctors losing time by having to write out recommendations.
 23. The number of farmers reached by the Plant Clinic system can also be increased by advocacy with farmer groups to send a representative rather than have each farmer come to the clinic on his or her own account. Likewise plant doctors should systematically request farmers to share information with other farmers.
 24. In the countries assessed, about one quarter to one third of the farmers making use of the plant clinic services is female. In the countries assessed there do not appear to be major socio-cultural factors inhibiting female farmers from visiting plant clinics, nonetheless, Plantwise tries to ensure at least 25% of its plant doctors is female to facilitate (female) farmer – plant doctor interaction.

1.5 KNOWLEDGE BANK

25. The Knowledge Bank is a high quality content repository that links local and international information on plant pests and remedies. The wide range of actual and potential beneficiaries and the quality of the outputs make the Knowledge Bank an excellent investment for EC as well as other donor support.
26. The Knowledge Bank is available in principle to all stakeholders, however, access by the key target group of plant doctors is hampered by the fact that this group usually lacks access to

internet as well as computers. The use of tablets that contain relevant information from the databank, piloted in Kenya, shows great promise in resolving this problem. Otherwise the lack of internet access is being dealt with fairly effectively by supplying plant doctors with printed materials.

27. The exchange of Knowledge Bank-based Fact Sheets and Pest Management Decision Guides between countries should be stimulated, with subsequent adaptation to local conditions by national expert teams.
28. Further developing the Plantwise Knowledge Bank interactive tool for diagnosing pests should be a priority to make the diagnosis and prescription process more reliable and quicker.

1.6 MONITORING AND EVALUATION

29. Monitoring and evaluation is hampered by the fact that performance indicators have in most cases not been quantified, which makes them difficult to assess. Also, many indicators represent outputs rather than outcomes. No national targets have been set for individual countries.
30. Plantwise has recognised weaknesses in M&E and is strengthening its M&E efforts, among others by contracting specialized staff and reformulating the global Plantwise logical framework.
31. Plantwise should consider designing and implementing simple impact measurement at farm level, linked to an M&E system that can be applied by national stakeholders. Such studies should yield rough indications of the effects of applied plant clinic recommendations, which can be obtained by asking farmers to provide estimates of production with and without applying the recommendation.
32. The above impact studies can be combined with research on the reasons why in four out of the six visited countries plant clinic attendance level is below expectations, through surveys in the surroundings of the venues where plant clinics are held.

1.7 TRAINING

33. Intensification and expansion of the standard training program is recommended, both to increase the knowledge and skills of Plant Doctors for diagnosis and prescription and to prepare staff forming part of the proposed Plant Health Support Structure for carrying out new or adapted tasks.
34. For plant doctors the proposed new or adapted tasks would aim among others at a more efficient management of plant clinics, stimulating dissemination of pest management information through farmer-to-farmer extension and farmer groups, and cooperation with agro-input dealers.
35. Non-plant doctor extension staff would receive basic plant health management training and subsequently serve as plant nurses / junior plant doctors by applying their newly acquired integrated pest management knowledge in their daily extension activities. Donors are recommended to provide additional funding for this form of training because of its importance for increasing impact in terms of number of farmers reached with interactive plant health extension.

1.8 COHERENCE

36. Plantwise is well aligned with the EU's Food Security Thematic Programme (FSTP)'s main objective of improving food security in favour of the poorest and most vulnerable through sustainable practices. Plantwise is also fully in line with the EU policy framework to assist developing countries in addressing food security challenges (COM 2010/127).
37. At country level no signs were found of duplication of efforts or conflicting activities, on the contrary, Plantwise generally aligns well with other agricultural development projects and programmes. However, there is scope for creating (more) synergy between Plantwise and such projects, the limiting factor being lack of time on the part of Plantwise country and national coordinators.

1.9 SUSTAINABILITY

38. Institutional sustainability is fostered by the fact that Plantwise is in line with national policy objectives and priorities and is implemented by national organizations, with a lead role for

government institutes. There is a keen interest on the part of all stakeholders, fostered by the high degree of ownership, to continue the programme after donor financing ends.

39. Regarding continued funding after donor withdrawal there are challenges to be met. Especially in Kenya it will be important for the NRO and county governments to prepare for assuming operational costs, notably transport (fuel) and allowances.
40. Maintaining Plantwise services will largely be an issue of political will: authorities should make available the required budgets. So far the signs are promising, however, as the saying goes the proof will be in the pudding, and will have to be assessed after donor financing has ended. CABI – Plantwise actively works on co-financing solutions, such as public-private partnerships, and is also considering the option of (partial) payment for services.

1.10 VISIBILITY

41. CABI and its partners promote visibility through regular updating of the Plantwise.org website, publishing of a newsletter, use of the Plantwise logo on Plantwise materials (e.g., plant doctor uniforms and other plant clinic materials, Plantwise reference materials, presentations, etc.), production of short case study videos and blogs that are shared with partners and posted online, and delivery of presentations at regional and international meetings.

2 INTRODUCTION

2.1 BACKGROUND

This is the Final Report of the mid-term evaluation of the support provided by the EU to the project “Plantwise: integrated plant health systems in Africa”, implemented by CAB International (CABI). It is based on a review of the documents supplied by Plantwise and field visits to six of the nine countries in which the EU-supported component of Plantwise is implemented.

The aim of Plantwise is to provide poor farmers in developing countries with better access to the advice and information needed to help them increase food security and improve their livelihoods by losing less of what they grow due to plant health problems. As the Project Document indicates this can be achieved with the knowledge available today through innovative approaches to extension, namely through expansion of the existing plant clinic network established by CABI, supported by the creation of a global knowledge bank of information on plant health, pests and diseases.

Since 2011, Plantwise has been implemented in a range of countries in America, Asia and Africa, as the successor to CABI’s Global Plant Clinic programme. The contribution of the EC has allowed Plantwise to expand operations in Africa. European Union funds will be used for implementing Plantwise in nine African countries: Kenya, Uganda, Rwanda, Sierra Leone, Ghana, Zambia and Malawi, with some additional pilot activities in Mali and Ethiopia.

The global objective of this evaluation mission is to provide decision-makers of the relevant external co-operation services of the European Commission and the wider public with sufficient information to make an overall independent assessment about the performance of the Plantwise programme, with a particular focus on expected impact of the project relative to its objectives.

The specific objective of this evaluation is to identify key lessons and propose practical recommendations for follow-up actions at three levels:

- 1) At country level, in the six selected countries
- 2) At continental level – using a comparative approach leading to a coherent framework for follow-up
- 3) At the level of EC visibility strategy implementation

The expected results of the evaluation are:

- 1) Conclusions on the implementation and impact of Plantwise thus far, in relation to the global and specific programme objectives and specifying lessons learnt
- 2) Clear answers to the evaluation questions
- 3) Recommendations derived from the conclusions and the lessons learned, especially in terms of identified good practices.

The remainder of this Chapter provides an overview of the main characteristics of Plantwise and its development cooperation context (2.2), a brief description of the evaluation methodology (2.3), and comments on the programme logical framework (2.4). Chapter 3 gives an overall assessment of the programme and its three main components, and Chapter 4 provides the conclusions and recommendations. Specific answers to the evaluation questions are given in Annex 1; in the standard format for EU evaluation reports this section constitutes Chapter 3. A brief discussion on visibility, Chapter 4 in the standard format, is presented in section 3.3., as part of the overall assessment chapter.

2.2 PROGRAMME CHARACTERISTICS AND DEVELOPMENT COOPERATION CONTEXT

The overall objective of Plantwise is to increase food security, alleviate poverty and improve livelihoods by enabling farmers around the world to lose less, grow more and improve the quality of what is grown. The ToR succinctly shows the relevance of programmes such as Plantwise by pointing out that up to 40% of the food grown worldwide is lost to plant pests (including diseases and weeds) before it can be consumed. Since solutions and recommendations to minimize these losses are already known, the prime cause of these losses is concluded to be low awareness as well as poor management. Problems are worsened due to the spread of plant pests resulting from international trade, travel and climate change. With an estimated 0.9 billion people going hungry every day, with

over half of this number made up by smallholder farmers in poor countries, crop health problems have a heavy negative impact on food security and income generation.

The purpose of Plantwise is to deliver an effective system for providing plant health advice and support to smallholder farmers in target countries. Plantwise aims to strengthen national plant health systems by bringing together existing and new information on plant health and supporting and informing stakeholders through fostering partnerships. Delivery mechanisms include a global knowledge bank and national networks of plant clinics.

Beneficiaries of Plantwise are governments, researchers, extension systems, input suppliers and, most importantly, small holder farmers. The end of programme vision is a situation in which:

- 1) National networks of plant clinics will be providing improved agricultural services to farmers
- 2) National plant health systems will be stronger and comprise functioning links among its actors
- 3) A global knowledge bank will be providing up-to-date information on crops, pests and diseases
- 4) Plantwise will be financially self-sustaining such that there is a continuation of in-country activities with only limited external funding and support by CABI.

Plantwise passes through five phases as a country progresses towards a more effective plant health system:

- 1) Assessment of the country context to evaluate suitability for the Plantwise approach
- 2) Pilot – Test Plantwise approach and relevance for the country
- 3) Consolidation – Strengthen in-country activities based on lessons learned to establish a critical mass of plant clinics with the necessary links to key stakeholders
- 4) Scale-up – Embed the organisational changes and new practices to enable expansion of Plantwise activities by national partners
- 5) Sustainability – Empower national partners, facilitate national ownership and responsibility to ensure the Plantwise approach is integrated into standard operating procedures and budgets

The below briefly describes the three main components of the Plantwise approach: strengthening the plant health system, Plant Clinic networks, and Knowledge Bank.

Strengthening the Plant Health System

A plant health system is a group of stakeholders whose interactions are underpinned by knowledge, data and information exchange. This system should function to prevent and manage pest problems, reduce crop losses and promote plant health. This is achieved through organised efforts and informed decisions of research, extension, input supply and regulation, which all serve to benefit farmers.

Plantwise helps developing countries to establish an integrated plant health system. This system links the farmer, via a plant clinic, with an integrated support network, consisting of input suppliers (e.g. pesticide manufacturers), diagnostic laboratories, researchers, national plant protection organizations and policy makers.

Plant health system components already exist in all countries but often operate in disparate ways. Plantwise acts as a catalyst to stimulate the interaction and integration of these parts into a stronger and more effective system; however, the exact nature of the plant health systems will vary from country to country.

Plant Clinic Networks

Plantwise works with local extension services to provide poor smallholder farmers with access to advice on pest problems through a concept called plant clinics. These clinics operate like a human doctor's surgery; they provide advice on demand, tailored to the farmer's individual need. The clinics are made accessible to farmers by holding them on a regular basis in a prominent local meeting place, such as a market. When the farmer has a problem with a crop, he/she can bring a sample along to the plant clinic. At the clinic a trained 'plant doctor' listens to the farmer, examines the sample, diagnoses the problem and offers a suggested treatment. Treatment suggestions are affordable for farmers and use locally available resources. The correct chemicals are recommended only when necessary.

Diagnosis is not always straightforward. Sometimes plant doctors need to send samples to a laboratory (in exactly the same way that a family doctor sends samples to a hospital laboratory). Plantwise helps link clinics with diagnostic laboratories and other resources they need. It also supports local grassroots organizations in setting up and running plant clinics in their local area. The plant clinic acts as the farmer interface; the place where the farmer's individual questions are answered and needs are met. Plantwise provides expert support, capacity building, training and diagnostics.

Plantwise works alongside local partners to train local people to become 'plant doctors' and shares its knowledge in surveillance and diagnostic techniques, integrated pest management, technology development, pesticide use and reduction, and markets and government policy. The prime source of information is the Plantwise Knowledge Bank.

Knowledge Bank

The Knowledge Bank is an interactive website providing information on pest diagnosis, treatment and pest distribution data, the latter gathered from plant clinics, researchers and international partners around the world. Stakeholders can tap into the open access global Knowledge Bank for general information; users with clearance can tap into a password-protected area, the Protected Online Management Systems (POMS), with data from national plant clinic systems on pest incidence and geographical distribution. The main aim of this secured area is to inform stakeholders, including policy makers, on emerging pests and diseases.

The Knowledge Bank also has a core function in M&E through regular reviews of plant clinic data to assess plant clinic coverage, identify (new) plant health problems, characterise plant clinic users (gender) and assess quality of diagnoses and advice. This M&E function of the system is still under development.

Capacity building

Basic training of plant doctors consists of two three day modules (Modules 1 and 2), one focusing on pest diagnosis and remedies and managing plant clinics, the second on providing good advice. Trainers of trainers and subject matter specialists undergo the same training as the plant doctors, before serving respectively as trainers and supervisors of plant doctors. Subject matter specialists, in particular researchers, are trained in Plantwise module 3, elaboration of fact sheets and Pest Management Decision Guides (PMDGs). This module also pays attention to writing extension messages aimed at farmers on the basis of already elaborated Pest Management Decision Guides.

M&E training takes place in what used to be called Plantwise Module 4 but has been rechristened Monitoring Plant Clinic Performance (MPCP). An additional training module is so-called validation training, aimed at subject matter specialists – plant health experts at national level who serve on a national validation teams that review the prescription sheets generated by the plant clinics network, mostly on a quarterly basis.

In some cases additional training and refresher training are given to plant doctors, e.g. on nutritional deficiencies. In Kenya, as part of a pilot project in which plant doctors are supplied with tablets, training was given on the adequate use of these devices for both accessing information on diagnosis and remedies and completion of prescription sheets.

Institutional arrangements

Plantwise is implemented in 33 countries worldwide; the component financed by the EU, evaluated in this report, is implemented in seven countries in Africa: Kenya, Uganda, Rwanda, Sierra Leone, Ghana, Zambia, and Malawi, with pilot activities being undertaken in two more countries, Burkina Faso and Ethiopia. In-country collaboration centres on key stakeholders contributing to extension, research, regulation and input supply. In each country there are two key partnership areas. The first is with the local organisations implementing the plant clinics (the "local implementing organizations"), the second with the country-specific body responsible for the national coordination of plant clinic services and plant health issues (the "national responsible organisation").

In most countries the Ministry of Agriculture is the primary partner of the Plantwise programme, since it generally has overall responsibility for agricultural research, public extension and regulation.

Research organisations, universities, and colleges need to be involved in the plant health system so as to provide technical back-stopping and diagnostic support for the clinics. Agro-suppliers, seed companies, and the organisations that are involved in the input supply chain can also become partners through the provision of advice and resources.

Plantwise cooperates with partners with repositories of complementary plant health datasets on diagnosis and treatment, which is especially important for the development of the Knowledge Bank. The partners include BioNET, CGIAR centres and national and regional plant protection organisations.

Alignment with EU priorities

Plantwise is well aligned with the EU's Food Security Thematic Programme (FSTP)'s main objective of improving food security in favour of the poorest and most vulnerable through sustainable practices. Plantwise thus contributes to the achievement of Millennium Development Goals 1 (halve extreme poverty and hunger) and MDG 7 (safeguard the environment).

Plantwise and more in general, CABI's work are fully in line with the EU policy framework to assist developing countries in addressing food security challenges (COM 2010/127) by supporting smallholder farmers in developing more sustainable and ecologically efficient production systems. This includes improved knowledge of disease and pest problems and the more efficient use of inputs and practices such as integrated pest management.

2.3 EVALUATION METHODOLOGY

The evaluation focused on the progress made in the programme thus far and compared this to the expected outcomes and outputs as defined in the programme's intervention logic, so as to arrive at:

- 1) Conclusions on the implementation and impact of Plantwise thus far, in relation to the global and specific programme objectives
- 2) Clear answers to the evaluation questions
- 3) Specification of lessons learnt and recommendations derived from them, especially in terms of identified good practices
- 4) Pinpointing of strategies and operations that could be improved to enhance effectiveness, efficiency, sustainability and impact.

It should be noted that this is a mid-term review, conducted after only one year and eight months into the 3 year duration of the project. Though an evaluation normally focuses on outcomes and impact, in this case it is too early to expect outcomes have been achieved already, let alone impact. Therefore, the focus was more on experience obtained thus far, and expectations with regard to realizing the outcomes and objectives. This assessment – the comparison between originally expected outcomes and present expectation – has yielded insights in problems encountered, lessons learnt, and ways to improve.

The evaluation process focused on generating lessons learnt (what works, what does not, and why) as a basis for the formulation of follow-up actions. The study was in line with the requirements of the last phase of the project cycle, using the following evaluation criteria:

- 1) The five evaluation criteria endorsed by the OECD-DAC: relevance, effectiveness, efficiency, sustainability and impact
 - a) Relevance: do the objectives of Plantwise align with the needs of the intended beneficiaries, the priorities of the recipient country, and the priorities of implementing and funding partners?
 - b) Effectiveness: has Plantwise managed to achieve its objectives, or is it expected to achieve its objectives?
 - c) Efficiency: has Plantwise converted resources and inputs (funding, time, expertise) into the intended outcomes in an economical way?
 - d) Impact: what are the long-term effects of Plantwise – both positive and negative, and intended or unintended?
 - e) Sustainability: can the benefits realised through Plantwise be sustained over time without further funding support, and are there any risks that may reduce benefits in the future?
- 2) The EC-specific evaluation criteria of EC: added value and coherence

- 3) Specific evaluation questions identified and agreed with the evaluation manager and the reference group during the first reference group meeting before the start of the field phase

The following sources of information were used:

- 1) Project documentation provided by CABI: program level, and national level.
- 2) Interviews with stakeholders. The following methods were used:
 - a) Plantwise global programme managers were interviewed through Skype.
 - b) Open-ended questionnaires with evaluation questions tailored to different types of stakeholders were sent out via the country coordinators, completed electronically, and sent back for assessment.
 - c) During the field visits observation, face-to-face interviews and group interviews were conducted using checklists tailored to the types of stakeholders.

The following types of stakeholders were interviewed at national level: the EC Delegation, Country coordinators (CABI), National coordinators (from the National Responsible Organization), National knowledge bank managers / coordinators, representatives of other national knowledge bank contributors (e.g. research institutes, universities), key staff from the Local Implementing Organizations, Trainers of Trainers, Plant Doctors, agro-input suppliers, and farmers – male and female.

Analysis of the data entailed a mostly qualitative review and interpretation of the collected information using the methods described above. Triangulation of information from different sources took place by comparing the information and data obtained from the different above mentioned sources, so as to arrive at conclusions that are firmly founded and as reliable as possible given the limited time frames available for this evaluation.

2.4 COMMENTS ON THE LOGICAL FRAMEWORK

Overall the logical framework is quite well elaborated and coherent, with adequate internal logic. However, a few comments need to be made.

Regarding the specific objective or project purpose it could be stated that its formulation focuses more on means and is, therefore, instrumental, then on impact. As indicated above the specific objective is formulated as: *an effective system for providing plant health advice and support to smallholder farmers in target countries backed up by a global knowledge bank*. This system, obviously, is a means to an end: the system is not a goal in itself but a means to achieve the end of reduced crop losses to pests and the improved crop health, quality and yields listed in the overall objective. Not specifying this in the project purpose also leads to the indicators referring to the tool, the system, rather than to the impact of the system.

Although impact is to some extent reflected in the term “effective” it would be better to indicate the desired impact explicitly and have it reflected in quantified indicators – e.g., “Crop losses of farmers reached through the programme reduced by 30%”.

Two other important goals which could be considered specific objectives are implicit in the Plantwise approach but not explicitly formulated. One is diminishing the use pesticides, especially those that are harmful to human and animal health and the environment, through promoting Integrated Pest Management, IPM. The other is the timely signalling and taking effective measures against major pest outbreaks. Though impact measurement for these goals is difficult, including them in the logframe would help in specifying outcomes and outputs needed to reach the goals.

In addition, the evaluation team notes the following:

- 1) No quantitative targets are given in terms of the reduction of crop losses due to the Plantwise intervention (an example, already mentioned above, would be: “crop losses reduced by ..._%”). As a justification for Plantwise it is indicated that worldwide, an estimated 40% of crops is lost due to pest problems. This could be the basis for a rough indication of the reduction in crop losses expected for the farmer-beneficiaries of Plantwise. It is, of course, recognized that these reductions will vary according to crops, agro-ecological conditions (between and within countries), and many other factors. Nonetheless, a rough estimate of the

- average reduction in crop losses could be made, to be followed up by systematic monitoring of the results of farmers applying plant clinic recommendations.
- 2) Likewise, the indicator on increased yields could be quantified by the following formulation: "increase crop yields by ... %", whereas outcome indicators 6, related to the knowledge bank, could give a numerical target on the number of times the KB information is accessed by male and female extension workers and farmers.
 - 3) No expected result or indicators have been formulated on key elements of Plantwise: the access of plant doctors and extension staff to the Knowledge Bank, the actual use made of that access, and the use of the information accessed for advising farmers in plant clinics or otherwise.
 - 4) An issue that would merit more attention in the expected results is the way in which the plant clinic system is going to be scaled up – particularly in terms of reaching the large numbers of farmers / farm households to be reached. An example would be: "Extension approaches to scale up the supply of information on plant health management to farmer beneficiaries developed and implemented". These approaches could be both generic and country- or situation-specific.
 - 5) No expected results or indicators / targets related to gender have been specified.
 - 6) Although there is an overall target for the farmers of farmers to be reached through Plantwise there are no targets for the countries where Plantwise is implemented. Especially for countries where Plantwise was already ongoing when the EC-funded component started, in 2013, it would have been relevant to set targets per country.
 - 7) Regarding the number of farmers reached it would also be important to distinguish in what manner they are reached. Especially relevant is the number of farmers reached through plant clinics, but also relevant are the numbers of farmers reached through e-extension, plant health rallies and indirectly, through farmers attending Plant Clinics advising neighbouring farmers or farmers from groups they are members of. Setting such targets will help focus attention on strategies and operations to optimize the impact of Plantwise.

It is important to note that since the original project proposal and logical framework for the EC-financed Plantwise component was elaborated CABI has paid much attention to strengthening Plantwise monitoring and evaluation overall, that is, for the entire programme conducted in 33 countries. This has resulted among others in contracting M&E specialists and in the elaboration of a new logical framework for the overall programme (October 2013). As this new logframe may be held to apply to the EC-financed component also, at least to some extent, some comments on this new logframe are given in the following:

- 1) In comparison with the first logframe, of October 2011, indicators for outcomes as well as outputs are elaborated in more detail and have been ordered and numbered, providing a much better overview.
- 2) However, indicators are still not quantified. Good examples, to which the above comments also apply, are outcome indicators 6 and 7. Indicator 6 is formulated as follows: *Increased numbers of male and female farmers have access to appropriate, timely and locally relevant information and advice on plant and soil health, through plant clinics and mass extension campaigns* Indicator 7 states: *Increased adoption of improved technologies and practices that lead to positive effect at farm level (including pest management strategies, use of inputs such as fertilizers and pesticides)*. It would be important to specify performance targets in terms of numbers: the numbers of (male and female) farmers reached through Plant Clinics, and the numbers to be reached through complementary forms of (mass) extension. Likewise, specification of the improved technologies and practices and of adoption rates (% of farmers adopting certain practices) and expected impact (% yield increase and possibly, increased areas grown with crops for which pests have been successfully combated). Again, it is clear that such figures can be no more than very rough estimates as different crops, agro-ecological conditions and pests and diseases are involved. Nonetheless such performance targets are important to help focus Plantwise efforts, provide benchmarks to measure performance, and provide a basis for impact assessment.

3 OVERALL ASSESSMENT

3.1 REVIEW OF THE MAIN PROJECT COMPONENTS

The specific Plantwise activities are grouped into five broad work areas represented in the five programme outputs presented in the logical framework: (1) Plant Clinics, (2) stakeholder linkages, (3) data management and use, (4) information exchange and knowledge bank, and (5) monitoring and evaluation. In terms of impact and benefits for the target group, i.e. reduced crop losses, higher yields and increased production for farmers, the Plant Clinics form the core of the Plantwise approach. The other four areas can to a large extent be considered as instrumental in ensuring that the Plant Clinics function optimally. Two other important purposes can be added to that of reducing crop losses: rationalizing the use of pesticides, especially those that are harmful to human and animal health and the environment, and taking timely and effective measures against major pest outbreaks. These purposes are implicit in the Plantwise approach but, as indicated in Chapter 3 of this report, are not explicitly formulated.

3.1.1 Plant clinics

The **Plant Clinic component is fairly successful** with in many countries, **significant growth in the number of plant doctors trained, clinics, and farmers served**. Very importantly, **feedback from farmers interviewed during field visits was positive**, with farmers who had visited before reporting that past recommendations had helped avoid major crop losses and even total crop failures. Though no firm data from representative samples of beneficiaries are yet available, it may be assumed that plant clinics have at least a measure of success in reducing pest-induced crop losses.

The Plant Clinic component is the most demanding Plantwise component, and faces a number of challenges. Some of these are partly addressed in :

- 1) Plant doctor consultation takes place in central locations, not on-farm. **Plant doctors may therefore miss out on certain contextual information that is important for providing the best possible advice**. Although in many cases pests and diseases may be recognized relatively easily, in other cases diagnosis may be less clear-cut. And even when pests and diseases (or if the case be, nutrient deficiencies) are correctly diagnosed, defining the best possible remedial action may depend in part on on-farm observation. In practice, some plant doctors already make follow-up farm visits as part of their non-Plant Clinic activities. This is possible because Plant Doctors dedicate on average from 10 to 20% of their time to conducting clinics, the rest of their time they conduct to other extension work and related activities. However, interaction of Plant Clinics with other forms of interactive extension is a local initiative, not part of the Plantwise approach, i.e., it is not systematically fostered by Plantwise.
- 2) A major challenge facing four out of the six countries visited is that the **number of farmers attending the plant clinics is limited**. Only in Uganda and Malawi are numbers what the evaluators expected to encounter: at least 20 farmers per clinic session, with somewhat lower numbers in the dry season, when there are fewer crops in the field. In the other countries average farmer numbers per Plant Clinic session of below ten were reported. This is problematic, especially considering that in Kenya and Ghana Plantwise has been operating for several years. Plantwise should make it a priority to assess the reasons of this limited assistance so as to take remedial action. That Plant Clinics can be successful is proven by Malawi and Uganda, with in the latter country average attendance rates of up to 40; the challenge is to create comparable demand in all Plantwise countries.
- 3) CABI reports on Kenya and Uganda, two countries with well advanced programmes indicate that **knowledge and skills of plant doctors are frequently inadequate**. If this is the case in the countries with the most advanced programmes it may well be the case as well in less advanced countries, where the program has started more recently. For most countries thus far no reliable and representative data are available on the quality of diagnosis and recommendations, a matter that Plantwise should address with urgency – some suggestions are given below.
- 4) Immediate supervisors, often considered subject matter specialists because of higher level education and training (e.g., a BSc rather than a Diploma or Certificate) may **lack the knowledge to adequately assess Plant Doctor work** (which may be why Plantwise aims to have validation take place at national level). An indication of this is that supervisors consider about 80 to 90% of diagnoses and recommendations are correct, a much higher percentage

- than found in the systematic study conducted in Kenya, and contradicted by a spot check conducted during this evaluation. Whereas the latter cannot, of course, be considered as representative it does point to an urgent need for further assessment.
- 5) Inadequate capacity for plant health problem diagnosis and recommendations can be and should be remedied in various ways:
 - a) **Additional training on plant health issues.** The present six days of Plant Doctor training, consisting of two three-day modules covering a range of topics, in any case appears fairly limited, longer duration training would likely increase skills.
 - b) **Exams for Plant Doctors,** to ensure only extension staff have acquired the necessary knowledge and skills to function successfully as plant doctors (already practiced in some countries).
 - c) **Better access to plant health knowledge and information** to support diagnosis and recommendations. This can be through a more ample supply of **printed materials** (already supplied to varying extents) and even better, through **tablets** with Knowledge Bank information and electronic support for diagnosis (after tapping crop and symptoms the system indicates the probable pest and remedies)
 - d) Better support and back-up, in the form of **supervisors – subject matter specialists validating prescription sheets as soon as possible after having been completed, and pointing out errors to the doctors.**
 - 6) As a result of deficiencies in the knowledge of plant doctors, in plant doctor back-up, and in the validation of diagnoses and recommendations **farmers may receive faulty diagnoses and recommendations.** This is a serious matter: it may lead farmers to take the wrong measures to address the problem, which may lead to increased costs and / or crop losses. This can have grave consequences not only for the farm household but also for the reputation of the Plant Clinics and the confidence in the extension service overall.
 - 7) **Plantwise does not have a mode of operation for correcting plant doctor errors towards farmers.** Validation is only foreseen at national level, and appears to be more oriented towards ensuring the correctness of data entered into the Knowledge Bank than pointing out errors to plant doctors and correcting recommendations given for farmers. In Kenya errors in prescription sheets are not discussed individually with the plant doctor making them, but are reviewed only in so-called cluster meetings where general feedback is given on the prescription sheets presented by all plant doctors. In any case correcting plant doctor errors towards farmers is of limited use as validation meetings take place only on a quarterly basis, meaning feedback on the correctness of prescription sheets is given only weeks or even months after farmers have received the recommendations. In other countries validation takes place at lower levels, by supervisors and on an incidental basis by teams of higher level subject matter specialists, e.g. researchers who also function as plant doctor trainers, and national and country coordinators. Although the latter can be expected to make the necessary corrections direct supervisors of the plant doctors at local level may lack the necessary expertise and in practice, focus more on whether prescription sheets have been completed correctly than on errors in diagnosis or recommendations. In the below, some suggestions are made for strengthening the validation process and orienting it more to farmer needs as well as increasing its usefulness for monitoring and evaluation and supply of relevant information to the Knowledge Bank.
 - 8) **Plant doctor – farmer interaction will usually involve one-on-one contact,** and therefore, **allows attending only a limited number of farmers. The greatest challenge is how to scale up to reach large numbers of farmers with quality advice tailored to their situation.** In the countries visited, there was hope and expectation that plant clinics could be scaled up to a sufficiently dense network covering the whole country. This is not very realistic, as the cost of doing so is likely to be prohibitive. Other strategies for scaling up are therefore needed. Plantwise advocates mass extension and e-extension, which will certainly be important. However, **prime attention needs to be paid to integrating the Plant Clinics system in existing extension systems involving extension agent – farmer interaction** (as opposed to the one-way communication of mass-extension), and using those other forms of extension systematically both to spread plant health information to larger numbers of farmers and to raise awareness on the possibility of getting expert advice in plant clinics. Some suggestions for this will be given below.
 - 9) Plan Clinic management needs to be improved in terms of **efficiency of plant doctor – farmer interaction.** As indicated, the fact that plant clinics involve one-on-one interaction

already limits its reach in terms of numbers of farmers that can be attended. In practice, this weakness is enhanced by the fact that plant clinic implementation is considerably less efficient than it could be. Plant doctors spend much time on filling in the prescription sheets destined for the Knowledge Bank (see below) and to a lesser extent, writing recommendations for farmers. They also take their time for interacting with farmers, many of whom come with several samples of different crops with health / pest problems, leading to consultations lasting up to an hour and sometimes longer. And even though several farmers come with the same problem and could be advised concurrently they are advised one after the other. In consequence farmers frequently have to wait a long time to be served – leading some farmers, especially the more entrepreneurially oriented ones who value their time the most, to leave in disappointment. In the below some measures are proposed to remedy these shortcomings, among others, by having assistants (“plant nurses”) do intake, group approaches, and simplification and digitization of registering information on prescription sheets.

- 10) A drawback of a demand-driven system such as the plant clinics is that those making use of it are not necessarily representative for the farmer population as a whole. It is, therefore, somewhat of an open question whether farmers taking the initiative to go to a plant clinic are those most in need of assistance but without the means to obtain it. Also, problems taken to the clinics may not always be representative for the area and/or farmer population as a whole – which may undermine the early warning function based on plant clinic attendance.
- 11) The plant clinic system has been set up as a new extension approach that is complementary to existing extension services – e.g., plant doctors are often extension agents who before Plantwise, supposedly conducted other extension activities. Thus Plantwise extracts to at least some extent human and other resources from the regular extension system. This is justified if Plantwise is more effective than the extension activities it replaces, and it probably is – if only because in many countries extension staff often lacks the means (transport, fuel) to adequately carry out their tasks, and may also lack up-to-date technical knowledge and advisory skills. Nonetheless it would be important for Plantwise to assess what activities have been halted or have diminished in scope as the result of the implementation of Plantwise – something that can be done fairly easily by consulting plant doctors and extension managers.
- 12) There is a lack of very simple written materials to be handed out to farmers. Plantwise advocates the dissemination of fact sheets to farmers but these are likely to be too complicated for most and are used mostly by extension staff – plant doctors. Availability of simple leaflets with recommendations in the national as well as local language could also save plant doctors time in dealing with farmers, as they could give a hand-out rather than having to write down the recommendation for the farmers.

3.1.2 Knowledge bank – information management and use – information exchange

The Knowledge Bank (KB), in particular the open access part, is **a highly relevant and very valuable and well-managed tool – not only for the Plantwise programme in the nine countries supported with EC financing, or the many other countries where CABI and Plantwise operate, but (potentially) worldwide.** On what one might call the supply-side (KB supplying to beneficiaries), the open access part of the Knowledge Bank contains a wealth of very accessible information on plant health issues for all major and a host of minor crops. On the demand side (KB obtaining information from beneficiaries), the Knowledge Bank is successfully managing a large quantity of information resulting from feedback from plant clinics, and is using this for the monitoring of key variables such as number of queries handled (for male and female farmers) and prevalence of specific crop pests.

In spite of its obvious benefits the Knowledge Bank faces (and in some cases is already coping with) the following challenges:

Supply side:

- 1) Internet access by extension agents and farmers. Very few farmers and even fewer smaller farmers, the target group of Plantwise, have access to internet and therefore cannot access the KB. The same goes for most extension agents. This is remedied in part by providing extension staff with printed materials based on KB knowledge: the fact sheets and Pest Management Decision Guides (PMDGs). The pilot in Kenya with the use of tablets on which the relevant part of the KB is uploaded has proven the usefulness of these devices,.

- 2) The fact sheets and PMDGs are developed in each country, from scratch. This has contributed to considerable delays in material becoming available. Plantwise should consider **supplying country teams with relevant fact sheets from other countries**, which can then be adapted to local conditions, which should be quicker than development from scratch and thus could help countries make available relevant materials to extension staff on shorter notice. In general, exchange of prescription sheets and PMDGs between countries should be actively promoted and stimulated.
- 3) It is important to make materials available in local languages, for extension staff – plant doctors as well as farmers. Currently Plantwise uses Google Translation for some languages, but these translations have serious deficiencies. It would be very difficult and costly for Plantwise to assume overall responsibility for translations, except perhaps for the most commonly and internationally used languages. For local languages it would be logical for the NRO and one or more LIOs to take responsibility for translating and producing the materials involved – if need be, with financial and other support from the Plantwise program.

Demand side:

- 4) The basis for the information fed into the Knowledge bank are the so-called prescription sheets, a Plantwise-designed one page format in which key information on each farmer query is registered. If a farmer comes with more than one pest problem one form should be completed for each problem. During the field visits several problems were noted with regard to prescription sheet completion:
 - a) Already mentioned was the **time involved in prescription sheet completion**, which significantly increases the time spent per farmer, and consequently, waiting times for other farmers waiting to be attended. This, in turn, leads to fewer farmers being attended and in some cases, farmers leaving before they can be attended. This can be remedied by limiting the information to be included in the prescription sheets, the use of tablets, and making available pre-printed recommendations. These remedies will be described in some more detail below.
 - b) The time involved in prescription sheet completion also leads to **plant doctors not filling in prescription sheets** at all for part of the queries. By some estimates only about half the queries are registered on prescription sheets. This may lead to distortions in quantitative estimates of pest incidence.
 - c) **Quality of prescription sheet completion** leaves to be desired – probably in part due to time pressure and to lack of motivation and ownership on the part of plant doctors, who have to do a sizeable amount of work in completing them but see little or no feedback on this work.
- 5) Validation of prescription sheets leads to the **rejection of sizeable number of prescription sheets**. The latter, again, may lead to distortions in quantitative pest incidence estimates, especially since rejection is likely to occur more frequently with difficult to diagnose pest problems. Some suggestions for strengthening validation are given below.

3.1.3 Stakeholder linkages – Plant Health System

Plantwise has been **successful in developing stakeholder linkages**, as shown by the fact that in all countries where activities have been initiated both knowledge bank and plant clinic activities have been set up and are being implemented by the national partners, with CAB International in a supporting role. In various countries Plantwise has overcome initial opposition, sometimes based on mistrust by organizations nationally responsible for plant health, through patient yet determined awareness raising and trust building. In consequence, national knowledge banks linked to the global knowledge bank and plant clinic programs are now operational and fulfilling their functions.

One type of **linkage still to be strengthened is that with agro-input suppliers**. Plantwise originally aimed to compile directories of registered agro-input suppliers, however, it has now changed this policy into encouraging plant doctors to assess the agro-input suppliers in their areas to identify those who are most trustworthy. Also Plantwise is investigating ways to further link agro-input suppliers with plant clinics, with the aim of ensuring that appropriate products are available to farmers. Whereas doubts can be raised as to the “assessment of trustworthiness”, some suggestions are made in the below for fostering cooperation with agro-input suppliers. These suggestions are based on observations made during the field visits, in which it was noted that sometimes plant clinics are held in front of agro-input supplier shops. This is positive in the sense that it creates linkages between plant

doctors and suppliers, with the former stimulating the latter to stock and sell the products the clinics recommend. However, it would be important to formalise cooperation, with the supplier committing to stocking and selling only the better quality, less toxic pesticides recommended by Plantwise and providing adequate advice on IPM measures as an alternative to pesticide applications when feasible. Plantwise might consider setting up and conducting special training for sales staff and managers/owners of the shops.

A challenge for the sustainability of the strengthened plant health systems created with support from Plantwise is, as mentioned above, the central role of Plantwise staff in those systems. To foster sustainability Plantwise might consider promoting the creation of national **plant health system coordination units**— rather than as at present leaving coordination to one national coordinator. The current national coordinators could chair the coordination units in the different countries, and with CABI support, prepare the units to take over all coordinating responsibilities once donor support is withdrawn.

3.1.4 Monitoring and evaluation

Plantwise pays ample attention to monitoring and evaluation, in particular to **impact evaluation**. The latter is a major challenge, as the Plant Clinic model makes it difficult to assess the actual impact of the recommendation given, since farmers who have been assisted may not return to the clinic, which makes collection relevant data difficult.

Plantwise is currently commissioning an impact study in Kenya, in which a large numbers of farmers will be monitored and the impact of plant doctor recommendations will be assessed by comparing the farmers involved with a control group who has not received such recommendations. Questions may be raised as to both the **effectiveness and efficiency of this study**. Because of its size and scope it is likely to consume considerable resources and will therefore unlikely to be replicable – not in Plantwise, and much less by local implementing organizations and national governments once Plantwise support is withdrawn. Although the purpose is to show the actual impact of the plant clinic approach the question is how representative this particular case is for the many varying situations in which plant clinics are held. And it is an open question whether the comparison between assisted and non-assisted farmers may be influenced by other factors – e.g. differences in pest and disease incidence and differences in agro-ecological and socio-economic conditions. Whereas the impact evaluators undoubtedly attempt to minimize such intervening factors, in practice it may be very difficult to do so.

Plantwise should consider designing and implementing **simpler impact studies and an M&E system for impact measurement that can be applied by national stakeholders**. Such studies should yield rough indications of impact, which can be obtained by asking farmers to provide estimates of production with and without the application of plant clinic recommendations. Also, additional to this more quantitative analysis a case study approach may be used to obtain more qualitative information on the application and impact of plant clinic recommendations.

The above **impact studies can be combined with research on the reasons why in four out of the six visited countries plant clinic attendance level is below expectations**. This can be investigated by conducting surveys with random samples of farmers in the surroundings of the venues where plant clinics are held – e.g., within a 5 to 10 km radius. Sampled farmers who have not visited the clinic should be questioned on the reasons for not doing so, whereas farmers who have can be questioned about follow-up and impact. Such surveys would also provide insight into the percentage of farmers (of the total farming population) making use of the clinics, and could be used to raise awareness on the clinics.

In addition to monitoring impact in terms of assessing the outcomes of the application of Plant Clinic recommendations it would also be important to monitor if and how extension staff use their knowledge and skills acquired under Plantwise in their other extension activities (i.e., in the 80 to 90% of their time not dedicated to running Plant Clinics). This would give insight in the corresponding spin-off effects of the Plant Clinic approach and the resulting outcomes and impact. Further suggestions on this are made below in the section on monitoring and evaluation.

3.2 STRENGTHENING PLANTWISE

3.2.1 Integrating Plant Clinics into a Plant Health Support Structure

In the above various challenges for the Plant Clinics and Knowledge Bank were mentioned. In this section suggestions are presented to address these challenges in an integrated manner. Some elements of the recommendations made are already being addressed, to varying extents, in the ongoing efforts of Plantwise to further refine and improve its strategies, as laid down in the new Plantwise Strategy 2015-2020 of which a draft appeared in July 2014.

As indicated, the Plant Clinic system is highly useful as a concept to focus the attention of extension services and farmers on plant health issues, and to do so in a demand-driven manner. Both extension and other support staff become more aware of the importance to address plant pests directly and effectively. **The impact of the plant clinics as such, however, remains rather limited, due to the limited number of farmers that can be attended and are currently being attended.** The reach and thereby, the effectiveness, efficiency and impact of the system in terms of reducing crop losses for large numbers of farmers should be increased through systematically integrating the plant clinics in existing extension approaches and systems, by creating what could be called a **Plant Health Support Structure**. This would entail service provision at several interacting levels, using plant health specialists with different expertise levels. The below overview provides an idea of such a structure.

As indicated elsewhere in this report, many of the elements of the below structure are already used in part at national and field level. But this takes place in an ad hoc rather than a systematic manner, and the practices engaged in do not form part of the formal Plantwise approach as described in project documents.

Category	Task	Training
Subject matter experts: researchers and other highly specialized subject matter specialists such as entomologists, phytopathologists, etc., at research institutes and universities	<ul style="list-style-type: none"> • Diagnosis plant problems not resolved at lower levels, referral to laboratory if needed • Training subject matter specialists and plant doctors • Highest level validation of diagnoses and recommendations in fields of expertise • Elaboration of fact sheets and PMDGs • Technical assistance for mass extension campaigns (message contents) 	<ul style="list-style-type: none"> • Use of knowledge bank • Plant clinic / plant health support structure principles and operation • Technical and ToT training as required • Elaboration of fact sheets and PMDGs – pest management manuals
Subject Matter Specialists: Extension supervisors and subject matter specialists with advanced schooling and training in agronomy, BSc level	<ul style="list-style-type: none"> • Training and supervision of plant doctors • Diagnosis plant problems not resolved by plant doctors, referral to subject matter experts if needed • Validation of all diagnoses and recommendations, feedback to plant doctors, monitoring of performance plant doctor team • Coordination and implementation of mass extension campaigns 	<ul style="list-style-type: none"> • Use of knowledge bank • Plant clinic / plant health support structure principles and operation • Technical and ToT training Monitoring – data collection
Plant doctors: Senior extension staff – BSc or Diploma level	<ul style="list-style-type: none"> • Conducting Plant Clinics: first line plant health advice in the immediate surroundings of the venues where the plant clinics are held and in non-clinic extension work; second line plant health advice for farmers referred by junior plant doctors / plant nurses to the clinics • Other extension activities • Completion of prescription sheets • Validation of prescription sheets through peer review • Data gathering for monitoring of impact 	<ul style="list-style-type: none"> • Use of knowledge bank • Plant clinic / plant health support structure principles and operation • Technical and advisory training • Monitoring – data collection

Category	Task	Training
	<ul style="list-style-type: none"> of recommendations • Informing farmers of corrections in diagnoses and / or recommendations • Linking to agro-input suppliers • Implementation of mass extension campaigns 	
Plant nurses /junior plant doctors: Junior extension staff. Possibly also lead farmers, community based development agents with agricultural training	<ul style="list-style-type: none"> • First line advice on plant health issues within general (extension) activities, awareness raising on and referral to plant clinics if diagnosis cannot be given. • Data gathering for monitoring of impact of recommendations • Support for mass extension campaigns 	<ul style="list-style-type: none"> • Use of knowledge bank • Plant clinic / plant health support structure principles • Technical and advisory training • Monitoring – data collection
Agro-input dealers: sales staff and managers	<ul style="list-style-type: none"> • Referring farmers with pest problems to Plant Clinics • Providing farmers with advice, information and extension materials on IPM and pesticide use • Stocking pesticides recommended in Plant Clinics 	<ul style="list-style-type: none"> • Training on Plant clinic / plant health support structure principles, IPM, and responsible pesticide use

The most important elements the Plant Health Support Structure adds to the Plantwise approach are the following:

- **Scaling up through existing extension:** Provision of plant health advice by creating **first line plant health support** through the existing extension system, in which trained extension staff – **plant nurses** or **junior plant doctors** – provide advice to farmers and refer to Plant Clinics in case they cannot resolve the pest problems farmers present to them. In principle all extension staff should receive basic training as plant nurses or junior plant doctors and subsequently serve as first line plant health officers. Training of lead farmers and community based change agents can also be considered. Plant nurses should diagnose problems and provide recommendations in their daily extension practice or farmer group activities – not in plant clinics! – for the most prevalent and easy to recognize pest problems. They should refer to plant clinics when not certain about diagnosis or recommendations. Plant nurses should also support plant doctors in collecting data on the impact of the recommendations made (prescription sheet to be developed), and can assist plant doctors in conducting Plant Clinics, both to allow plant doctors to work more efficiently (by doing intake, see below) and to learn “in-service” from plant doctors advising farmers.

The use of plant nurses or junior doctors (countries should decide on the most appropriate term) will greatly increase the reach of Plantwise, as existing extension systems often use a group approach and farmer-to-farmer extension. It can also rationalize the use of plant doctor time by having (lead) farmers representing farmer groups visit clinics for advice on major pest problems affecting larger numbers of farmers. Utilising existing extension systems for first line plant health services is essential for reaching a significant proportion of the farmer population with plant health advice. This is on the one hand because the Plant Clinic system as such has limitations that are inherent to the one-on-one interaction of some duration that defines the model. On the other hand the Plant Clinic system is too costly to be multiplied to cover all geographical areas and therefore, should be considered a second line plant health service rather than a first line one.

Basic training of plant nurses / junior plant doctors could initially consist of one day training courses by expert SMS for imparting basic knowledge on IPM, the use of PMDGs and fact sheets, and diagnosis of and remedies for the main pests in the areas where the trainees operate. Follow-up training could be used to expand on these themes and update information on important pests and diseases.

- **Increased support for plant doctor diagnosis**, by creating a **diagnosis structure** in which plant doctors unable to diagnose the problem brought to them first consult their regional subject matter specialists who, if they do not know, consult the expert subject matter specialists. Only if the latter do not know will laboratory diagnosis be called upon. Presently, plant doctors are expected to send pest problems they are not able to diagnose directly to laboratories, which usually they are unable to do, is costly and therefore unlikely to be sustainable; moreover it is time consuming. Referring to laboratories should be a matter of very last resort, utilized only after expert subject matter specialists have not been able to resolve the problem.
- **Active linking to agro-input suppliers.** At field level plant doctors should pro-actively approach agro-input suppliers to co-opt them into cooperating with the Plant Clinics. In initial contacts they could request suppliers to forward farmers with plant health problems to plant clinics, plant doctors, or plant nurses, and leave the needed contact information. They could also provide information on the remedies, including pesticides, proposed for specific pest problems, in the form of fact sheets and PMDGs. In follow-up visits they could provide information on the recommendations made in the clinics and advise on products to purchase, so suppliers can stock them. They could also leave extension materials for farmers, and ask the suppliers to hand these out to farmers coming to the store – as a second choice option for going to a clinic. Plantwise should consider supplying suppliers with forms to register this information, and even more important, should consider providing basic training to agro-input supplier shop attendants on responsible pesticide use and other IPM measures.
- **Multiple level validation and feedback to farmers on faulty diagnosis and recommendations:** Validation of prescription sheets should be a three-step process, allowing rapid feedback on errors made and monitoring not only of whether diagnoses are correct or wrong, but also correlating faulty diagnoses to specific types of pest problems, thus identifying training needs. For monitoring the quality and correctness of diagnosis and recommendations, and for ensuring rapid feedback in case of errors the following validation stages are proposed:
 - First stage validation: peer review by colleague plant doctors. At the end of the Plant Clinic session, or the next day, the two plant doctors should check each other's prescription sheets and correct or add – with their responsible colleague – where necessary. In case of faulty recommendations to farmers the farmers involved should be contacted directly – usually this will be possible by phone, otherwise by a follow-up visit.
 - Second stage validation: by the Plant Doctor's (technical) supervisors – subject matter specialists. They should review the prescription sheets as soon as possible after completion, preferably the following day. In case of errors the responsible plant doctor should be contacted and instructed to contact the farmer with the correct information as soon as possible.
 - Third stage validation: by Expert SMS – regional or national level validators, usually researchers from regional or national research institutes or universities. These experts also should validate as rapidly as possible and provide direct feedback to plant doctor supervisors in case of faulty diagnoses and recommendations, so the supervisor can forward the information to the plant doctor involved.

Presently Plantwise only envisages what in the above is called third stage validation, although to some extent validation by direct supervisors also takes place. This does not happen systematically, and remains limited mostly to checks on whether completed prescription sheets have been completed in the required manner. These checks do not usually verify the correctness of diagnosis or recommendations.

The proposed multi-stage validation will not only allow rapid feedback to farmers but also, by providing direct feedback on errors, significantly increase the capacity of plant doctors and their supervisors in diagnosing and remedying plant health problems. Also, with the necessary adaptations in the prescription sheets, it will allow monitoring of supervisor and plant doctor performance overall, as a basis for identifying training needs. It should also decrease the number of prescription sheets rejected because of incompleteness, which will allow obtaining a more representative picture of pest incidence.

- **Advocacy:** junior plant doctors will refer more difficult and/or lesser known plant health problems to Plant Clinics and in general, raise awareness on their existence and benefits.
- **Monitoring and evaluation:** Senior and junior plant doctors will collaborate on gathering data for impact monitoring, notably in terms of asking farmers for feedback in the form of estimates of yields obtained after application of the recommendations and yield estimates had the recommendations not been applied.

The below table presents the most important elements which the Plant Health Support Structure adds to the Plantwise approach, the additional support required from Plantwise, and suggestions for sponsoring by donors.

Proposed new Plantwise components	Support required from Plantwise	Support from donors	Time frames
Scaling up through existing extension: Provision of plant health advice by creating first line plant health support through the existing extension system, in which trained extension staff - plant nurses / junior plant doctors provide advice to farmers and refer to Plant Clinics in case they cannot assist farmers.	Adapt Plantwise strategy to include this component – starting, in a particular country, in the pilot phase once the first Plant Clinics are up and running. Capacity building of trainers to train (non-Plant Doctor) extension staff who will function as plant nurses or junior plant doctors. These can be subject matter specialists and/or plant doctors with training abilities	Funding for training of trainers of junior plant doctors Funding for training junior plant doctors Funding of tablets for junior plant doctors could be considered	2015 and onwards – programme extension required
Increased support for plant doctor diagnosis, by creating a diagnostic support structure in which plant doctors first consult their supervisors / subject matter specialists who, if they do not know, consult the expert subject matter specialists.	Adapt Plantwise strategy – task descriptions of supervisors and subject matter specialists Incorporate needed skills development for diagnostic support structure in all training programs (training of trainers, supervisors, plant doctors)	None	2015
Linking actively to agro-input suppliers by asking suppliers to refer farmers to Plant Clinics and advising suppliers on what products to stock. Also, ask suppliers to disseminate information to farmers, and basic training to agro-input supplier shop attendants on responsible pesticide use and IPM.	Incorporate explanation on purpose and practice of cooperation with agro-input suppliers in plant doctor and supervisor training programs	Funding of capacity building (development of training package and actual training) of agro-input supplier sales staff	Plant Clinic / Doctor linking to suppliers: 2015 Training of supplier staff: 2016 – programme extension required
Validation at multiple levels: first by colleague plant doctors, then by immediate supervisors, and then by regional or national level validators.	Incorporate explanation on purpose and operation of multiple level validation as well as required skills development in training programs of subject matter specialists – trainers of trainers	Possibly, funding of additional capacity building of supervisors – subject matter specialists	2014? – should be initiated as soon as possible
Feedback to farmers on faulty diagnosis and recommendations: rapid signalling of problems in	Incorporate explanation on purpose and operation of farmer feedback as well as skills development in providing	None	2014? – should be initiated as soon as possible

Proposed new Plantwise components	Support required from Plantwise	Support from donors	Time frames
diagnosis and recommendations to be followed by immediate feedback to farmers with the corrected diagnosis and especially, recommendations.	effective feedback in all training programs (training of trainers, supervisors, plant doctors)		
Advocacy: junior plant doctors will refer more difficult and/or lesser known plant health problems to Plant Clinics and in general, raise awareness on their existence and benefits.	Incorporate required skills development in training programs of plant nurses / junior plant doctors	See above: Funding for training of trainers junior plant doctors Funding for training junior plant doctors	2016 – programme extension required
Monitoring and evaluation: Senior and junior plant doctors collaborate on gathering data for impact monitoring	Incorporate explanation on purpose and operation of M&E as well as required skills development in training programs of supervisors, plant doctors and plant nurses / junior plant doctors	Funding for training supervisors, plant doctors and plant nurses / junior plant doctors	2015

Should Plantwise decide to adopt the above proposals the concepts and modes of operation would need to be discussed and implementation capacity would need to be built in workshops for all implementing staff, in particular plant doctors and their technical supervisors. Such workshops could also be used to refresh technical knowledge and build capacity on plant health issues where plant doctor knowledge still falls short.

With regard to the possible introduction of a Plant Health Support Structure it should be noted that by itself, the way Plantwise initiates its programme in individual countries is sound. Introducing a new approach, the Plant Clinics, implementation of which occupies in practice only 10 to 20% of the time of extension staff, and providing the means to do so, is more feasible than starting of with a concept of a Plant Health Support Structure, which might be considered a challenge to existing extension approaches and therefore, might generate resistance. However, once the Plant Clinic approach is accepted and undertaken scaling up requires integrating the clinics into the existing extension system, as indicated above.

The proposed structure is no alternative for, but an addition to the mass-extension through campaigns, plant health rallies and the use of the mass media already envisaged in Plantwise. Put differently, **Plantwise should consider three levels of plant health interventions towards farmers: ordered according to the intensity of interaction and number of farmers reached: Plant Clinics, Plant Health Extension, and Mass Plant Health Extension, with the second as the to-be-added element.**

3.2.2 Increasing Plant Clinic capacity

Although as argued in the above Plant Clinics have inherent limitations in terms of the number of farmers that can be reached there are a number of fairly simple ways to increase significantly the number of farmers that can be served.

- At the stage of awareness raising about the Plant Clinics, when pointing out the possibility to make use of clinic services, those advocating should emphasize that it is best if farmers make inventory with neighbouring farmers and with other members of farmer groups on the occurrence of pests and diseases and then send one or two **representatives** to the Plant Clinic.
- As with regular health clinics a less qualified person can be used to do **intake** of farmers coming to the clinic. These persons – plant nurses / junior doctors, or community based agents – can take data such as name, address, phone number, crop, and can start describing

symptoms before referring to the plant doctor, thus saving the latter time. They can also group farmers with the same problem – see next point.

- At intake farmers with the same problem should be grouped and be **attended as a group** by the plant doctor. This will greatly increase the number of farmers that can be attended and reduce waiting times for farmers. The prescription sheet system should be adapted, allowing for completing one prescription sheet for several farmers with the same problem, by including a variable indicating the number of farmers covered.
- **Prescription sheets should only contain the most relevant information** for the purposes of the Knowledge Bank, meaning the data on diagnosis and recommendations made. E.g., name and contact data of the farmer do not need to appear on the prescription sheet, but can be registered separately for local use of the plant doctors, their colleagues, and their superiors. A unique number per farmer or group of farmers should suffice, saving the plant doctor considerable time in completing the sheet.
- Availability of simple **printed materials with recommendations** for the most prevalent pest problems would save plant doctors considerable time in filling out sheets and prescriptions and ensure clearer instructions to farmers on how to handle pest problems. These hand-outs need to be much simpler and to the point than the fact sheets, which are aimed at supporting plant doctors in diagnosis and prescription, and should be provided in the official as well as local language, with illustrations where relevant.
- The **use of tablets** will further facilitate and speed up prescription sheet completion as well as give plant doctors on-the-spot access to information to support diagnosis and prescription. It could also allow sending pictures to subject matter specialists for diagnostic support. In most settings it will also make completing prescription sheets more agreeable for the plant doctor, increase plant doctor status, and allow for sending prescription sheets to supervisors, data bank manager and possibly expert subject matter specialists for rapid validation.

As the above measures will **reduce waiting times** they may also make it more attractive for farmers to seek out Plant Clinic services, which is likely to increase the number of farmers visiting. At the same time they are likely to increase significantly the percentage of consultations for which prescription sheets are completed, thus giving a more reliable picture of pest incidence.

To increase the number of farmers reached plant doctors should also systematically **request farmers to share information with other farmers** – e.g. at least five neighbouring farmers and/or farmer group members. It should be emphasized that information sharing with neighbouring farmers is important not only to disseminate the knowledge gained and make other farmers aware of the possibility to make use of plant clinic services, but also to prevent pests that have been controlled effectively by visiting farmers from invading once more from neighbouring fields whose cultivators have not applied the recommendations.

3.2.3 Data supply to the Knowledge Bank

Data supply from field level to The Knowledge Bank is important for quantifying pest incidence, validation of plant doctor diagnosis and prescription, and monitoring and evaluation of farmers reached. The following minor adaptations could improve these functions further:

- Prescription sheets could be adapted as indicated above, by taking out the name and contact data of the farmer, and **adding a variable indicating the number of farmers** with the same pest problem **attended as a group**. Other data that would be relevant to add are:
- Adding two variables that would allow **marking on the prescription sheet whether the original diagnosis and recommendations of the plant doctor** were correct. Three scores each for diagnosis and recommendations are suggested: correct, partially correct, and wrong, with partially correct standing for a diagnosis or recommendation that is incomplete (e.g., recommendation: use of improved variety, without indicating what variety or varieties). This information will be important for adequately monitoring plant doctor performance while at the same time allowing for correcting prescription sheets and including them into the database – rather than, as apparently now happens frequently, exclusion from it.
- A **variable specifying production conditions** of the crop involved, e.g., rain-fed, irrigated, greenhouse. It may also be relevant to indicate agro-ecological conditions, e.g. humid tropic, semi-arid, arid; altitude; and season – rainy or dry. Apart from the season these variables could be pre-coded for specific regions or possibly countries with uniform conditions, as plant doctors can be expected to always operate in the same production conditions. These new

variables could be used as filters for information exchange between different countries and regions with comparable production conditions.

- One of the ways the above suggested information exchange could take place would be to **exchange fact sheets and Pest Management Decision Guides between countries**. Presently each country develops its own fact sheets and PMDGs from scratch, leading to delays in materials becoming available and much double work. Fact sheets and PMDGs could be exchanged between countries and subsequently adapted to local conditions by national expert teams. Overall, there appears to be underutilized potential for exchanging information and knowledge on pest management between countries, especially neighbouring ones – a process to be stimulated by the regional coordinators.
- The Plantwise Knowledge Bank has already created an **interactive tool for diagnosing pests**. Users can choose the country, then the crop and then the part of the plant affected to filter down to a list of thumbnails of the pests that meet the chosen criteria. If the list is long, further filtering by more specific symptoms is possible, as is clicking on a thumbnail for referral to the Technical Factsheet for a chosen pest. It would be worthwhile to explore the possibilities to focus this tool on plant doctors using tablets, so that after having inserted all information on crop and symptoms in the electronic prescription sheet they can click on an option that will make the system come up with a diagnosis and possible remedies. This would make the diagnosis and prescription process more reliable and quicker.

3.2.4 Monitoring and evaluation

In the above several suggestions on strengthening M&E were already made, most notably, the design and implementation of impact studies linked to an M&E system that can be applied by national stakeholders. Rough indications on impact can be obtained by **asking farmers to provide estimates of production with and without the application of plant clinic recommendations**. This information should be obtained in the following manners:

- 1) Through Plant Clinics and plant doctors, by the latter requesting farmers to return to the clinic after the harvest and report on the results of applying the recommendations – actual yield and yield estimate if no action had been taken. Alternatively, this information can be obtained in follow-up visits to the farmer involved, either by the plant doctor or other extension staff / plant nurses.
- 2) Though the already mentioned survey conducted among a representative sample of farmers in a radius of between 5 and 10 km of the venue of the plant clinic, aimed at collecting information from both farmers who have not made use of the plant clinic (on the reasons why no use was made) and farmers who have (on their opinion on the quality of the service, application of the recommendations, the outcomes obtained in terms of reduced yield losses, the number of farmers the information was shared with and, of this group, the number of farmers actually applying the recommendation and the impact for those farmers).
- 3) Additional to the more quantitative analysis a case study approach may be used to obtain more qualitative information on the application and impact of plant clinic recommendations.

As suggested earlier the survey mentioned under 2 should be conducted with urgency, particularly in the four out of the six visited countries in which plant clinic attendance level has remained below expectations. Such surveys would also provide insight into the percentage of farmers (of the total farming population) making use of the clinics, and could be used to raise awareness on the clinics.

Monitoring and evaluation should also pay attention to spin-off effects, notably of plant doctors using their newly acquired knowledge on (integrated) pest management in their non-Plant Clinic extension activities. Weekly reports using simple formats for reporting on the plant health issues encountered, number of farmers attended and recommendations made could contribute importantly to local, national and global Plantwise teams obtaining feedback on extension workers activities and findings at field level. As many extension services already require their staff to report back on the activities conducted this would not be a new, major burden for extension staff, so integration into the existing task package should not pose major challenges. However, it would be important for Plantwise to pay prime attention to the review and processing of this information.

3.3 VISIBILITY

CABI and Plantwise promote the project's strategy and activities through information supply and communication. Given the large number of donors contributing to Plantwise, the full list of donor logos

is only used where feasible, primarily on PowerPoint presentations, programme videos and published documents. The Plantwise logo is considered to represent all programme donors. CABI and its partners promote visibility through:

- Regular updating of the Plantwise.org website
- Publishing of a regular Plantwise newsletter and a Plantwise update in the 'CABI In Review' report
- Use of the Plantwise logo on Plantwise materials (e.g., plant doctor uniforms and other plant clinic materials, Plantwise reference materials, presentations, etc.)
- Production of short case study videos and blogs that are shared with partners and posted online
- Delivery of presentations at regional and international meetings on subjects ranging from rural advisory services to pest management and food security

These collective visibility activities has enhanced global awareness of the Plantwise programme as shown by an increase in demand from various national and international plant health stakeholders (universities, agro-input suppliers, diagnostic services, etc.) to link with Plantwise.

As regards visibility of the EU the following comments can be made:

- 1) Where donors are presented the EU flag is used, but without text. It is doubtful whether all stakeholders, particularly African farmers and extension staff, know what the flag stands for. Even though this appears to be standard for the EU logo, for promoting visibility of the European Union, especially among populations in recipient countries, it is therefore recommended to add text to the flag (as do the other donors) – e.g. "European Union".

In the countries visited the EU is often the only or one of two or three donors. There would appear to be scope for increasing the visibility of the EU and the other donors, e.g. by printing the logo on hard copy materials such as fact sheets, PMDGs and extension messages aimed at farmers, and on the banners announcing a Plant Clinic is in progress. On the other hand, the donors and Plantwise have agreed not to present any donor logos on materials used at field level, such as banners or fact sheets. This was proposed by Plantwise because in countries where Plantwise is supported by various donors the logos would take up much space and result in a confusing lay-out of the materials involved. Also it was felt that, at least on the banners, it was important not to distract from presenting the name of the main implementing organization. This focus on the service provider is expected to contribute to a more sustainable relationship between service provider and recipients – the farmers.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

4.1.1 Overall

1. The Plantwise programme is a highly relevant and timely initiative considering the high percentage of crops lost to pest and disease problems, the impact these problems have on especially small farmer livelihoods, and the probability that in the future plant health problems will be enhanced by climate change and globalization.
2. The Plantwise approach, based on a) the reinforcing of plant health systems by strengthening stakeholder linkages, b) the provision of plant health management advice to farmers through Plant Clinics, and c) the supply of high quality plant health information to stakeholders through an interactive on-line tool, the Knowledge Bank, is sound and merits full donor support.
3. Minor adaptations and one important addition to the Plantwise strategy are needed to increase programme impact in terms of numbers of farmers reached interactively with plant health advice. Minor adaptations relate a.o. to making Plant Clinic operations more efficient and disseminating recommendations to individual farmers to farmer groups. A major addition to the Plantwise strategy would be to use, in addition to the Plant Clinics, existing national extension services to provide demand-driven plant health advice.
4. The systematic use of existing extension systems to provide plant health advice would involve a major investment in training non-plant doctor extension staff as “junior plant doctors” or “plant nurses”. Donors are recommended to support such investment as it will be key to reaching the large numbers of farmers intended to benefit from Plantwise.
5. Plantwise continuously works on improving performance, among others by refining its implementation strategies and strengthening monitoring and evaluation. In consequence some of the concerns raised and recommendations made in this report are already being addressed to varying extents. It is hoped that, with donor support, Plantwise will follow up especially on those recommendations aimed at scaling up the number of farmers reached with valid advice.

General – plant health systems

6. Plantwise activities are grouped into five broad work areas represented in the five programme outputs presented in the logical framework: (1) Plant Clinics, (2) stakeholder linkages, (3) data management and use, (4) information exchange and knowledge bank, and (5) monitoring and evaluation. **In terms of impact and benefits for the target group, reduced crop losses and increased yields and production for farmers due to proper pest management, the Plant Clinics form the core of the Plantwise approach.** The other four areas can be considered as instrumental in ensuring that the Plant Clinics function optimally.
7. Two other important purposes can be added to that of reducing crop losses: **diminishing the use of pesticides**, especially those that are harmful to human and animal health and the environment, and **taking timely and effective measures against major pest outbreaks**. These purposes are implicit in the Plantwise approach but are not explicitly formulated.
8. Overall the logical framework is quite well elaborated and coherent, with adequate internal logic. However, the specific objective is formulated as: *an effective system for providing plant health advice and support to smallholder farmers in target countries backed up by a global knowledge bank*. This system should be seen as a means to an end: **the system is not a goal in itself but a means to achieve the end of reduced crop losses and improved crop health**. Not specifying this in the project purpose leads to indicators referring to the tool, the system, rather than to the impact of the system and thereby, the impact of the programme.
9. In all countries visited **Plantwise has been integrated into the national plant health system**. CABI has encountered challenges in setting up the program and making it operational, among others because of agencies competing for the lead role in national Plantwise management. However CABI regional and country coordinators, with support from national stakeholders, have done a commendable job in overcoming such obstacles by careful and tactful process management.
10. In several countries **Plantwise has had to deal with major institutional change**, such as decentralization / devolution (Kenya) or the restructuring of agricultural extension services (Uganda). Also, Plantwise has had to deal with changes of and in government, leading in

- some cases to the need to state the case for Plantwise towards key decision makers once again. Plantwise has adapted to these changes in an effective manner.
11. Plantwise implementation at national and field level calls for intensive consultation with local stakeholders. As Plantwise is implemented by national organizations / stakeholders there is a **high degree of ownership** of the programme. The nature of Plantwise interventions, 'supportive' and not 'controlling', also contributes to ownership.
 12. In the visited countries linkages between stakeholders have been strengthened, cooperation has improved and in consequence, **stronger plant health systems have emerged**. Relations and coordination with local authorities, institutions, beneficiaries, and donors are well developed and running smoothly.
 13. CABI and national staff work very hard to manage all ongoing activities and plan for additional ones. This is especially the case for the CABI country coordinators, who have to coordinate activities in two or three countries. Because of **shortage of staff time** some activities have to be delayed, meaning staff time is inadequate for full-fledged and timely implementation. This challenge may grow as efforts to scale up Plantwise increase in scope.

Plant Clinics

14. The Plant Clinic – plant doctor concept of Plantwise has been of great importance in **focusing the attention of extension services on plant health issues**. However, Plantwise has been successful not only in fostering attention for plant health issues but also in **increasing the relevance of extension and the motivation of extension agents and their supervisors**.
15. Nonetheless the question is valid whether the Plant Clinic concept by itself is the most effective and efficient way to support farmers in plant health management. It can be argued that the Plant Clinic approach is **relatively inefficient** because of the individual consultation (a Plant Doctor interacting one-on-one with a single farmer) and the fairly long time taken for such consultation (up to an hour). This strongly limits the number of farmers that can be reached.
16. Improved access to plant health services of large numbers of farmers will depend on the **Plantwise strategies for scaling up**. These focus presently on **mass extension**, in the form of campaigns on major problems through conducting so-called plant health rallies, on the use of mass media, and on ICT – based solutions related to cell phone use.
17. In the countries visited, there was expectation that plant clinics could be scaled up to a sufficiently dense network to cover the whole country. However, the one-on-one interaction of extension staff with farmers limits the numbers of farmers that can be attended. **Other strategies for scaling up interactive extension on plant health issues are therefore needed**.
18. Plantwise advocates mass extension and e-extension, which is certainly important. However, prime attention needs to be paid to **integrating the Plant Clinics system in existing extension systems involving extension agent – farmer interaction** (as opposed to the one-way communication of mass-extension). Though in practice, at field level, such linkages already occur, Plantwise should pursue a stronger and more systematic integration.
19. The Plant Clinic component is implemented satisfactorily with in many countries, significant growth in the number of plant doctors trained, clinics, and farmers served. Very importantly, **feedback from farmers interviewed during field visits was positive**, with farmers who had visited in past cropping cycles reporting that past recommendations had helped avoid major crop losses and even total crop failures.
20. A major challenge facing four out of the six countries visited is **that the number of farmers attending the plant clinics is limited**. This is problematic, especially considering that in Kenya and Ghana Plantwise has been operating for several years. That Plant Clinics can be successful in terms of attendance is proven by Malawi and Uganda; the challenge is to create comparable demand in all Plantwise countries.
21. CABI reports on Kenya and Uganda, two countries with well advanced programmes indicate that **knowledge and skills of plant doctors are frequently found to be inadequate**. For most countries thus far no reliable and representative data are available on the quality of diagnosis and recommendations, a matter that Plantwise should address with urgency.
22. As a result of deficiencies in the knowledge of plant doctors, lack of plant doctor back-up, and delays in the validation of diagnoses and recommendations, **farmers may receive faulty diagnoses and recommendations**. Plantwise does not have a mode of operation for

- correcting such plant doctor errors towards farmers. Validation is foreseen only at national level, which does not allow for timely feedback to plant doctors and much less to farmers. This should be a matter of concern, as faulty diagnosis and recommendations can have serious consequences for farmer livelihoods and for confidence in the plant doctors, clinics and the overall support system.
23. Also, individual **feedback to plant doctors** on faulty diagnoses and prescriptions is not part of the system, which can contribute to plant doctors continuing to provide faulty information to farmers.
 24. Plant Clinic management needs to be improved in terms of **efficiency of plant doctor – farmer interaction**. The limited reach in terms of number of farmers attended, due to plant clinics being based on one-on-one interaction between plant doctor and farmer, is further enhanced by the fact that plant clinic implementation is considerably less efficient than it could be.
 25. There is a **lack of simple written extension materials** to be handed out to farmers. Plantwise advocates the dissemination of fact sheets to farmers but these are likely to be too complicated for most, and are used more by extension staff – plant doctors.
 26. During the field visits it became clear that **farmers receiving recommendations usually share these with neighbouring farmers** or farmer group members, leading to increased impact. More **systematic use should be made of this phenomenon to further increase impact** and scale up in terms of number of farmers reached and recommendations applied.
 27. In the countries assessed, **about one quarter to one third of the farmers making use of the plant clinic services is female**. In the countries assessed there do not appear to be major socio-cultural factors inhibiting female farmers from visiting plant clinics, nonetheless, Plantwise tries to ensure at least 25% of its plant doctors is female to facilitate (female) farmer – plant doctor interaction.

Knowledge Bank

28. The Knowledge Bank is a high quality content repository that links local and international information on plant pests and remedies. The wide range of actual and potential beneficiaries and the quality of the outputs make the Knowledge Bank **an excellent investment for EC as well as other donor support**. It scores high on all five evaluation criteria, and meets and exceeds the targets defined in its performance indicators.
29. The KB now contains 3,400 Technical Factsheets and 3,500 External Factsheets taken from globally and CABI-owned information. The present project has generated **550 Plantwise Factsheets for farmers and 100 Plantwise Pest Management Decision Guides**, written specifically by Plantwise countries for national use, after Plantwise training on extension messages. The scope of the Knowledge Bank is being broadened by including information on abiotic factors influencing plant health, notably nutrient deficiencies.
30. All evaluated countries have **National Data Managers officially assigned**, are submitting data and have accounts with Protected Online Management Systems (POMS).
31. The Knowledge Bank is available in principle to all stakeholders, however, **access by the key target group of plant doctors is hampered** by the fact that this group usually lacks access to internet as well as computers. The **use of tablets** that contain relevant information from the databank, as piloted in Kenya, shows great promise in resolving this problem. Presently this lack of access is being dealt with fairly effectively by supplying plant doctors with **printed materials**, notably fact sheets and Pest Management Decision Guides, on the most prevalent pests in the country or region.

4.1.2 Plant Health System

32. Plantwise has been successful in **developing and strengthening stakeholder linkages**, with has resulted in all countries where activities have been initiated in national partners cooperating smoothly in programme implementation, with CABI in a supporting role.
33. During the country visits it was observed and national Plantwise management indicated there is **scope to further expand and intensify partnerships**, notably with NGOs and other donor-funded projects and programs.
34. One type of **linkage still to be strengthened is linkages with agro-input suppliers**. Plantwise is investigating ways to further link agro-input suppliers with plant clinics, with the aim of ensuring that appropriate products are available to farmers.

35. A challenge for the sustainability of the strengthened plant health systems created with support from Plantwise is the **central role of CABI country coordinators** in those systems.

4.1.3 Monitoring and evaluation

36. Plantwise has **recognised weaknesses in M&E** and is strengthening its M&E efforts, among others by contracting specialized staff and reformulating the global Plantwise logical framework.
37. At present, monitoring and evaluation is hampered by the fact that **performance indicators have in most cases not been quantified**, which makes them difficult to assess. Also, many indicators represent outputs rather than outcomes. No national targets have been set for individual countries.
38. **Impact evaluation** is a major challenge, as the Plant Clinic model makes it difficult to assess the actual impact of the recommendation given. Plantwise is currently commissioning an impact study in Kenya, in which a large numbers of farmers will be monitored and the impact of plant doctor recommendations will be assessed by comparing the farmers involved with a control group who has not received such recommendations. Although the study is implemented in a highly professional manner, questions may be raised as to both the **effectiveness and efficiency of this study** in terms of the aptness of the (scientifically sound) choice of methods in the highly variable conditions of small scale farming. On the other hand, lower cost, less scientifically rigorous but more practical and replicable forms of impact monitoring are possible.

Coherence

39. Plantwise is **well aligned with the EU's Food Security Thematic Programme (FSTP)**'s main objective of improving food security in favour of the poorest and most vulnerable through sustainable practices. Plantwise is also fully in line with the EU policy framework to assist developing countries in addressing food security challenges (COM 2010/127).
40. Plantwise **cooperates and interacts with a large number of donors and implementing organizations**. A good example is the Knowledge Bank, which draws on a variety of resources developed and managed by other organizations. The CABI-Plantwise approach can be assumed to lead to mutual reinforcement, but is unlikely to lead to conflict or duplication.
41. At country level no signs were found of duplication of efforts or conflicting activities, on the contrary, **Plantwise generally aligns well with other agricultural development projects** and programmes. However, there does seem to be scope for creating (more) synergy between Plantwise and such projects. Presently Plantwise country and national coordinators may simply lack the time to pursue this further than they already do.

4.1.4 Sustainability

42. National institutional capacity to implement Plantwise exists or is being created. Institutional sustainability is fostered by the fact that Plantwise is **in line with national policy objectives** and priorities and is implemented by national organizations, with a lead role for government institutes. There is a keen interest on the part of all stakeholders, fostered by the high degree of ownership, to continue the programme after donor financing ends.
43. Regarding **continued funding** there are **challenges** to be met. Especially in Kenya it will be important for the NRO and county governments to prepare for assuming operational costs, notably transport (fuel) and allowances. This challenge is exacerbated by the fact that allowances for extension staff going to the field are relatively high.
44. Maintaining Plantwise services will largely be an issue of **political will**: authorities should make available the required budgets. So far the signs are promising, however, as the saying goes the proof will be in the pudding, and will have to be assessed after donor financing has ended. CABI – Plantwise actively works on co-financing solutions, such as public-private partnerships, and is also considering the option of (partial) payment for services
45. In all countries **sustaining the supply of field level information to the Knowledge Bank**, through prescription sheet completion by Plant Doctors and subsequent processing, will be a challenge. At field level there is as yet limited ownership of this data management system; in consequence motivation to complete the sheets is often low.

46. The current process of **validation**, by national committees of experts, involves considerable cost. This threatens sustainability: there are doubts whether national stakeholders will assume this cost once donor supports ends.

4.1.5 Visibility

47. CABI and its partners **promote visibility** through regular updating of the Plantwise.org website, publishing of a newsletter, use of the Plantwise logo on Plantwise materials (e.g., plant doctor uniforms and other plant clinic materials, Plantwise reference materials, presentations, etc.), production of short case study videos and blogs that are shared with partners and posted online, and delivery of presentations at regional and international meetings.

4.2 RECOMMENDATIONS

General

1. To meet the challenge of lack of time on the part of CABI country coordinators having to cover two or three countries an option for Plantwise, CABI and donors to consider is to have **one CABI coordinator per country** rather than having one coordinator cover several countries.

Plant Clinics

2. Plantwise should make it a priority to **assess the reasons of limited Plant Clinic attendance by farmers** in four of the six countries visited during the present evaluation, so as to take remedial action. This can be done by conducting surveys in a radius of between 5 to 10 km around the venue of the clinics, with farmers not having visited the clinic being asked to give the reasons for not doing so.
3. The reach and thereby, the effectiveness, efficiency and impact of the system in terms of reducing crop losses for large numbers of farmers could be increased through **systematically integrating the plant clinics in existing extension approaches**, by creating what could be called a **Plant Health Support Structure**. This would entail service provision at several interacting levels, using plant health specialists with different expertise levels.
4. Plantwise should consider **three levels of plant health interventions towards farmers**: ordered according to the intensity of interaction and number of farmers reached: **Plant Clinics, Plant Health Extension, and Mass Plant Health Extension**, with the second, Plant Health Extension, as the to-be-added element in the current Plantwise approach.
5. Plant Health Extension would consist of the provision of **first line plant health support** through the existing extension system, in which trained extension staff (**plant nurses** or **junior plant doctors**) as well as plant doctors not operating Plant Clinics provide plant health advice to farmers and refer to Plant Clinics as needed.
6. The Plant Health Support structure would also aim at **increased support for plant doctor diagnosis**, by creating a **diagnostic structure** in which plant doctors unable to diagnose a problem brought to them first consult their regional subject matter specialists. If these do not know the answer they consult subject matter experts from research or universities. Only if the latter do not know will laboratory diagnosis be called upon.
7. A Plant Health Support structure would also serve to **improve the process of validation** at three levels: validation through peer review (Plant Clinic level), validation by immediate supervisors / subject matter specialists (local level), and validation by subject matter experts (researchers and academic specialists at regional or national level). This should allow **timely pinpointing of faulty diagnoses and prescriptions given to farmers**, followed by immediate remedial action, in the form of plant doctors or other extension staff getting in touch with the farmer involved and providing him or her with the correct information.
8. Measures should be taken to **reduce waiting times** at Plant Clinics and thus, make it more attractive for farmers to seek out Plant Clinic services. This should **increase the number of consultations as well as the number of prescription sheets completed**. Possible measures to reduce time spent per farmer are to have non-plant doctors do intake of visiting farmers, to attend farmers with the same problem as a group, to reduce the amount of information to be registered on prescription sheets, and making available simple printed extension materials with recommendations for the most prevalent pest problems.
9. The number of farmers reached can also be increased by advocacy with farmer groups to request **sending a representative** rather than have each farmer come to the Clinic individually. Likewise plant doctors should systematically **request farmers to share**

information with other farmers – e.g. at least five neighbouring farmers and/or farmer group members.

10. The **use of tablets** would facilitate prescription sheet completion as well as give plant doctors on-the-spot access to information to support diagnosis and prescription. It could also facilitate sending pictures to subject matter specialists for diagnostic support, and for sending prescription sheets to supervisors, the data bank manager, and subject matter experts for rapid validation.

Training

11. **Intensification and expansion of the standard training program** is recommended, both to increase the knowledge and skills of Plant Doctors for diagnosis and prescription and to prepare staff forming part of the proposed Plant Health Support Structure for carrying out new or adapted tasks. These tasks would involve, as suggested above, a) a more efficient management of plant clinics, b) validation of data sheets through peer review, c) systematically stimulating dissemination of pest management information through farmer-to-farmer extension and farmer groups, d) systematic linking to and cooperation with agro-input dealers, and e) impact measurement (by requesting farmers to report back on the impact of applying Plant Clinic recommendations on crop yields and losses avoided).
12. **Expansion of the training program is recommended in the form of providing basic training on plant health management to non-plant doctor extension staff** (and possibly, farmer extensionists / lead farmers and agro-input suppliers). The persons trained would subsequently serve as plant nurses / junior plant doctors and apply their newly acquired integrated pest management knowledge in their daily extension activities.
13. The above mentioned basic training would be conducted by national trainers of trainers. At local and/or regional level these would be well performing plant doctors and senior extension staff and subject matter specialists with adequate ToT skills. Expert teams at regional and national level, consisting of extension and technical subject matter specialists, would coordinate and provide backstopping at the national level and as required, training of the local/regional ToT teams.

Knowledge Bank

14. Ownership of the data registry function of the Knowledge Bank, particularly at field level, should be enhanced through the **simplification of the prescription sheets, the use of tablets, and regular feedback of the outcomes of data analysis** to the plant doctors.
15. Monitoring of plant doctor performance could be enhanced by adding to the prescription sheet format two variables that would allow **marking on the prescription sheet whether the original diagnosis and recommendations of the plant doctor were correct**. This would also allow for correcting prescription sheets and including them into the database – rather than, as apparently happens frequently now, exclusion from it.
16. Another addition to the prescription sheet that would be useful would **be a variable specifying production conditions** of the crop involved, e.g., rain-fed, irrigated, greenhouse. It may also be relevant to indicate agro-ecological conditions, e.g. humid tropic, semi-arid, arid; altitude; and season – rainy or dry.
17. The **exchange of Fact Sheets and Pest Management Decision Guides between countries should be stimulated**, so as to speed up the process of relevant materials becoming available quickly for plant doctors and avoid double work. Fact sheets and PMDGs could be exchanged between countries and subsequently adapted to local conditions by national expert teams.
18. Plantwise Knowledge Bank work on an **interactive tool for diagnosing pests** should be supported. This tool has already been developed and is operational, but options could be explored to simplify its use and focus the outcomes, so as to allow plant doctors using tablets to use the system for coming up rapidly with a diagnosis and possible remedies, thus making the diagnosis and prescription process more reliable and quicker.
19. National organizations should take responsibility for making extension materials available in local languages, for extension staff – plant doctors as well as farmers. As needed this could be supported by Plantwise, at least initially, financially and otherwise. The corresponding tasks and responsibilities could be included in a standard format in the memorandums of understanding, to be adapted according to specific circumstances and conditions per country.

Plant Health System

20. To foster sustainability Plantwise could consider promoting the creation of national **plant health system coordination units** – rather than as at present leaving coordination to one national coordinator. These coordination units, composed of three to four representatives of the key national agencies implementing Plantwise, could be chaired by the current national coordinators.
21. Plantwise should **promote active linking of Plant Clinics and plant doctors to agro-input suppliers**, by co-opting the latter into cooperating with the Plant Clinics. Among others plant doctors could request suppliers to forward farmers with plant health problems to plant clinics, plant doctors, or plant nurses, and could also provide information on the remedies, including pesticides, proposed for specific pest problems, through fact sheets and Pest Management Decision Guides.

Monitoring and evaluation

22. It is important for Plantwise to **distinguish between farmers reached directly through plant clinics and farmers reached in other ways**, e.g. through other forms of extension, including farmer-to-farmer extension, mass-extension, and e-extension.
23. For planning, budgeting and monitoring purposes it would be important for Plantwise to set **national targets** for training and Plant Clinic implementation (as well as for numbers of farmers served) by the end of the present project period, December 2015.
24. Plantwise should address with urgency the problems with diagnosis and prescriptions and prescription sheet validation. The **validation process should be strengthened and oriented more at farmer needs by allowing for immediate feedback**. Improved validation will increase the supply of relevant information to the Knowledge Bank and the usefulness of this information for monitoring and evaluation.
25. Plantwise should consider designing and implementing **simpler impact studies linked to an M&E system that can be applied by national stakeholders**. Such studies should yield rough indications of the effects of applied plant clinic recommendations, which can be obtained by asking farmers to provide estimates of production with and without applying the recommendation.
26. Plantwise should also systematically monitor how plant doctors use their increased knowledge on pest management in non-Plant Clinic extension work, among others by asking plant doctors to report on the activities undertaken and the outcomes obtained.
27. The above **impact studies can be combined with research on the reasons why in four out of the six visited countries plant clinic attendance level is below expectations**. This can be investigated by conducting surveys with random samples of farmers in the surroundings of the venues where plant clinics are held – e.g., within a 5 to 10 km radius.
28. It would be important for country teams to produce **annual reports**, both towards national stakeholders and for Plantwise Regional and Global. In addition to reporting on progress made against performance indicators such reports should contain lessons learnt in implementation, to be shared with teams from other countries and the regional and global Plantwise teams, so as to further develop and refine strategies and operations.