



Plant clinics and plant health diagnostic labs team up for crop health in Ghana

In Ghana, plant pests and diseases are responsible for about 30% of crop yield losses annually. Plant clinics, supported by Plantwise, have been working in the country since 2012 to help farmers reduce such losses. Plant doctors occasionally need expert support from plant health diagnostic laboratories to accurately diagnose plant health problems that are difficult to identify. Without this support they are limited in their ability to make reliable recommendations to farmers. University of Ghana carried out a study to assess the current support provided to plant clinics by diagnostic laboratories and to find out how to improve the relationship.

Key highlights

- Almost all the existing 27 plant health diagnostic laboratories in Ghana render support to agricultural extension officers on identification of plant pests and diseases, but only a third of the plant clinics use them. Among the reasons are: absence of laboratories in some localities, inadequate sample referral systems and shortage of capacity of some of the laboratories.
- There is a good degree of cooperation among laboratories but their collaboration with plant clinics and other extension providers is generally weak. A formal framework for the interaction of plant clinics and diagnostic laboratories would help to facilitate their collaboration.
- Laboratories do not usually charge for the laboratory analyses, but in a few cases plant doctors and other agricultural extension officers are charged for laboratory consumables. In such cases, they use their personal savings or funding from Council for Scientific and Industrial Research and Ministry of Food and Agriculture.
- Staff of most of the diagnostic laboratories has postgraduate education, which has positive consequences for the quality of laboratory services. Yet, laboratory technicians and plant doctors could benefit from short courses in phytoplasma and viral disease diagnostics, plant nutrient and soil analysis and weed identification.
- The current procedures for collection, packaging and delivery of diseased plant samples to diagnostic laboratories compromise the sample quality, making diagnosing of the problems challenging. Training is therefore required in this area.
- The diagnostic laboratories have relatively good access to internet services but use of information technology such as mobile telephony, email, dedicated social network groups and applications such as WhatsApp would speed up submission of queries to the laboratories and delivery of results to plant clinics, agricultural extension officers and farmers.



Plant clinics

Ghana's crop production sub-sector generates 32% of the country's GDP. Intensifying crop production is essential for the country's economic growth. For this to succeed, the country has to confront the threat from pests and diseases, which are estimated to be responsible for about 30% of the annual crop yield losses.

In 2012, Plantwise, collaborating with the Ministry of Food and Agriculture (MoFA), introduced plant clinics with trained plant doctors in Ghana, beginning with two (Ashanti and Brong-Ahafo) out of 10 regions. More clinics have since been established in Eastern, Northern and Volta regions and total 66 today.

The plant clinics have a farmer friendly atmosphere. When farmers bring a sample of an unhealthy plant into the clinic, the plant doctors diagnose the problem and advise the farmers, free of charge, on practical ways to improve the health of the crop or prevent that the problem appears the following season. The plant clinics also allow collection and sharing of information on the extent and trends of plant pests and diseases in the country, thus facilitating informed action such as publicizing pest alerts, developing evidence-based extension materials and conducting relevant research.

“Information from plant clinics enables us to assess whether our extension systems are really promoting integrated pest management (IPM), whether there are specific areas in which extensionists need further training, and how, at a very practical level, plant clinics can be a way of putting national and international policies and frameworks into practice.”

Mrs Milly Kyofa-Boamah, Director of Plant Protection and Regulatory Services Directorates (Business Ghana, 31 July 2014, <http://www.businessghana.com/portal/news/index.php?op=getNews&id=199507>.)

Diagnostic support

Diagnosing plant health problems is a challenging task. To correctly diagnose problems which cannot be reliably identified visually or to confirm the causal agent of a disease, plant doctors depend on the support of plant health diagnostic laboratories. Twenty-seven such facilities exist in Ghana (Table 1). Thirteen belong to the Council for Scientific and Industrial Research (CSIR) and another 13 to universities, colleges and other research centres and the Plant Pathology Laboratory of Plant Protection and Regulatory Services Directorate (PPRSD) of MoFA. Besides the plant clinics, the laboratories serve other agricultural extension officers of MoFA.

Table 1: Plant health laboratories in Ghana belonging to PPRSD, CSIR, universities and other research centres.

(Green cells highlight regions with plant clinics).

Region	PPRSD	CSIR	Univ., colleges, research centres
Ashanti	-	2	3
Brong-Ahafo	-	-	1
Eastern	-	3	3
Northern	-	2	2
Volta	-	-	1
Central	-	-	1
Greater Accra	1	3	2
Upper East	-	1	-
Upper West	-	1	-
Western	-	1	-
Total	1	13	13

PPRSD – Plant Protection and Regulatory Services Directorate of MoFA;

CSIR – Council for Scientific and Industrial Research

Eleven of the laboratories have the capacity to diagnose nearly all of the important plant pests and diseases, while the few with facilities for soil and plant nutrient analysis have limited capacity for plant pest and disease diagnosis. Eight laboratories diagnose pests on a variety of crops including vegetables, roots and tubers, cereals, tree crops, herbs and spices, fruit crops, legumes, flowers and ornamentals. Sixteen laboratories diagnose pests on selected groups of crops and three deal exclusively with soil and plant nutrient analysis.

The diagnostic laboratories, possibly because they are located in cities, have relatively easy access to internet services, which is an invaluable resource for literature on plant pests and diseases. There is a good degree of cooperation among laboratories, while their collaboration with plant clinics and other extension providers is generally weak. Most of the laboratories have adequate space to handle large volumes of samples but they are not sufficiently funded to purchase supplies and maintain their equipment. This greatly limits their capacity and efficiency to render diagnostic support.

Only about a third of the plant doctors use the diagnostic laboratories for problems they cannot handle. Reasons include absence of laboratories in some localities, poor means of sample delivery and insufficient laboratory capacity, among other reasons.

Apart from seeking assistance on identification of pests and diseases, plant doctors and extension officers seek management advice. They, however, rarely ask for support on issues related to soil fertility and plant nutrition. This is possibly because they are unable to distinguish between nutrient deficiency and disease symptoms. The high costs involved in soil and plant nutrient analysis may also be part of the reason. Furthermore, the majority of the laboratories focus on pest and disease problems with only a few handling soil and plant nutrient problems.

The current process of sample referral by plant doctors to the laboratories requires that samples be submitted through the regional plant clinic coordinators. This results in delays in the delivery of diagnostic results. Most of the plant doctors go through this system to request support from the laboratories. Establishing more direct links between plant doctors and diagnostic laboratories may speed up the process.

A related issue is that sample transportation often occurs without regard to the practices for the safe movement of pests and disease material across geographical regions. The internal quarantine regulations on movement of diseased plant samples from plant clinics to diagnostic laboratories in different regions should be strengthened. Establishing diagnostic laboratories at vantage locations, especially in Brong-Ahafo, Upper East, Upper West, Volta and Western regions, and introducing rapid procedures for sample referral and reporting of results will ease some of these problems.

A formal framework defining the relationship between the plant clinics and diagnostic laboratories is required. Such agreements are particularly important since institutional mandates of diagnostic laboratories and agricultural extension do not easily match. Most diagnostic laboratories in

Ghana are mainly charged with supporting teaching and research, less so with providing services to agricultural extension officers and farmers. Nonetheless, almost all laboratories express their willingness to receive plant samples from extension agents.

The Plant Pathology Laboratory of the PPRSD headquarters (MoFA) in Accra is the most frequently accessed laboratory by plant doctors and extension officers for diagnostic support. This is probably due to the fact that all the plant doctors are employees of MoFA's Extension Division.

Plant doctors and other agricultural extension officers do not usually pay for laboratory analyses, but in a few cases they are charged for laboratory consumables. In such cases, they use their personal savings or funding from CSIR and MoFA.



Plant clinic set up during a wedding ceremony.

Laboratory staff revealed that many of the plant samples received are poorly packaged, labelled and handled. Such samples make identification of the problem difficult and could cause the wrong advice to be given on the management the plant health problem. Training of plant doctors, extension officers and farmers on sample collection and handling is essential.

Some laboratory technicians and plant doctors lack skills in phytoplasma and viral disease diagnostics, plant nutrient and soil analysis and weed identification. The building of a stronger human resource base to diagnose all the important biotic and abiotic plant health problems in Ghana is imperative. Short courses to close the skills gaps as well as the introduction of a plant doctor programme in agricultural universities and colleges are necessary. Training of plant doctors and laboratory technicians should take into account the individual needs of the regions and that pests and diseases are not stagnant.

In most cases the laboratories deliver the diagnostic results to plant clinics, extension officers or farmers within three weeks, although the response time can be as short as a day or as long as eight weeks. Personal visits are used for delivering the results

in almost half the cases, followed by telephone. Email is hardly used. More efficient use could be made of information technology to speed up communication between laboratory staff and plant doctors and between plant doctors and farmers. Using mobile telephony and creating a dedicated social group on WhatsApp or an internet blog where photos of pest and disease samples are submitted for visual observation and posting of results could be a first step.

The following donors support Plantwise

Department for International Development, UK

Swiss Agency for Development and Cooperation

European Commission through DG DEVCO-EuropeAid

Directorate General for International Cooperation,
Netherlands

Irish Aid

International Fund for Agricultural Development

Australian Centre for International Agricultural Research

Ministry of Agriculture of PR China

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Additional information and resources

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September 2015



UNIVERSITY OF GHANA



About Plantwise

Plantwise is a CABI-led global programme, which strives to increase food security and improve rural livelihoods by reducing crop losses. Working in close partnership with relevant actors, Plantwise supports the establishment of networks of local plant clinics, run by trained plant doctors, where farmers can find practical plant health advice. Plant clinics are reinforced by the Plantwise knowledge bank, a gateway to online and offline actionable plant health information, including diagnostic resources, pest management advice and front-line pest data for effective global vigilance.

Plantwise in Ghana

In 2012, plant clinics were launched in the Ashanti and Brong-Ahafo regions by Plantwise in collaboration with the Ministry of Food and Agriculture through Directorate of Agriculture Extension Services (DAES) and Plant Protection and Regulatory Services Directorate (PPRS). In 2014 plant clinics were expanded to Eastern, Northern and Volta regions. Other partner organisations include Council for Scientific and Industrial Research (CSIR) and Adventist Development and Relief Agency (ADRA). By 2015 there are 66 active plant clinics and 147 trained plant doctors in the country.