Tree Health Course Seychelles

1. Diagnostic Methods in Tree Health
9-13 September 2002
Venue: Berjaya Mahé Beach Hotel
Course leader: Dr Eric Boa (Cabi Bioscience)

2. Practical Laboratory Methods for Tree Health
16-18 September 2002
Venue: Diagnostic Laboratory, Plant Protection, Mahé
Course leader: Ms. Paula Nash (CABI Bioscience)

General Report and Outline of Courses

Prepared by Eric Boa and Paula Nash

Organised and held under the auspices of FAO project and
With the support of the Government of Seychelles

TCP/SEY/0168

Strengthening National Capacity for Control of
Pterocarpus indicus Wilt Disease and Forest Protection

Background

A previously unrecorded disease of Pterocarpus indicus (sandragon) appeared in 1998 in the Seychelles**.** P. indicus widely naturalised and is an important tree on the main islands in the country. The rapid decline and death of trees caused widespread alarm and added to a general concern about tree health prompted by the discovery of Takamaka wilt some years earlier.

Pterocarpus wilt and takamaka wilt share a number of similar features but are essentially different diseases.

Takamaka wilt is caused by Leptographium calophylli: The fungus is spread by a beetle (Cryphalus trypanus) and infections result in distinct wilting symptoms that signal a death of branches and eventually the whole tree. The sandragon disease is also closely associated with a fungus but a different species, Fusarium oxysporium. This has still to be confirmed as the cause of the dieback and death of trees but there is little doubt that the fungus is responsible. There is no conclusive evidence for an insect vector.

Introduction to courses

The FAO Technical Cooperation Project (TCP) has two main thrusts: to study sandragon disease itself and to strengthen national capacity in forest protection. The appearance of two damaging tree diseases within a few years of each other has emphasised the need to know more about how to study and manage tree heath problems.

One of the main challenges of diagnosing problems on trees such as Pterocarpus indicus is making the distinction between the relative importance and influence of biotic and abiotic factors. This suggests a different approach to training, particularly for those whose jobs embrace general responsibilities for trees. The broad aim of the two training courses held under the TCP was to provide practical guidance in diagnosis and preliminary examination of plant samples. This report outlines how the courses were organised and run.

The forestry department looks after trees but does not have specialists in forest protection. The Plant Protection service works with many different crops and plants but lacks a knowledge of forestry. There are many others with a keen interest in trees and these include ecologists, nature conservationists, the public utilities corporation (responsible for managing water catchments which sandragon trees help to maintain) and even teachers in schools.

These different groups have become sensitized to tree health problems as a results of takamaka wilt and now the sandragon disease. It is for them that the training courses were designed, bearing in mind their need for practical assistance, their general job responsibilities and their common lack of knowledge concerning tree pests and tree health.

It made little sense to teach those invited to the training courses about the scientific basis of forest protection. A curriculum was developed which concentrated on symptom recognition and preliminary (visual) interpretation of tree health problems. It was based on tree health courses held in the UK and Bolivia which were organised for a similar group of people working with trees in developing countries but lacking a specialist knowledge or specific professional interest in tree health.

Symptoms are widely misinterpreted in trees and hasty and premature decisions are often made about their significance which routinely hinder efforts to develop effective management strategies. The diagnostics course attempted to show how careful observation of trees in a systematic and rigorous manner could provide a lot of useful information on why they appeared unhealthy and contribute towards an informed strategy for minimising damage and losses. In contrast, the laboratory methods course was attended by a small group of people who already had some knowledge of pest and were broadly familiar with laboratory techniques. The specific aim of this course was to show the technical people how to collect samples and to carry out simple investigations.

The main thrust of the training courses was, however, in showing people how to examining trees in the field. The observational skills needed to assess symptoms and carry out a preliminary, visual diagnosis are rarely if ever taught, yet the benefits of good preliminary diagnosis are considerable and are worth stating clearly: it helps to eliminates some causes; it avoids costly and inappropriate actions, such as widespread chemical treatments or felling of trees; it pinpoints the most fruitful line of investigation in an attempt to identify an effective management strategy

Much was achieved with the broad group of people who attended these courses. Doing simple things well can have a significant impact in managing a tree disease, either by rejecting a particular course of action (such as spraying against the sandragon leafminer), but more commonly by highlighting what can be done to reduce losses

[1] `Tree health' is used throughout in preference to `insect pests and diseases'. This avoids the assumption that the cause of the problem is known to be a living agent.

Organisation of report

Documents and forms used to gather information or to carry out practical exercises, have been loosely brought together for this general report. The report includes the slides of the various PowerPoint presentations and information sheets on symptoms, causes of ill-health in trees and so on.

This is not a course manual as such, since that would require more time to prepare than is currently available.

The *Illustrated Guide lo the state of Health of Trees* .j, written by Dr Boa, will be the companion volume for the diagnostic course. It is due for publication by FAO in 2003

To be effective, a course on symptoms needs good photographs. The selection used came mainly from Dr Boa's collection and was supplemented by others taken during the course itself.

Teaching approaches

Dr Boa has previously taught two and three day courses on tree health to overseas foresters who attended the summer course organised by the Tropical Forestry Resource Group in the UK. These formed the basis for the diagnostic course in the Seychelles, but extended to five days and attended by a much larger groups of people. The schedule is outlined below.

Topics were briefly introduced before proceeding directly to the practical exercises. Most involved observing trees or specimens and extensive use was made of trees close to the training venue. In other exercises people examined photographs and had to suggest how to assess tree health and monitor tree populations.

For most of the time people worked in small groups, usually three to four people. Larger groups are less effective in allowing people to express ideas. Ms Nash and Ms Allard moved between the groups to help stimulate discussion and prompt answers to the different exercises. Groups were asked to present their 'results' or conclusions to the other groups and general debate frequently brought out useful points. Dr Boa provided additional information or clarified confusion when summing up each section of the course.

Taking good photographs is an important skill for describing symptoms. Participants were able to test their skills with digital cameras and advice was given on how to improve their techniques.

The diagnostics course took place in a conference room of a local hotel. Participants were encouraged to make best use of their existing faculties, whether this was looking at trees, touching samples or even asking hotel employees about the history of trees in the grounds. The course could not have been held without a video projector. This allowed rapid display and analysis of specimens (photographed with a digital camera - see examples that follow) and group exercises via a laptop computer.

It was only necessary on one occasion to travel from the hotel, when tree health assessment exercises were performed on Casuarina populations close to Victoria.

The use of technical terms and scientific names for pest organisms was kept to a minimum. A number of participants asked for further information and this is straightforward to provide.

All the participants felt they had learnt something of practical use and that the course had given them the confidence to examine trees with an intelligent eye, armed with a better understanding of symptoms and their significance.

The training approach adopted here to `strengthen national capacity in forest protection' has wider applications. The material can be adapted both to other tree needs and to the wider arena of agriculture and crop protection.

Although the recognition and interpretation of symptoms is less of a fundamental issue, given the larger number of scientists active in crop protection, field diagnosis is still a poorly executed craft and one that is rarely taught. It needs further attention and training of scientists and extension workers. This manual offers suggestions on how this could be carried out.

Eric Boa
Paula Nash

December 2002

C O U R S E S U M M A R Y

1. Diagnostic methods for tree health

9 - 13 September 2002

Organisation

The course began at 0900 and ended around 1615 with breaks for coffee, lunch and tea taking up about one and a half hours each day. On the fifth day we ended at noon. We began with 17 people attending, excluding course tutors (Dr Boa, Ms Nash) and Ms Allard from FAO. A larger group of people would require additional help to provide the degree of supervision that was achieved for the average attendance of 13 - 14 people.
The tutors arrived in the Seychelles two days before the course began. This was sufficient time to prepare given that Ms Antoine and her colleagues had organised the venue and who should attend the course. The participants worked hard throughout the five days and were highly motivated and enthusiastic. Their comments help to demonstrate some of the concerns that they experienced and this feedback is essential in designing better courses in future.
The surrounding trees and vegetation at the hotel provided enough field material for the initial exercises. We faced some problem in finding a tree species growing in sufficient numbers close to each other for the assessment and monitoring exercise and eventually chose Casuarina. In early September most of the sandragon were still without leaves (and indeed appeared dead or dieing, though this appeared to be a hasty judgment as most/many started to come into leaf at the end of the month).
Some of the participants were familiar with plant pests and they were distributed among the different groups so that their experience could be widely shared.

Schedule

ERB - ERIC BOA; PN - PAULA NASH; PPT - POWERPOINT PRESENTATION

Monday (ERB)

- Official opening
- General introduction (PPT-1); handouts introducing course
- Half group explain who they are and what they do; short game of guessing famous names involving all of group; other half of group introduce themselves
- List types of symptoms on different parts of tree (handout); collate results and present to group, removing duplicate descriptions and simplify list
- Collecting samples: groups sent to collect examples of symptoms on trees (and plants). Brought back to meeting room. Members of each group are asked to describe four of the specimens they have collected and to compare their descriptions with other group members.

Tuesday (ERB)

- Illustrated and guided tour of symptoms (PPT-2); show plates from book (Illustrated Guide to Tree Health*)* enlarged to A3 size

- Fill out sheets with personal details (name, job and education; responsibilities and interests)

- Groups asked to write down their definitions of pest, disease, symptom and diagnosis; answers are read out and discussed between groups in plenary session

- Handout on definitions and explanations of tree health

- Introduce the idea of a classification of symptoms based on four major categories (changes in growth or different development; general death; `localized death'- this category needs to be renamed, physical evidence of pest/ general damage/ other organisms etc.). Groups asked to classify list of symptoms taken from the Crop Protection Compendium. Results are discussed in plenary session and groups examine handout giving more details of a simplified classification used in the Illustrated Guide to Tree Health

- Groups asked to list causes of symptoms and damage; results are compared between groups; develop the idea of living (pests) and non-living factors and these are listed in two handouts

- Illustrated and guided tour of pests and other factors which affect the health of trees (PPT-3)

- First diagnostic test with individuals (not groups) asked to match symptoms with possible cause: 18 specimens are labeled and presented on the tables using material gathered yesterday (and still reasonably fresh)

Wednesday (ERB and PN)

- Discuss interpretations of 18 specimens starting each specimen with a new person. Specimens are displayed on the screen having been photographed the day before with the digital camera and put in PPT-4

- Groups asked to consider how insects and fungi affect plants (two separate forms to fill out); results discussed in plenary session. This is a useful test of how much has been learnt from previous exercises and presentations. Other groups of pests can be included depending on the experience and background of participants.

- COLLECTION AND DISPATCH OF SAMPLES - sessions led by Paula Nash

- Introduction to the topic (PPT-5) explaining some general principles

- Groups proceed to the grounds of the hotel where they are asked to observe yellowing palms and trees in the car park with dieback *(Samania saman).* They take photos of the trees which are later commented on by ERB. They use binoculars to observe crown and are reminded that useful information can also be obtained from people who work in the hotel and may have observed the trees over a longer period.

- Groups bring back their notes and specimens and are now asked to write a letter to the CABI plant clinic saying what they have found (known as the LtP or Letter to Paula). The letters and the prepared specimens are sealed in envelopes and handed to PN who later examines them and transcribes the letter (see printouts). A model letter is prepared by PN and handed out the next day.

- ASSESSING AND MONITORING (ERB)

- Short presentation is made about tree condition, introducing the topic of crown transparency. The example given is urapân disease from Colombia (PPT-6).

- Participants are split into two groups and now proceed to Victoria where they are asked to take photographs of Casuarina trees showing a range of crown transparency. First group starts next to airport, second group nearer Victoria to avoid them following each other. This exercise takes at least two hours and films have to be developed and printed in time for next day

Thursday (ERB and PN)

- Handout of symptoms and causes prepared earlier from Crop Protection Compendium

- Return to collecting and dispatch of specimens. PN reviews letters and how well specimens were packaged.

- Photos of trees arrived (from yesterday's session) and participants are asked to select seven which show an even progression from full crown to one that is almost bare. This exercise can be repeated with series of photographs taken of other diseases and is a most useful way of showing how simple scales can be created which allow observers to assess and monitor the state of health of a tree. Depending on the number of photos, groups can be asked to repeat the selection procedure and their results compared with other groups

- Once the final selection is agreed, photographs are mounted on a card and colour photocopied, usually by reducing an A3 sheet to A4. The selection can also be photographed with a digital camera and prints made this way (quicker and better quality, depending on availability of colour photocopiers)

- Photographs of Gliricidia little leaf and flurtracedrurdec1ine are shown (PPT-7 and PPT-8 respectively). Participants are asked to say what symptom(s) they would assess in a monitoring exercise designed to measure the impact of a particular disease (or other type of damage). This was a short `filler' presentation designed to fill the inevitable gaps that occur as activities are synchronized

- Armed with the photographs showing the seven point scale all participants proceed to test it in the field. They are given a sheet on which they decide what score to give a tree selected by ERB. It is essential that people decide by themselves what score to give the, after a short time pondering, each observer announces their score. A discussion is held to decide on a consensus score and this is noted on each sheet. Gradually the scoring becomes more consistent and the majority of people begin to understand some of the difficulties with misshapen crowns, where to start a crown assessment and so on.

Friday (ERB)

- The scaling (assessment of tree health) exercise is reviewed.

- Short introduction is given to monitoring, examining how to sample trees under different planting arrangements. Ten different examples, ranging from living fences to small woods on hillsides, are passed around the different groups and they are asked to suggest how they would sample trees. These suggestions are discussed in a plenary session while viewing the photographs in the final presentation (PPT-9).

- Ideally, we would have gone to, the field to sample trees using the suggestions developed out of the previous exercise but firstly there was insufficient time and secondly there were few obvious places to do this

- Participants are asked to comment on the course.

C O U R S E S U M M A R Y

2. Practical Laboratory Methods for Tree Health

16 - 18 September 2002

Organisation

Six people attended this course. Samuel Brutus and Randy Stravens also attended the first course. The four new members came from quarantine, the soil laboratory and included a student currently studying in the UK (Danielle Esparon).

Schedule

ERB - ERIC BOA; PN - PAULA NASI I; PPT - POWERPOINT PRESENTATION

Monday (PN with ERB)

- Introduction to course, get to know participants and current activities and duties of plant protection and soil labs (where course was held)
- Organisation of laboratory: arrangement of work areas, progression of samples from dirty areas to clean areas
- Introduce procedures for isolating, preparation of media

Tuesday (PN)

- Collect samples and examine in the laboratory.
- Demonstrate procedures; further advice on preparing material for dispatch; sealing plates to prevent mites entering.
- How to use local materials to make laboratory items e.g. alcohol burners. `Make and mend' approaches encouraged.
- Early closing because of storm warning

Wednesday (PN)

- Demonstration of how to do isolations sir .racer (directly from tree material in the field). Equipment needed when going to the field.
- Laboratory administration - how to keep track of specimens and work done on them. Complete isolation work, review course contents.
- Laboratory administration - how to keep track of specimens and work done on them.
- Complete isolation work, review course contents.

List of Contents

PPT - PowerPoint presentation.

ITEM	NOTES	# PAGES
Participant details	Summary	2
Tree Health: practical diagnostics course, Seychelles. Participant details	Form to fill out and return	1
Course feedback	Summary	2
PPT-1: Diagnostic methods for Tree Health. Introduction		11 slides
Tree Health Training Course. Sheet 1. Introduction	Background to course	1
Tree Health Training Course. Sheet 2. Course details	Describes topics to be covered	1
Symptoms - damage - signs	Parts of plants to consider: aide memoire for practical exercise	1
Types of symptoms	List known examples. Practical exercise	1
Symptoms recorded by groups 1 to 4	Results of previous exercise	2
Self definitions	Form used to record group responses for pest, disease, symptoms and diagnosis.	1
PPT-2: Symptoms of ill-health in trees		19 slides
Tree health: definitions and explanations	Handout	1
Classifying symptoms and damage I	Written exercise	1
Causes of symptoms and damage	Written exercise	1
PPT-3: Pests and others factors which affect the health of trees		12 slides
Classification of symptoms and damage	Handout	1
Major groups of pests which attack trees	Handout	1
Abiotic factors which affect the health of trees	Handout	1
Diagnosing the 18 examples	Form used to record responses	2
PPT-4: My very first diagnosis	18 examples used for the diagnostic quiz	9 slides
Fungi: how they affect plants	Written exercise	1
Insects: how the affect plants	Written exercise	1
PPT-5: Collecting and sending samples		13 slides
Sequence of investigation	Stages in observing and examining a tree health problem. Handout	1

ITEM	NOTES	# PAGES
Sending samples	Form to accompany “sequence of investigation”. Used for practical exercise with saman and palm trees. Trees where described and samples collected for dispatch	1
Letters to Paula	Group results: covering letters and descriptions of saman and palm trees	1
Letters to Paula: sending samples. Group assessment	Form used to comment on the “letters to Paula” that accompanied samples	1
Dear Ms Nash	Handout. Model letter.	1
PPT- 6:Assessment and monitoring		5 slides
PPT- 7: Austrocedrus decline and Gliricidia little leaf disease		8 slides
Casuarina monitoring scale	Scale used to asses crown transparency	7 photos
Assessing tree health Casuarina	Form used to record personal scores and consensus score from seven point scale	1
PPT- 8:Sampling tree populations for surveys		10 slides

Tree Health Course, Seychelles

Participant details

Name
Position/Job
Training (University/College etc)
Interest/Responsibilities that involve trees

Course Feedback

Assessed formally for first course with a form, from which responses have been summarised. PN assessed participants reaction to the second course informally. Ratings for different parts of the course were:

1 - poor, unhelpful, not clear; 2 - useful, sometimes not clear, wanted more information; 3 - very useful, interesting

TEACHING METHOD: Talks; Class Exercises; Field Exercises

COURSE CONTENT: Symptoms; Causes; Diagnosis, Samples, Assessing

	Methods			Contents					
NAME	T	E	F	S	C	D	P	A	COMMENTS
Alcindor, Henri ANTOINE	3	3	3	3	3	3	3	3	Lecturers had warm and welcoming personalities and were very interesting. Useful and well explained exercises. Now more confident about understanding symptoms. Wanted more time on diagnosis and needed greater concentration on assessment and monitoring.
Antat, JOSEPH	3	2	3	3	3	3	3	3	Very helpful and interesting, sometime delivery was too quick. Looks forward to more `amusing' teachers. I have learnt a lot.
Antoine, HELDA	3	3	2		3			3	Delivery of talks good (pitch of voices, loud and clear). Talks and exercises well balanced. Wanted more time in field and more examples to work on. I enjoyed it a lot. It will help the project team a lot and they are better equipped to do the monitoring and collecting samples. And of great assistance to myself as project coordinator.
Boukondzo, MARCELLINE Dinzebi	2	3	3	3	3	3	2	3	1 could understand the speakers well. The presentations were clear and instructions easy to grasp. The balance of talks was good Explanation of how to collect samples was too fast and more instructions needed. I am now more confident about understanding the causes of symptoms.
Brutus, SAMUEL,	3	3	3	3	2	2	3	2	Course was too general but also good and informative.
Dora, CHRISTINA	2	3	3	3	3	2	2	3	Generally interesting and fruitful. Field exercises were most interesting and I gained a lot of practical skills, especially in taking photos. Overall quite challenging and I had to concentrate carefully. 1 really enjoyed the course and learnt more than I expected.
Doudée, DAMIEN	3	3	3	3	3	3	2	2	Well organised and pace of course was good. Copies of handouts were immediately available. Wanted more time on field exercises, symptoms and collecting and sending samples. Time was limited on assessment and monitoring.
Doway, ANDRE	2	3	2	3	3	3	2	3	Overall well organised and I have gained quite a lot. Wanted more information on collecting samples. The course has given me more confidence.
Gonzalves, Pool.	3	3	3	2	2	2	2	3	Expertly prepared and delivered. Very interesting. Wanted more time on symptoms. Gained more than expected.

Onezime, RACHEL_	3	3	3	3	2	2	2	3	Very lively and practical teaching approach. The slides and pictures were very good. I feel more confident about symptoms though I still have difficulties. I wanted more information about causes and how to diagnose and more practice in sending and collecting samples. I expected to visit many sites and to work with a wider variety of trees.
Payet, WILVEN	3	3	3	3	2	2	2	3	Interesting, well prepared, we could understand clearly. I didn't expect it to be so practical and I enjoyed this.
Savy, DANIELLA	2	2	2	2	2	2	2	2	Delivery of some lectures too fast and not always clear. Wanted more information about assessment (printed notes) and fieldtrips. Also for many of the specific topics. Generally enjoyed the course and group work and my knowledge has been increased.
Stravens, RANDY	3	3	3	2	3	2	3	2	Generally good but not enough time for some topics (e.g. symptoms). Class exercises were well organised and good interaction. Wanted more time on field exercises.
Subramaniam, RAVINDRAN	3	3	3	3	2	2	3	2	Well planned and organised. Delivery was good and informative and content was eye-opening. Wanted more information about causes and diagnosis and further explanations of sampling methods. I am very satisfied.
Telemaque, GILBERT	3	2	2	2	2	2	3	2	It was fun and interesting.
Valentin, MASON Romy	3	3	2	2	2	2	3	3	Course was generally very good and well organised. Wanted more information on symptoms
VOSS, PIERRE,									

sheet 1
Information

TREE HEALTH
Training Course
9 – 13 September 2003, Mahé, Seychelles

Keeping trees healthy

Trees contribute many things to the environment and to people. They provide products that we use while their biological processes and physical presence maintain an ecological balance. The landscape is shaped and defined by trees and they are an essential feature of the countryside and urban areas.
Trees are attacked and damaged by pests, diseases and other non-living factors. Normally we would ask specialists to help in diagnosing a problem - finding the cause. But people with specialist knowledge are few and for between and most work in temperate countries.
So, to summarise: trees are important, we are concerned about their health, yet help in coping with problems is not readily available. How are we going to improve local responses to new problems? We need to work more closely with people who have a primary responsibility for trees and to improve their knowledge of the basic features of tree health. That is the aim of the present course.

What is tree health?

Tree health is concerned with trees and people. It addresses the full range of symptoms shown by unhealthy trees (regardless of their cause) and is concerned with their recognition and interpretation. Ultimately it includes resolving problems. Tree health embraces a wide range of interests, from people with a general interest or responsibility for trees to scientists who study tree pests and diseases.

Training needs

All previous efforts to increase local capacity and skills in tree health have focused on the study of disease causing organisms and insect pests. This is an important topic but it concerns a very small number of technical people and scientists. This is the first national course to address the wider challenges of tree health, namely to improve general skills. The greatest need for training in tropical countries is in symptom recognition and interpretation. The course seeks to achieve a number of important things:

- heighten awareness of tree health problems
- improve the accuracy of first reports on 'new' diseases'
- monitor the extent and severity of tree health problems
- strengthen collaboration between government agencies, NGOs and scientists
- reduce delays in identifying and thereby managing problems

We want you to understand more about the features of ill-health, how to observe them and report them. We do not expect you to become plant pathologists or even diagnosticians. We believe that the general approach taken by the course will be the most effective way of coping with future problems in the Seychelles. Bonne chance!

ERIC BOA AND PAULA NASH
CABI Bioscience

sheet 2
Course Details

Schedule

The list of topics that follows will be studied during the five days. The time we spend on each topic will depend on a number of factors that cannot be predicted in advance. That is why there is no published schedule. The most important items that will be dealt with are shown first in the list.

Structure

We want participants to think and talk more than they write or read. The emphasis is on practical exercises, initially in the classroom but then going into the field to examine trees and symptoms more closely. Dr Boa will also be showing photographs and talking about diseases from other parts of the world to help illustrate some of the broader points, and to vary the diet of exercises.
There will also be some quick tests to help you monitor your own progress and to identify areas where further teaching might be needed. We also want you to compare and share your own knowledge - do not underestimate what you already know!
Remember, though, that this is not a course about tree diseases or fungi or insect pests, but one which aims to teach you general principals that you can apply 'where there is no tree health doctor'.

Topics

1. SYMPTOMS
different types; classification into simple groups; collecting samples from the field; describe in classroom; summary

2. CAUSES OF ILL-HEALTH
different types; arrange into groups; features of causal factors (via photographs); summary

3. INTERPRETATION (PRELIMINARY DIAGNOSIS
connecting symptoms to causes; interpret samples from field trip; quiz

4. SHORT TECHNICAL INTERLUDE
how to collect and send samples; describing symptoms; sources of technical advice

5. MONITORING TREE HEALTH
crown density; use of scales; standardising observer responses; establishing plots, observation trees

6. TESTING, REVIEWING, FEEDBACK
find our what people have learnt; identify good things, things that could be done better; participants assess teachers

Symptoms - Damage - Signs

THINGS THAT DON'T LOOK RIGHT

Consider the following parts of the tree or plant:

Crown

Leaves

Stems

- **green shoots**
- **twigs**
- **branches**
- **trunk**

Wood (inside trunk)

Flowers

Fruit

Seeds

Roots

GROUP

Types of Symptoms

List the examples that you know.

1	16
2	17
3	18
4	19
5	20
6	21
7	22
8	23
9	24
10	25
11	26
12	27
13	28
14	29
15	30

Symptoms recorded by groups 1 to 4

GROUP	SYMPTOM/DAMAGE	
1	Abnormal flowering	
1	Abnormal fruits/too small I	
4	Bark bursting	
3	Bark peeling off	
3	Black spots	I
3	Bleeding	
2	Bleeding abnormal	
1	Borer holes in the trunk	
2	Breaking of barks	
3	Burrows	
2	Canker	
4	Colour change	
2	Dead twigs/branches	
1	Deformation of seeds	
3	Deformation of trees	
1	Dieback	
3	Dieback	
2	Discoloration of fruits	
1	Discoloration of leaves	
1	Discoloration of roots	I
2	Dried branches	
13	Dried leaves, discoloration	
1	Dried rot	
1	Dried seeds	
1	Dried twigs	
3	Dropping of parts of plants e.g. branches	
3	Dropping of (immature) fruits	
2	Drops of fruit	
4	Drying up of young shoots	

GROUP	SYMPTOM/DAMAGE	
2	Extra growth	
1	Flower drops/sheds	
3	Flowers drop	
1	Gaps in the crown	
4	Glue sap	
3	Green leaves drop	
3	Greyish brown powder	
4	Hole in bark	
2	Holes in bark	
1	Insects infestations	
1	Lack of flower buds	
2	Lack of producing new shoots	
4	Lack of seed development	
4	Large quantities of pests I	
2	Leaf discoloration	
1	Leaf curl	
2	Leaf curl, down/up	
2	Leaf drops	
1	Leaf fall	
3	Leaf miner	
2	Leaf spots	
4	Leaves turn black	
1	Liquid/fluid oozing out	
2	Loosening of barks	
2	Loss of crown shape	
2	Loss of flowers	
2	Loss of seed production	
1	Malformed shape (of fruits)	
4	Misshapen of leaves	

GROUP	SYMPTOM/DAMAGE	
4	Dwarfing of the branch	
4	No development of flower	
4	No leaves	
2	Opening of barks	
4	Palm tree branches collapse	
I	Patches on fruits	
I	Patches on leaf stems	
4	Pest beneath the bark	
2	Pest infestation	
2	Physical damage	
2	Poor root development	
I	Poor viability of seeds	
4	Rolling of leaves	
I	Root rot	
I	Rootknot	
3	Rotting of trunk	
I	Rupture of bark	
3	Rust	
2	Rusty leaves	
2	Secretions	
I	Seeds drop/shed	
4	Self-debarking of tree	

GROUP	SYMPTOM/DAMAGE	
4	Shedding of leaves at unusual intervals	
2	Shrinking	
4	Small fruits drying up	
I	Soft rot	
I	Spots on leaves and stems	
4	Spots on fruits	
4	Spots on leaves	
I	Stunted growth	
2	Stunted growth	
3	Stunted growth	
2	Stunted roots	
4	Twigs drying	
2	Weak stem	
3	Weakened stems	
3	Wilting	
I	Wilting of leaves/plants	
2	Wilting of trees	
3	Withering dry	
2	Wood dust	
3	Yellowing colour in leaves	

Symptoms shaded yellow are already described and would therefore be excluded from a final list

Self-Definitions

Pest
Disease
Symptom
Diagnosis

Groups then compare their definitions

Tree health: Definitions and Explanations

Term	PREFERRED USE	
Abiotic	Non-living; a physical or chemical factor that adversely affects the health of a tree	Abiotic factors result in disorders and not disease
Biotic	Refers to pests i.e. living organisms which attack trees	As used in the phrase 'biotic factors' or 'biotic influences
Do m a g e	An *injury* to a tree: commonly used to describe the effect of insect feeding	Symptoms lead to damage in a general sense. As in 'the damage caused by a tree disease'
Decline	A loss in tree vigour; a gradual and general deterioration (leading to tree death)	Some declines are temporary and trees get better. The causes of declines are often associated with abiotic factors.
Diagnosis	The process of identifying the cause of symptoms and damage, whether pest or abiotic factor	Also used in the narrow sense of identifying a pathogen and disease. As in 'diagnostic test' for a (fungus).
Disease	A harmful deviation of normal physiological or biochemical processes caused by infection of a pathogen	Does not admit the effects of abiotic factors and insect feeding
Disorder	Any harmful deviation from normal physiological processes due to abiotic factors	General description describing problems caused by non infectious agents
Forest health	A collection of concerns and issues surrounding the *decline* of trees	Also: the condition or well-being of a natural forest
Health	The state of well-being; physiological and biochemical processes are undisturbed	See tree *health*
Host	The tree which harbours a parasite or insect pest	
111-health	The adverse effect of pests and other factors on the normal appearance of a tree	Useful term that embraces diseases, disorders and direct insect damage; does not always translate well from English.
Infection	To enter and establish a permanent or temporary parasitic relationship with an organism; a plant which is infected and showing symptoms is said to be diseased.	The key point is the dependent relationship between the infective agent, such as a fungus, and the host, such as a tree. Infection is not the same as inoculation.
Infestation	To occupy and cause injuries, as with insect pests	Also includes microbes or virus particles on plant surfaces. Does not imply that infection has occurred
Injury	Any event which impairs the growth of the (tree), its normal functions and/or appearance	Damage is more commonly used when describing such events on trees
Parasite	An organism or virus existing in intimate association with a living organism from which it depends on its existence.	Parasites do not infect their host and thus do not cause disease. However plant nematodes are called parasites and pathogens.
Pathogen	Disease causing organism or virus	Includes fungi, bacteria, viruses and phytoplasmas but excludes insects and other pest organisms.
Pathology	The study of diseases, their causes and how to control them	
Pest	A plant, animal or pathogenic agent which causes damage or injury to a plant or plant product. Includes viruses.	A primary pest is one which is the leading cause of a problem; a secondary pest contributes to symptoms and damage but is not the principal agent.
Sign	Not used in the guide in the narrow scientific sense (see right)	An objective or physical indication of a pathogen, such as fungus fruiting bodies
Symptom	A feature, usually a visible sign, which provides evidence of a disease or disorder. (The result of a physiological or biochemical disturbance.)	Symptoms that have a range of possible causes are said to be non-specific e.g. dieback. The boundary between symptom and damage is not always clear.
Syndrome	A collection of symptoms or sum of effects which describe a particular disease or disorder	
Tree condition	The state of health of a tree	See *condition*
Tree Health (individual trees)	The state of well-being; normal growth and development	Health of the tree distinguishes the state from the general topic of 'tree health'
Tree Health (general topic)	Study and consideration of factors that influence state of well-being and the effects these have on the tree	

Classifying Symptoms and Damage

Select appropriate category for each symptom/damage.

1. **Change in growth or different development;**
2. **General death**
3. **Localised death (see note below)**
4. **Physical evidence (of pest, general damage, other organisms etc.)**

CAT	#	SYMPTOM/DAMAGE	NOTES
	1	abnormal colour	
	2	abnormal form or shape	
	3	blight	
	4	collapsed ('uprooted, toppled)	
	5	cysts on root surface	
	6	damping off (seedling collapses)	
	7	dead heart of trunk	
	8	dieback	
	9	discoloration	
	10	distortion, twisting, cracked	
	1 1	dwarfing (reduced size, growth)	
	12	early senescence	
	13	elongation	-
	14	empty grains	
	15	exit hole (obvious)	
	16	external feeding/insects present	
	17	frass (powder/sawdust from insects)	
	18	fungal growth (fruiting or sparing also)	
	19	fused together	
	20	galls	
	21	gum or resin production from stem	
	22	hairy root	
	23	sooty mould	
	24	internal feeding by insect	
	25	leaf spot or necrosis	
	26	leaf rolling	
	27	mosaic patterns on leaf	
	28	mummification, shrivelled	
	29	necrosis, general	
	30	canker	
	31	rust	
	32	ooze from stem	
	33	mildew	
	34	lichens/mosses on stems	

CAT	#	SYMPTOM/DAMAGE	NOTES
	35	premature fall, shedding	
	36	premature ripening	
	37	witches' broom (proliferation of branches)	
	38	reduced root system	
	39	internal rot of stem	
	40	scars & healing	
	41	shredding of leaves	
	42	spittle mass (froth on leaves and stems)	
	43	stubby growth	
	44	swelling	
	45	webbing - leaves stuck together	
	46	wilt	
	47	Parasitic plant	

NB The original category of 'localized death' caused some problem when participants were asked to apply this as a major category of symptoms. 'Localized necrosis' is a better term but does of course require an understanding of what necrosis means.

GROUP

Causes of symptoms and damage

List the examples that you know

1	17
2	18
	19
4	20
5	21
6	22
7	23
8	24
9	25
10	26
11	27
12	28
13	29
14	30
15	31
16	32

Classification of Symptoms and Damage - FAO book

Plate numbers refer to FAO book: *An Illustrated Guide to the State of Health of Trees.*

Table 5.1 : Main categories of symptoms of ill-health

Major Category	Notes
1 Different growth or development	Consider colour and shape and rate or pattern of growth, often overlooked or their significance not fully understood
2. General death	Includes some of the more obvious symptoms such as dieback and wilting
3. Localized death	Includes many commonly observed symptoms such as leaf spots and rots
4. Physical evidence: damage by animal feeding, pest infestation and other growths	Includes injury by non-pest factors, fungal growth, insect populations and epiphytic plants; there are often difficulties in deciding their role in disease development and other disorders

Table 5.2: Different growth or development

General Feature	Notes	Plate(s)
Colour changes in crown	change of colour; loss of colour (discoloration); close ups of leaf symptoms are	Plates 1A, 1B
Form or shape	galls, swellings and knots	Plate 2
	cracked or split surface, distorted, malformed	Plate 3
More or reduced growth	growth stimulation	Plate 5
	stunted or reduced growth	
Premature loss or development	early flower drop, senescence or ripening; leaf fall	Plate 6

Table 5.3: General death

General Feature	Notes	Plate(s)
Blight	general description of an unhealthy tree; used specially to indicate collapsed seedings	Plate 7
Dieback	branches show progressive death from the tip downwards	Plate 8
Wilt or collapse	loss of rigidity in leaves, less obviously present in young stems	Plate 9

Table 5.4: Localized death

General Feature	Notes	Plate(s)
Small areas [spots and lesions]	many words used to describe them – e.g. spots, scabs, pit	Plate 10
Defined areas [cankers]	cankers vary from those with sunken centres, others with raised edges and some with swelling	Plate 11A and 11B
General region	rots and decays, most commonly inside major stems	Plate 12

Table 5.5: Physical evidence

General Feature	Notes	Plate(s)
Damage by animal feeding	exit holes, frass, webbing, internal, external, shredding, spittle mass; note that ‘animal’ includes insects	Plate 13A and 13B
Pest infestation	insect visible, fungal sporing structure (e.g. brackets), mycelium, growth of moulds or sooty appearance	Plates 14A and 14B
General damage	bleeding, ooze (not bacterial)	Plate 15A and 15B
	mechanical damage; adverse climatic conditions	
Other growth on tree	parasitic plants, epiphytes, lichens, mosses, algae	Plate 16

NB The original category of ‘localized death’ caused some problem when participants were asked to apply this as a major category of symptoms. ‘Localized necrosis’ is a better term but does of course require an understanding of what necrosis means.

Classification of Symptoms and Damage - originally from CPC

1. Symptoms were transcribed for all plant parts from the Crop Protection Compendium. Global Module 2000.

Plant = whole plant; grw-pt = growing point; floral = inflorescence; vg-prt = vegetative part [tuber, corm, rhizome etc]

2. Original symptoms [see sheets 1 and 2 in an Excel spreadsheet] were narrowed down and simplified. Further changes were required:
   a) Is discoloration a separate symptom type or a secondary manifestation of other symptoms such as lesions? Discoloration has not been classified.
   b) wilting has been classified as general death
   c) note possible overlap between abnormal development and altered development e.g.

NB. The purpose of this classification is to provide a training tool for recognizing and interpreting the features of unhealthy plants.

1.Abnormal growth or development										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
1.1	abnormal colour		x							
1.2	abnormal form or shape		x							
1.3	distortion twisting cracked	x	x					x		
1.4	dwarfing (reduced size, growth)	x			x	x	x	x		
1.5	elongation	x								
1.6	fused together								x	
1.7	mosaic (abnormal patterns)							x		
1.8	proliferation (incl. witches' broom)			x	x					
1.9	stubby growth			x	x					
1.10	swelling			x	x					
2.0 General										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
2.1	bright (also seeding)	x						x		
2.2	collapsed ('uprooted, toppled')	x								
2.3	dumping off (seedling collapses)	x								
2.4	dieback	x		x		x	x			
2.5	lodging; broken stems			x						
2.6	wilt	x	x	x		x	x			
3.0 Necrosis: general (3.1-3.3) local (3.4-3.5)										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
3.1	dead heart	x		x		x				
3.2	necrosis, general			x						
3.3	rot (internal, dry, soft)		x	x	x	x	x	x	x	x
3.4	lesions (spot, scab, pit, fleck, streak)		x	x	x	x	x	x	x	x
3.5	necrotic area (canker, streak, lesion)		x	x	x					

4. Physical evidence of pest										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
4.1	cysts on root surface				x					
4.2	exit hole (obvious)			x		x		x		
4.3	external feeding/insects present	x	x	x	x	x	x	x	x	x
4.4	frass	x	x	x		x	x	x	x	x
4.5	fungal growth (fruiting or sporing)		x	x	x	x	x	x	x	x
4.6	honeydew, sooty mould		x	x		x	x	x		
4.7	internal feeding	x	x	x	x	x	x	x	x	x
4.8	ooze, bacterial	x	x	x				x		
4.9	shredding (general eating)		x							
4.10	spittle mass		x	x						
4.11	webbing (stuck together)		x			x	x	x		
4.12	other growth (mistletoe, lichen etc.)		x	x		x	x	x	x	
5. Altered growth of plant										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
5.1	early senescence	x	x							
5.2	empty grains								x	x
5.3	premature fall, shedding		x				x			
5.4	galls		x	x	x		x	x		
5.5	hairy root					x				
5.6	mummification, shrivelled							x	x	x
5.7	premature ripening						x			
5.8	reduced root system				x					
6. Other										
Symptom or damage		PLANT	LEAF	STEM	ROOT	GRW-PT*	FLORAL	FRUIT	SEED	VG-PRT
6.1	dirty roots				x					
6.2	gummosis, resinosis				x			x		
6.3	odour	x	x	x		x		x		
6.4	ooze, non-bacterial	x	x	x				x		
6.5	discoloration	x	x	x		x	x	x		
6.6	scars & healing (physical damage)			x						

Major groups of pests which attack trees

Group	Type	Notes	Example (see relevant plate from FAO Guide)
Fungi	Pathogen	Common cause of disease. Associated with a wide range of symptoms. Diverse group of pest organisms: some with large fruiting bodies visible with the naked eye but many only 'visible' when grown in artificial culture in the laboratory. Fungi also play a secondary role in decays and rots.	Rust fungus on Acacia mangium [2.2]
Bacteria	Pathogen	Uncommon cause of disease but several have caused widespread losses. Cannot be detected with naked eye except in bacterial oozes.	Bacterial wilt of Eucalyptus sp. [9.5]
Viruses	Pathogen	More common cause of symptoms than perceived but overall production losses low compared to fungi. Symptoms may resemble those of other pests and factors. Transfer to new host plants by (insect) vectors, sometimes by manual transmission.	Leaf discoloration and flecking on Gliricidia sepium [10.91]
Nematodes	Pathogen	There are very few serious nematode diseases of trees - best known example is pine wilt nematode.	
Phytoplasmas	Pathogen	Uncommon cause of disease but more widespread than usually thought, mainly because typical symptoms are not recognized. Formerly called mycoplasma-like organisms.	Gliricidia little leaf disease [8.1 and 8.2]
Insects	Pest	Widespread, extremely common cause of damage and rarely host tree specific (unlike many pathogens). Readily seen but often assumed to be the cause of more damage than is supported by biological evidence. Different insect groups associated with particular patterns of feeding on trees.	Leaf miner damage on Pterocarpus indicus [13.6]
Mites	Pest	Common pest whose feeding results typically in distinct symptoms (e.g. galls); not readily seen with the naked eye.	Leaf galls on Vangueria infausto [2.1]
Parasitic plants	Pest	Widely present in many tree species that have been weakened by other factors. Rarely the cause of major losses.	Parasitic plant on Schinus molle [14.13]
Weeds	Pest	Some weeds out-compete trees, especially when young; others grow in the canopy and can strangle trunks and branches	Bromeliads on cacao [16.1]
Animals	Pest	Includes large mammals such as deer, smaller rodents and birds which feed on the foliage. Damage and losses can be significant though plants often recover.	Deer damage on Gmelina arborea [13.12]

* Note that pathogens are also pests but they differ from insects, for example, because they cause disease.

Abiotic factors which affect the health of trees

Main Factor	Categories and Examples	Notes
Chemicals	TOXIC: pesticides, herbicides POLLUTION: deposition on plant; atmospheric; industrial waste MISCELLANEOUS: salt, oil poured in to soil	The role of atmospheric pollution in tree declines is over-stated
Mechanical agents	MACHINERY: agriculture, construction HUMAN malicious; accidental	Mechanical damage can provide means for pathogens to enter
Fire	FIRE: some start naturally while others involve people	Weakened trees may be more susceptible to insect attack
Soil conditions	AVAILABILITY OF NUTRIENTS: deficiency, excess PHYSICAL STRUCTURE: poor drainage; inhibition of root development	Tree species respond in different ways to lack of particular nutrients
Water	Too MUCH: flooding; waterlogging NOT ENOUGH: drought	Trees differ in their ability to withstand excess water and poor availability
Weather	TEMPERATURE: too low or too high LIGHTNING; hail; wind; snow and so on	The effects of climate on tree health are often delayed

Diagnosing the (X) examples

#	SUGGESTED CAUSE	NOTES
1		
2		
3		
4		
5		
6		
7		
8		
9		

Where X represents the number of examples examined by participants.

FUNGI: how they affect plants

GROUP

Describe symptoms or damage caused.

1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19
10	20

INSECTS: how they affect plants

GROUP

Describe symptoms or damage caused.

1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19
10	20

Sequence of Investigation: how to do a visual diagnosis

Start with individual parts of the plant and broaden the observation of symptoms to the whole tree, neighbouring trees and then the actual site (at which point you will need to talk to someone familiar with the area)

- Plant part
- Tree
- Tree population
- Site / history of problem

Sending samples

Here are some suggestions about how to document information when collecting specimens for diagnosis

Plant part symptom description

Tree symptoms

Tree Population

History/Site details

Letters to Paula

Covering letter from Group 3

11th September 2002
Miss Paula Nash
Plant Clinic Diagnostic and Advisory Service
CABI Bioscience
Egham Surrey

Sending to you the two different specimens and the observation we made, for you to identify the problem affecting coconut trees and Samania tree. Waiting for the result as soon as the identification is completed

Thanking you for your cooperation

Group 3

Yours faithfully

Covering letter from Group 4

Ministry of Environment
Forestry Section
Botanical Gardens
P.O Box 445
Victoria
Mahé, Seychelles

CABI Bioscience
Bakeham Lane
Egham Surrey, TW20 9TY

Attention Miss Paula Nash

Dear Miss

RE. IDENTIFICATION OF TREE DISEASE

We would be grateful if you could do the needful to identify the causes of the diseases of the enclosed trees samples, for our ministry. Please kindly send the results as soon as possible.

Thanking you for your co-operation

Yours faithfully

signature 11/09/02

Letter 1 (Group 1)

Specimen A (Coconut tree)- Collected on the 11th September 2002 around 11.15 pm
Location: Port Glaud, Mahé Beach Hotel Garden Nearby the sea and the main road
General appearance: Generally all the coconut trees in this area look old and unhealthy. It seams that there are animals (Birds) feeding on these trees. The trees are bearing very few fruits
Specific Symptoms
Leaves Dried tips
Yellow patches, dried and brown spots circle by yellow patches
Roots Physical damage caused by the grass cutter
Bark Covered by different type of fungus

Letter 2 (Group 1)

Specimen B (Saman)- Collected on the 11th September 2002 around 11.30 pm
Location Port Glaud, Mahé Beach hotel car park (main)
General appearance- The trees (Saman) does not look healthy and need some proper maintenance (pruning). However, they do not look old. Generally some of them have fruits and flowers
Specific symptoms
Branches Dried
Leaves Shedding
Discolouration of some leaves (yellow edges)
Few physical damage (bruises due to strong winds0
Yellow spots present
Bark Presence of termite colony
White and brown frass
Green patches on bark

Letter 3 (Group 2)

Tree Name Saman
Crown: Loss of shape
Change in colour (yellowish) Mainly at the leaf margin. Almost all the leaves is showing the yellowish colour, percentage (90-100%)
Tree is actually in the seedling stage. 20-3- % twigs are dried out of the whole of the tree.

Letter 4 (Group 2)

Tree name hybrid coconut 11/09/2002
Tip burn almost on all leaves
Leaf spot mainly found on the older leaves
Necrosis found mainly on the lower branches
Lichens found all over the trunk
Algae is growing only on one side of the tree (side facing the sea)
Physical damage with the tree trunk by cutting

Letter 5 (Group 3)

For our first specimen which is coconut tree. Firstly they are situated near the road and also close to the sea. Our observation is firstly, most of the leaves have yellow patches and are spotted. Also observe is parasites and sooty mould. The leaves of the tree have also been eaten by insects. Enclose is the specimen of a healthy and an affected one. 90 % of the coconut leaves have a yellowish colour.
We didn't get a chance of sending you a photo, so instead we've sending you a healthy one.

Letter 6 (Group 3)

The other plant observe is Samania, in which case we found is due to bad pruning, causing scars on the bark. The bark of the tree is also dark with sooty mould. Also observed is dead branches, dry twigs and foliage are sparsely. Also observe on the leaves are some yellowish colour.

Letter 7 (Group 4)

Saman Tree
Sample No. 1
90% of the plant is dying
Bark bursting
Bore holes on lower trunk
White decaying under bark on trunk
Some of the leaves left on one remaining branches
Leaves tip and around the edge are dried up
loosing its healthy green leaves to yellowish
Burst bark on lively part of the branch
Brown hole in the centre of branch

Letter 8 (Group 4)

Palm Tree- Coconut
Sample 2
Abnormality on the lower part of the tree
Yield is not very good
Size of the fruit is abnormal
Spots on the lower upper branches and leaves
Tip of the leave drying up
From- Ministry of Environment, Forestry Section, Botanical Gardens, P.O. Box. 445, Victoria, Mahé, Seychelles

Letters to Paula: Sending samples

Group Assessment

Four groups collected samples from two trees and wrote a covering letter explaining the symptoms and features of each disease. Examine the three sets of letters/samples (six in total) and comment on the information provided in the letter. Can you think of information that is missing? Has the sender told Paula where she can send her reply? Does Paula (or Randy/Sam etc.) know all the useful details that allows them to diagnose the problem?

There are SIX letters to examine from a total of EIGHT letters sent. Remember that two of the letters were sent by your group. LtP - letter to Paula.

LtP number [Palm in lawn / Tree in car park]*

LtP number [Palm in lawn / Tree in car park]*

LtP number [Palm in lawn / Tree in car park]*

Dear Ms Nash

I am sending you some photos of *Quelqueshozia dubious*. Healthy and mature trees can grow up to 10 m tall and have dark green leaves up to 15 cm long, as shown in the photograph labelled 'healthy'.

Recently I have noticed five trees in one of my fields infested by insects. I first saw this five months ago when we had a serious flooding after the river broke its banks. The appearance of the foliage in these trees has changed.

The leaves are curled up and have small white marks on the surface giving them a very distinct appearance like freckles. The trees generally are unwell compared to other trees that did not experience waterlogging.

The trees are important to me because of the valuable fruits they produce. The affected trees are producing much less fruit and this year I estimate that I have only 10% of normal production. This is having a serious effect on the money I can earn.

Please, I ask you to help me. What insecticide should I used to get rid of the insects?

Yours

Juliet Romeo

Assessing tree health
Casuanna

Victoria, Mahé, Seychelles. 12 September 2002

Your name

Tree#	My Score	Consensus
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		

Tree#	My Score	Consensus
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		

Form used to score trees using scale (see previous photo).

Equipment for plant specimen collection	Additional equipment for isolations in the field

List necessary tools of trade

Camera/Film/Batteries	**Dissection kit**
Binoculars	**Alcohol and swab**
Labels	**Media plates (TWA)**
Large Knife/Machete	**Marker pen**
Paper bags/Envelope	**Sealing tape**
Secateurs	**Towel**
Notebook/Pens	
Hand lens	
Pen Knife	
Trowel (for roots)	
Specimen Bottles	
Field bag (for equipment and	
GPS	
Scales (for monitoring)	

Power point presentations

PPT – 1 Introduction to Tree Health Course


Tree Health Courses
The solution to your problems
Tree Health
Tree Health

PPT – 2: Symptoms

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

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Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

Symptoms of Ill-Health in Trees

PPT-3: Pests and other factors which affect the health of trees

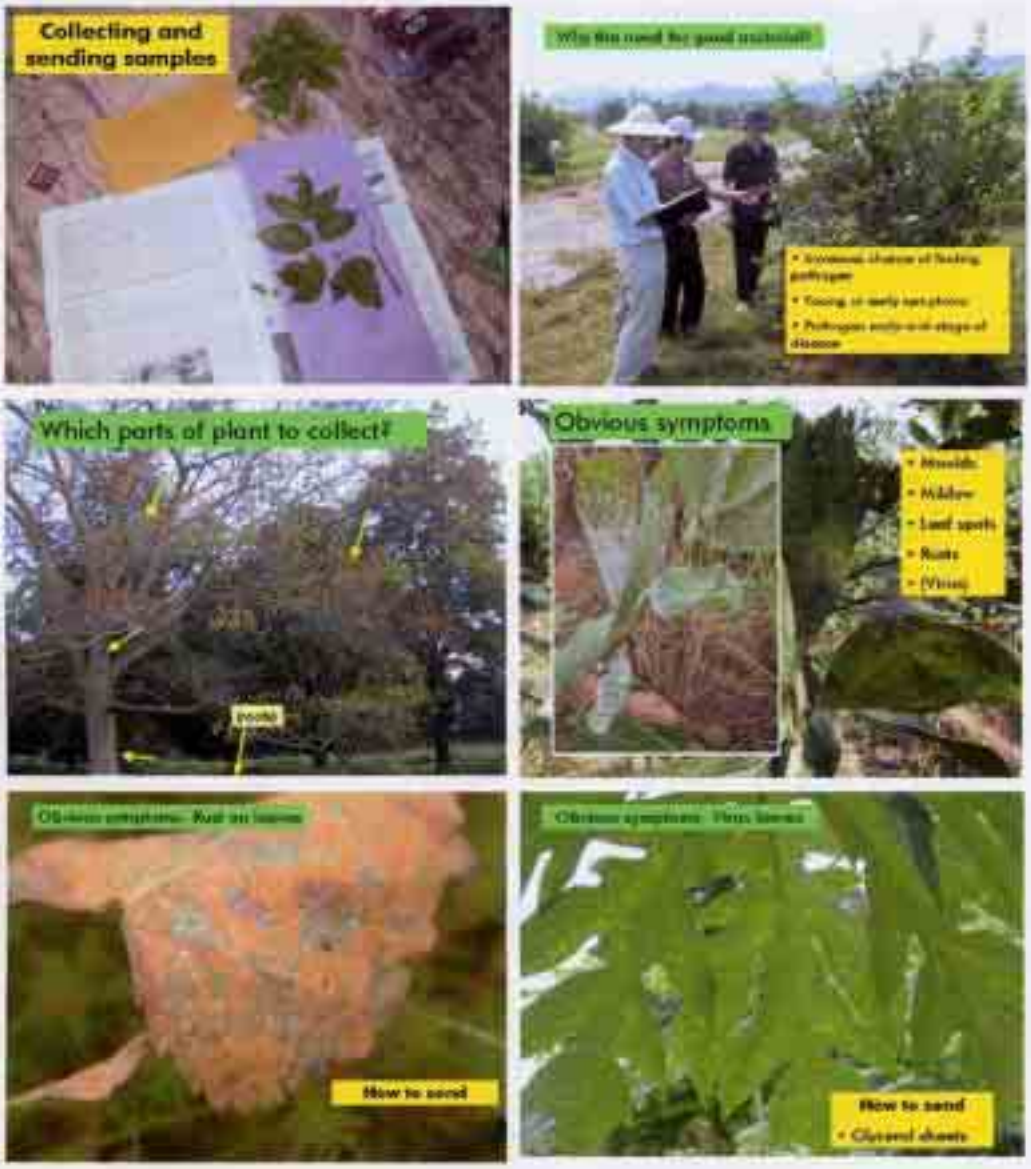
Pests and other factors: **INSECTS**

Pests and other factors: **INSECTS**

Pests and other factors: **INSECTS**

Pests and other factors: **INSECTS**

PPT-5: Collecting and Sending Samples




Obvious symptoms- pathogen maybe internal ?
Eucalyptus Canker


Obvious symptoms- Canker on stem
•Cut into lesion
•Margin of healthy and diseased
•NOT TOO BIG


Not obvious where pathogen lies- Tobacco Wilt
Obvious symptom and part to send are different

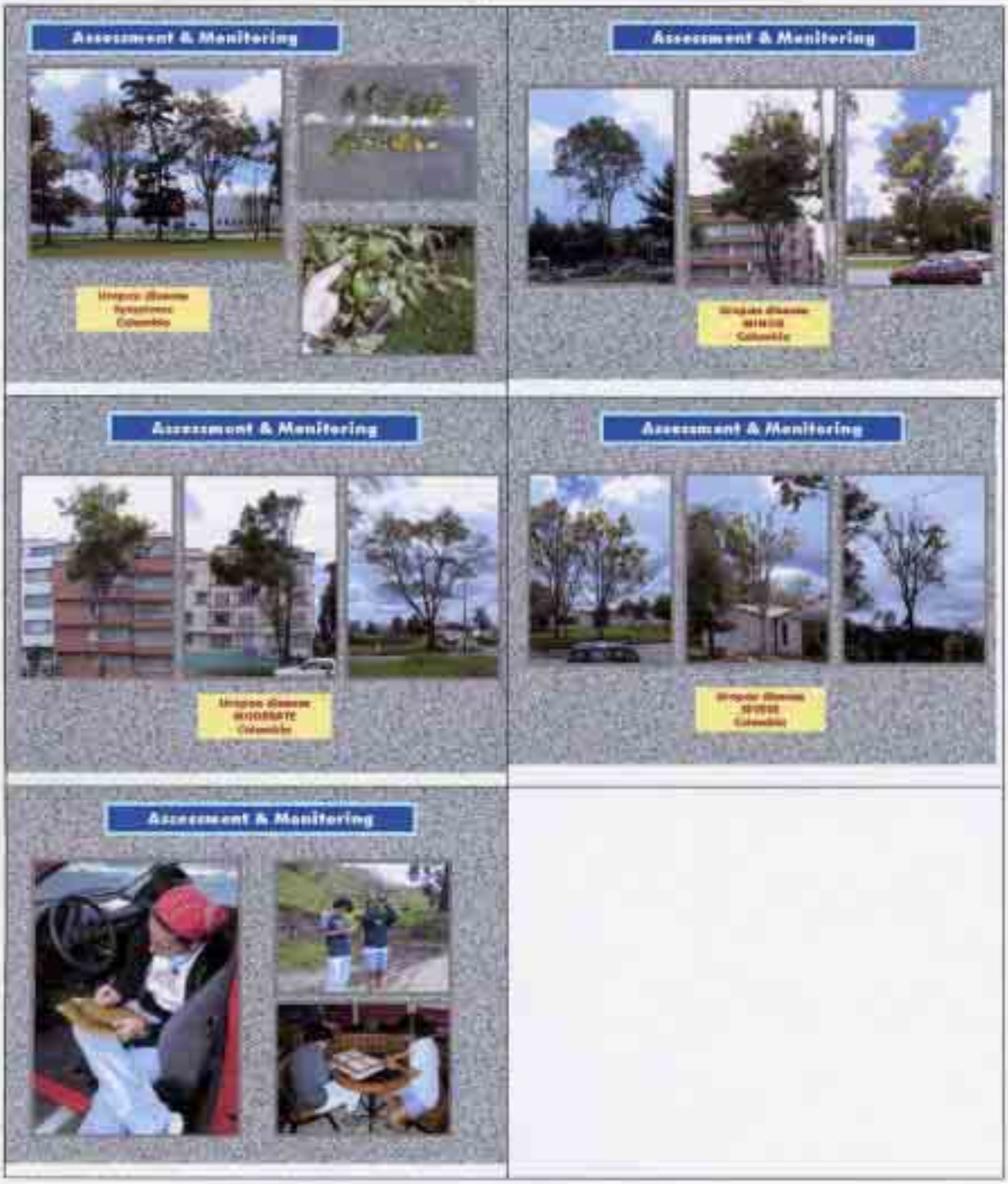

Not obvious where pathogen lies-Wilt
Q. What to send?
A. Roots
How to send


This is how to do it!
Malia azadarach
Yellows disease
Belize


General Points
Contact clinic


Remember to keep me happy
or else!

PPT-6: Assessment and monitoring



These examples taken from *Fraxinus udhei* in Bogotá, affected by ash yellows phytoplasma.

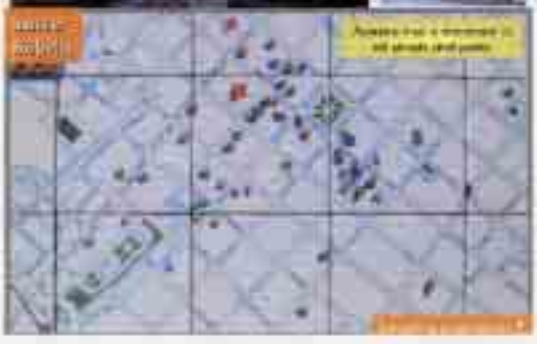
PPT – 7: *Austrocedrus* decline (Argentina) and *Gliricidia* Little Leaf (C America)

Gliricidia little leaf disease, showing progression of symptoms over one year and altered growth patterns

Scale used to assess Casuarina crowns

This was the final selection of seven photos chosen to represent an even transition from very unhealthy to full crowns.

PPT – 8: Sampling Tree Populations for Monitoring Health



Participants were asked how they would select a sample of trees to assess their health (on the basis of crown cover transparency).