PestSmart eLearning

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FAO e-Agriculture Webinar

31st October 2018

KNOWLEDGE FOR LIFE

CABI

What is CABI?

CABI is a not-for-profit science-based development and information organization

KNOWLEDGE FOR LIFE

CABI

CABI in brief

- **not-for-profit** intergovernmental organisation established in **1910**
- Provides scientific expertise and information about **agriculture** and the **environment**
- Owned by **49 member countries**
- **480 dedicated staff** worldwide in 21 locations
- Compliant with requirements for **Joint Management** of strategic EC programmes, following successful 4-pillar audit in 2011
- Parent organisation of **SciDev.Net**

CABI and e-agriculture

Our **Digital Development** theme supports our international development work by applying digital tools to:

- Provide scientific **information and evidence** to a wide variety of users
- Promote **data-driven development**, engaging in data-focused research partnerships, adding value to data, and engaging with stakeholders to build data literacy
- Support **data collection and communication**

CABI's e-agriculture projects

- Plantwise
  - providing access to plant health information and pest management advice via the **online Knowledge Bank** and **Factsheet Library app**
  - collecting live data from plant clinics and farmers via a dedicated **data collection app**
  - connecting farmers, plant doctors and diagnostic experts via **messaging apps**
- PRISE (Pest Risk Information SErvice)
  - using **satellite data** to provide pest forecasts
- GODAN
  - the **Global Open Data for Agriculture and Nutrition** secretariat is hosted by CABI

What is Plantwise?

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

Plant clinics

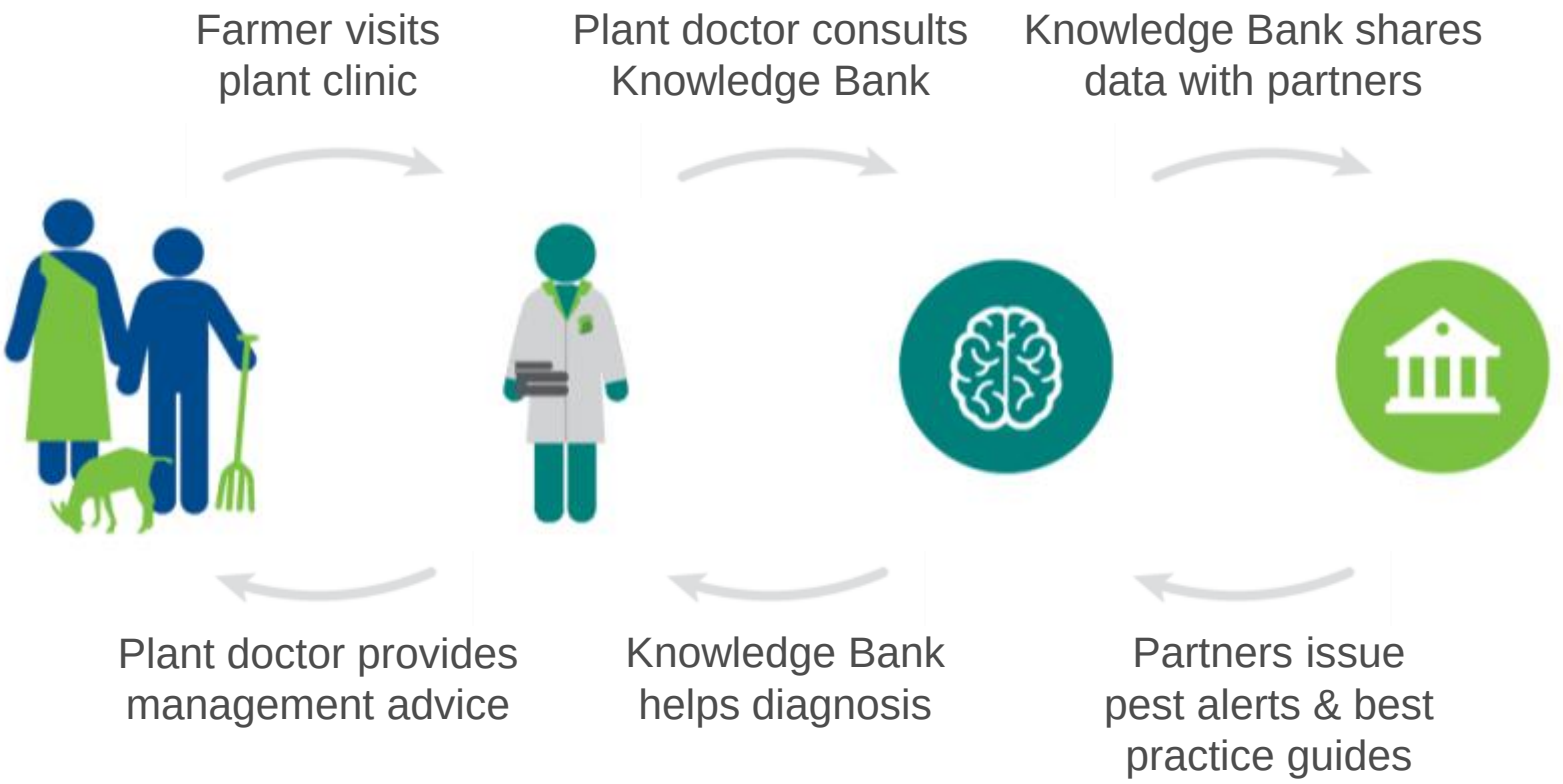
- **SET UP** in local meeting places
  - e.g. at markets, village squares and near human health clinics
- **PROVIDE** diagnosis and treatment advice
  - for any crop and any problem
- **COLLECT** data about farmers and crops
  - e.g. outbreaks of fall armyworm, maize lethal necrosis disease (MLND) or tomato leafminer (*tuta absoluta*)

Knowledge Bank

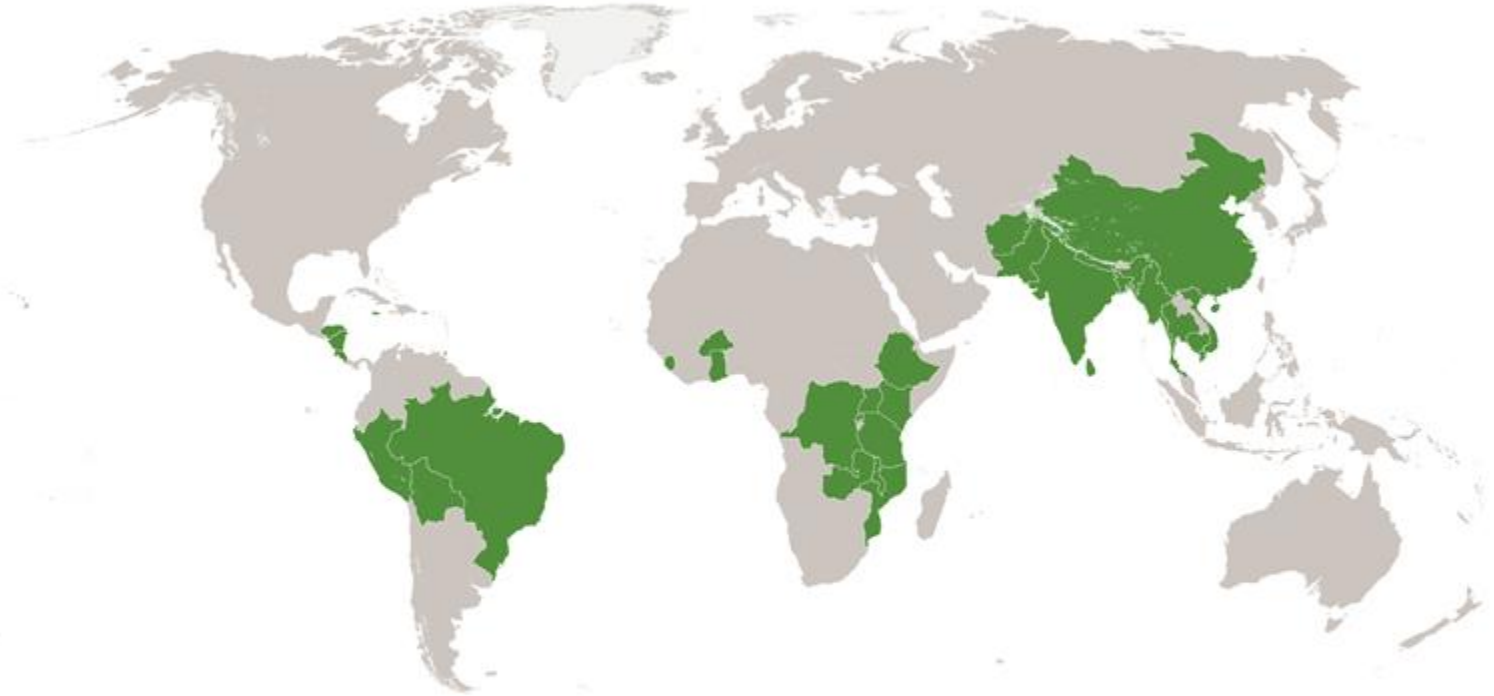
- an **open access** internet resource
- covering **2,500 crop pests** in 80 languages
- over **12,500 factsheets** to provide practical information on pest management
- **thousands of images** to assist with diagnoses
- **interactive maps** showing pest distribution
- **pest alerts** to inform of new pest outbreaks
- **plant health news** from online sources
- **available offline** and via apps

www.plantwise.org/**KnowledgeBank**

Process


Farmer visits plant clinic
Plant doctor consults Knowledge Bank
Knowledge Bank shares data with partners
Plant doctor provides management advice
Knowledge Bank helps diagnosis
Partners issue pest alerts & best practice guides

Countries



The Americas

Barbados
Bolivia
Brazil
Costa Rica
Grenada
Honduras
Jamaica
Nicaragua
Peru
Trinidad & Tobago

Africa

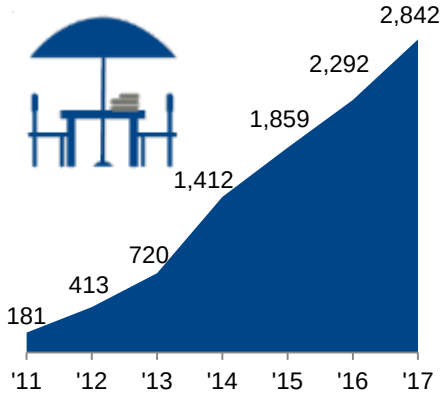
Burkina Faso
DR Congo
Ethiopia
Ghana
Kenya
Malawi
Mozambique
Rwanda
Sierra Leone
Tanzania
Uganda
Zambia

Asia

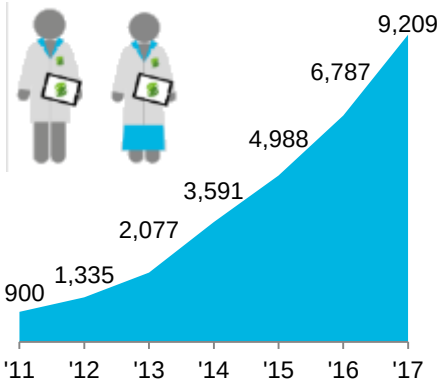
Afghanistan
Bangladesh
Cambodia
China
India
Myanmar
Nepal
Pakistan
Sri Lanka
Thailand
Vietnam

Scale

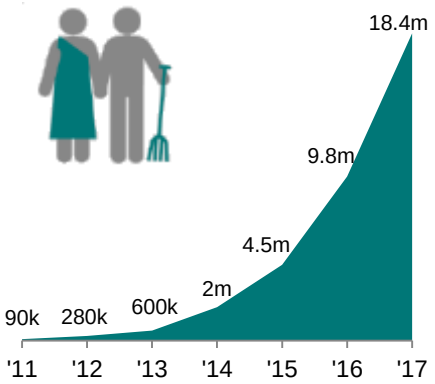
2,800 plant clinics established



9,200 plant doctors trained



18.4 million farmers reached



Awards

Winner
NEF Innovation Award 2013

Winner
Open Data Award for Social Impact 2014

Winner
OECD DAC Prize 2015

Winner
Bond Innovation Award 2017

2013 2014 2015 2016 2017

Shortlisted
The Queen's Award for Enterprise 2014

Shortlisted
Olam Prize for Innovation in Food Security 2015

Winner
St Andrews Prize for the Environment 2017

What is PestSmart?

Based on Plantwise training material, PestSmart is an eLearning course teaching plant diagnostics

PestSmart is an eLearning course teaching plant diagnostics

- Based on **Plantwise** training material, independently proven to improve the plant health knowledge of those trained
- The online course consists of **5 modules** and includes videos, content and photos, as well as knowledge checks
- In addition, the package contains access to the:
  - **Diagnostic Field Guide eBook**
  - **Plant Diagnostic Simulator App**

The PestSmart course

- *The 5 eLearning modules* cover symptoms, insects and mites, causes, nutrient deficiencies, and finally diagnostics.
- *The Diagnostic Field Guide* supports diagnostic decisions by showing relationships between common symptoms and causes on plants
- *The Simulator App* supports and reinforces investigation and diagnosis skills through engaging gameplay and real time feedback to build confidence and competence in plant pest and disease diagnosis.

PestSmart in Numbers

The eLearning course contains:

- ✓ Over 15 hours of training, broken up into manageable 30 minute lessons
- ✓ More than 1000 high quality photos - most exclusive to CABI
- ✓ Over 400 knowledge check questions
- ✓ 5 modules and 22 lessons

The accompany e-book contains:

- ✓ 100 pages of learning material
- ✓ Over 400 images and reference tables

The app contains:

- ✓ 4 crop simulation and diagnostic scenarios
- ✓ Over 20 scenarios

TARGET AUDIENCE

Market research feedback has been **very positive.**

Course can be used both as a teaching aid and accessed by students in own time.

- *Customers:* Universities, Research Institutes, Governments and NGOs across the Globe

- *Users:* students studying Biology, Crop Science, Horticulture, Plant Health Sciences

The course works well with students who have already acquired a basic theoretical knowledge in botany and plant pathology.

Key Benefits

Users

- A practical course enabling learners to go directly out into the field and apply their learning
- The course is tried and tested – CABI has taught this course face-to-face for many years
- The knowledge checks in the course enable the learner to assess their own progress as they go

Institutions

- The growing seasons may not fit well with the teaching curriculum. PestSmart can be taught at any time of year and can compliment the time your students spend in the class
- The course extends the teaching specialisms that faculty are able to offer

PestSmart Diagnostic Course

Learn how to diagnose and control pests and diseases in the field. Using CABI's extensive knowledge and experience, we have developed PestSmart, an e-learning course with handy reference tools. PestSmart guides learners through identifying symptoms and causes of plant health problems, and introduces a methodology for field-based diagnosis.

Table of Contents

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- Course introduction
- Module 1: Symptoms
- Module 2: Insects & Mites
- Module 3: Causes
- Module 4: Nutrient deficiences
- Module 5: Diagnostics

PestSmart Diagnostic Course

CABI

Module 1: Symptoms

Lesson 1: Marks and other features on leaves

Start

Introduction

Welcome to Module 1 Lesson 1: Marks and other features on leaves.

Unlike insect pests, that are generally large enough to be seen, pathogens are usually identified by the symptoms they produce on the host plant. Hence, it is very important to recognize symptoms and to name them correctly. It is also important to know which symptoms generally have common cause (as it very unusual to find a plant with symptoms from only one cause) and to develop the ability to dismiss irrelevant symptoms.

In this lesson, we will look at the marks and other features that can appear on leaves as a result of pathogens. By studying this lesson you will:

- View images of marks on leaves and surface growth on leaves
- Understand the concept of a leaf spot, that it is not just a mark on a leaf
- View various examples of microorganisms growing over leaves and bursting out from within leaves (pustules)
- Learn about the concept of leaf edge scorch

Leaf spot

The term "leaf spot" is a tricky one, as it can mean different things to different people. A spot on a leaf does not necessarily make it a leaf spot. There are many definitions of leaf spots, but in this course we have taken a very general view and consider it to be a brown area on a leaf with a dead area within it. However, even this definition can be challenged − for example should insect chewing be considered as leaf spots? In this course we suggest not.

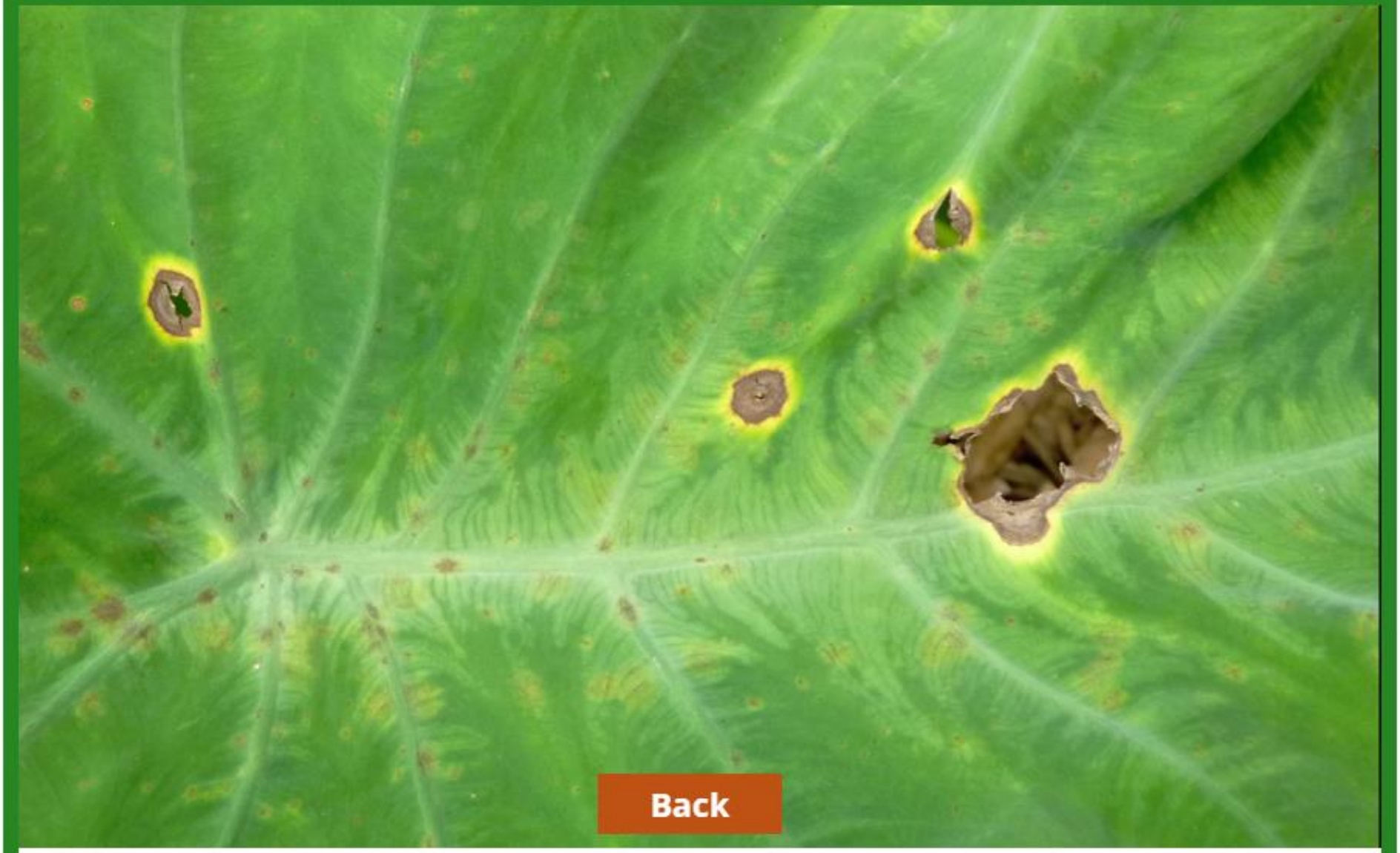
Select each image to view in more detail.









Symptom: leaf spot on taro.

There are four clear spots on this leaf and a few other marks. The four spots consist of a central brown area surrounded by a yellow ring. In three cases the brown central area has torn leaving a hole. Careful observation shows that there are rings within the brown zone.

Symptom: leaf spot on taro.

Close up of a leaf spot. Note the rings of structure within the leaf spot and the dark (almost black) ring just inside the diffuse yellow halo which surrounds the spot.

Knowledge Check: Question 1

Which of these are considered to be a leaf spot?
Choose one, then **submit**.

Correct.

A is correct. This is a classic leaf spot; there is a dead centre and a clear border.

The following answers are not correct:
B: The material (dusty and white) is growing on the surface of the leaves.
C: The dusty orange pustules are bursting out from within the plant.
D: The crusty black growth is over the surface of these leaves.

Introduction

Welcome to Module 3 Lesson 1: Fungi Part 1.

Fungi are a diverse group of organisms; most do not attack plants but fungal plant pathogens can be some of the most serious causes of lost yield in any cropping environment. Fungi can attack all plants and all parts of those plants. Some live in the soil and attack roots, whereas others attack the above-ground parts of the plant.

Most fungal plant pathogens are extremely specific with regard to the plants they can parasitize and they are usually unable to attack more than one species of plant. However, a few have a broad host range (i.e. they can attack a range of plants). All plant pathogenic fungi draw their nutrients from the host plants.

By studying this lesson you will:

- View symptoms of marks and other features on leaves, and disturbances to the shape or size of the plant, all caused by fungi
- For any one photograph learn which symptoms are typical of a fungal infection and, crucially, which are not typical, and the reasons why

Common symptoms of fungal infection

Fungi can produce a wide range of symptoms on plants. How often is each symptom seen?

Common symptoms of fungi	Unusual symptoms of fungi	Never, or almost never, caused by fungi
Leaf spot Surface growth Pustule Wilt Yellowing Necrosis/drying Rot Canker Gummosis	Witches broom Little leaf Leaf distortion Reddening Streak Dieback Staining	Leaf edge scorch Stunting Fasciation Galls Mosaic/mottle Speckle (thrips and mites) Frass Feeding damage (chewers) Webbing and wax

In the slides which follow, select the For and Against boxes to reveal which features of the symptom you are viewing are typical or atypical of being caused by a fungal infection.

Leaf spot – caused by fungi

Leaf spots are an extremely common symptom and determining the cause in the field is one of the most difficult aspects of plant pathology. Many aspects of the leaf spots need to be considered to determine the most likely cause.

Select a thumbnail image to find out more (then select the magnifying glass to view an image in high-res).

Leaf spot is a common symptom of fungal infection.

Some features seen in the photograph indicate a fungal cause, others not so.

Select For and Against to reveal which features are typical symptoms of a fungal infection and which are not.

NB: the photograph is of *Cercospora* leaf spot of lettuce caused by *Cercospora lactucae-sativae*.

For | Against

Knowledge Check: Question 1

Complete the sentence (by selecting the one correct answer):

Fungal leaf spots:

- A. are often associated with the edge of leaves.
- B. will spread along leaf veins.
- C. usually have a clear darker border region.
- D. have a uniform appearance across their area.

Submit

PestSmart Diagnostic Course

CABI

Module 5 Lesson 1: Easy Diagnosis Exercises

Start

Easy Diagnosis: Question 5

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Choose the most appropriate diagnosis, then select submit.

Select image to view in more detail.

Discrete brown spots of dead areas on the leaf. This symptom is best described as 'leaf spot'.

The leaf spots appear to be spreading from the edge of the leaf. This means the most likely cause of the symptom is:

- Mites
- Fungi
- Bacteria
- Nematodes

Submit

Easy Diagnosis: Question 6

CABI

Choose the most appropriate diagnosis, then select submit.

Select image to view in more detail.

Discrete brown spots of dead areas on the leaf. This symptom is best described as 'leaf spot'.

The leaf spots are associated with the edge of the leaf BUT they have structure (rings) within them. A good diagnosis therefore would be:

- Water moulds
- Fungi
- Bacteria
- Nematodes

Submit

PestSmart Diagnostic Course

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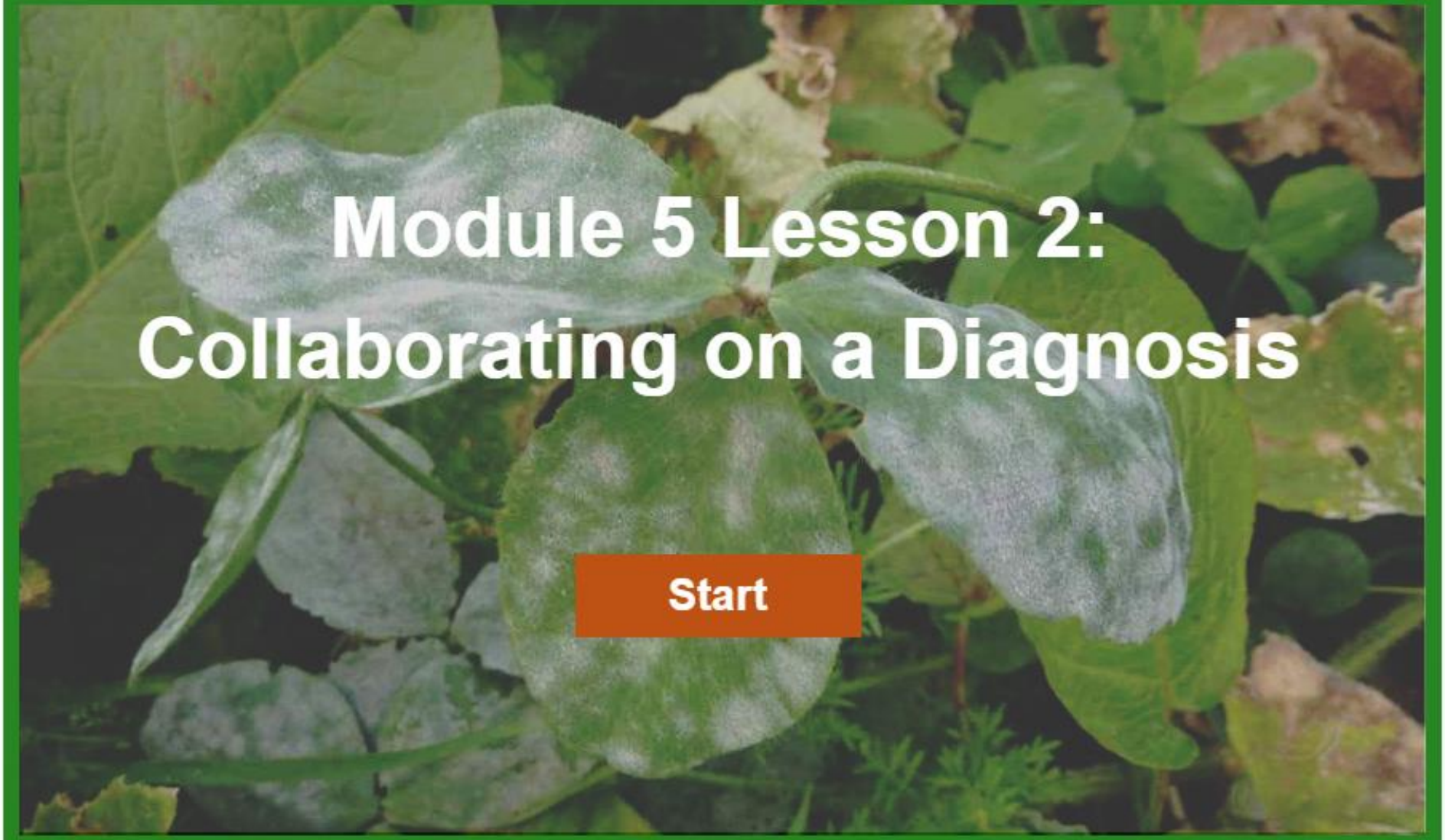


Module 5 Lesson 2: Collaborating on a Diagnosis

Start

Collaborating: Question 1

Choose the most appropriate option, then select submit.

On inspection of this photograph one of your colleagues has provided a diagnosis of 'fungal leaf spot'.

Select the image to view it in more detail.

Which of the statements below do you most agree with?

- Agree with the diagnosis that the cause is definitely fungal
- Agree that the cause is probably fungal
- Whilst it is possible, it is unlikely that the cause is fungal
- The diagnosis is clearly incorrect and fungi could not cause these symptoms

Submit

Collaborating: Question 3

Choose the most appropriate option, then select submit.

On inspection of this photograph one of your colleagues has provided a diagnosis of 'fungal leaf spot'.

Select the image to view it in more detail.

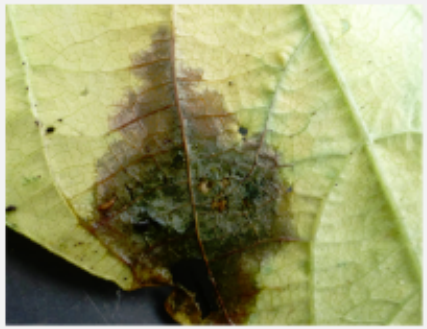
Which of the statements below do you most agree with?

- Agree with the diagnosis that the cause is definitely fungal
- Agree that the cause is probably fungal
- Whilst it is possible, it is unlikely that the cause is fungal
- The diagnosis is clearly incorrect and fungi could not cause these symptoms

Submit

Collaborating: Question 27

Choose the most appropriate option, then select submit.



On inspection of this photograph one of your colleagues has provided a diagnosis of 'bacterial leaf spot'.

Select the image to view it in more detail.

Which of the statements below do you most agree with?

- Agree that this is definitely a bacterial leaf spot
- Agree that this is probably a bacterial leaf spot
- Whilst it is possible, it is unlikely that this could be a bacterial leaf spot
- The diagnosis is clearly incorrect, this is not a bacterial leaf spot

Submit

CABI is an international intergovernmental organisation, and we gratefully acknowledge the core financial support from our member countries (and lead agencies) including:

UKaid from the British people

Ministry of Agriculture and Rural Affairs, People's Republic of China

Australian Government Australian Centre for International Agricultural Research

Agriculture and Agri-Food Canada

Ministry of Foreign Affairs of the Netherlands

Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

Swiss Agency for Development and Cooperation SDC