

# **Pest surveillance for mango**

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Director  
Plant Protection Division  
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# Pest surveillance for Mango

**Project Name** – Strengthening ASEAN Plant Health Capacity Project under the ASEAN Australia Development Cooperation Program (AADCP)

**Project Duration** – From 2006 April to 2008 February

## Goal

- To enhance the capacity of ASEAN countries to strengthen competitiveness and market access for crop commodities that may pose a Phytosanitary risk.

## Purpose of Survey

- To develop the pest lists of pulses especially on mung bean, pigeon pea, black gram and chickpea for Myanmar, focusing on specified regions
- To improve the accuracy of existing pest lists on the insect pest and diseases in Myanmar
- To record the main insect pests and diseases in selected ecological regions within time limitation

# Survey Team

- Mrs. May May Khin (Dy. General Manager)
- Mr. Myo Khin (Manager)
- Mrs. Myint Nu Thwin (Assistant Manager)
- Dr. Pyone Pyone Kyi (Assistant Manager)
- Mr. Win Than (Deputy Supervisor)
- Mrs. Khin Mya Mya Lwin (Deputy Supervisor)
- Mrs. Cho Cho Lwin (Deputy Supervisor)
- Mrs. Yee Yee Myint (Assistant Supervisor)
- Ms. Maw Maw San (Assistant Supervisor)
- Ms. Myat Su Tun (Apprentice)
- Mrs. Pa Pa Win (Apprentice)

# Regions Surveyed

Sr. No.	Regions/States	Sites
1	<u>Yangon Region</u>	<b>1.Kan Thar Yar Farm</b> <b>2.Vegetable and Fruit Research and Development Centre</b> <b>3.Mindama Nursery Ground</b> <b>4.Seed Division Compound</b> <b>5.Plant Protection Compound</b>
2	<u>Mandalay Region</u>	<b>1.Singaing , Paw Taw Mu Farm</b> <b>2.Htone Bo Farm</b> <b>3.Meiktila Grape Farm</b>
3	<u>Ayeyarwady Region</u>	<b>1.Ta Lote Lat Village</b>
4	<u>Southern Shan State</u>	<b>1.Nan Lat Farm</b> <b>2.Shwe Pu Zun Farm</b> <b>3.Ko Zaw Min Aung Farm</b>
5	<u>Bago (West) Region</u>	<b>1.Paukhaung Township</b>

# Growth stages of mango and Survey Schedule

	<b>GrowthS Stages</b>	<b>Mandalay</b>		<b>Yangon</b>		<b>Shan</b>
		<u><b>Yin Kwe</b></u>	<u><b>Sein Ta Lone</b></u>	<u><b>Yin Kwe</b></u>	<u><b>Sein Ta Lone</b></u>	<u><b>Sein ta lone</b></u>
<b>1</b>	<b>Flushing</b>	<b>Aug-Sep</b>	<b>Jul-Aug</b>	<b>Aug-Sep</b>	<b>Aug-Sep</b>	<b>Sep</b>
<b>2</b>	<b>Flowering</b>	<b>Dec-Jan</b>	<b>Dec-Jan</b>	<b>Dec-Jan</b>	<b>Dec-Jan</b>	<b>Jan</b>
<b>3</b>	<b>Fruit setting</b>	<b>Mar- May</b>	<b>Feb-mid May</b>	<b>Feb-Mar</b>	<b>Feb-Mar</b>	<b>May</b>
<b>4</b>	<b>Harvesting</b>	<b>mid Jun- end of Jul</b>	<b>start of mid May</b>	<b>Apr- May</b>	<b>Apr-May</b>	<b>July</b>

# Collection of Plant Disease Specimens

**Lodging specimens in Herbaria is important.**

- good quality specimens
- specimens with early or middle stage of disease
- old specimens with evidence of pathogen
- label to specimen immediately (Collection no.)
- record extra information in field book

## **Examining Specimens**

- Hand lens
- Cellotape method
- Stereomicroscopic method
- Prepare a microscope slide
- Examine under the compound microscope
- Staining (cotton blue)
- Photograph

# Storage and Curation of Specimens

- Specimens are stored in herbarium room under room temperature.
- All staffs in the Pathology Section are responsible for maintenance of pathology specimens.
- We do not have technician who is trained especially for curation and maintenance of plant disease herbarium systematically.
- At present, disease and insects are housed in different rooms in different building. But it is proposed to move to big room with partition in the middle.

# Specialist identifications

Sr No.	Pathogen	Identifier
1.	<i>Xanthomonas axonopodis</i> pv. <i>mangiferaeindicae</i>	Dr O. Pruvost and C. Verniere
2.	<i>Botryosphaerea parva</i>	Dr. Greg Johnson
3.	<i>Gonatofragmium mangiferae</i>	Dr. Eric McKenzie
4.	<i>Diaporthe</i> sp	Dr. Greg Johnson
5.	<i>Cytosphaera mangiferae</i>	Dr. Greg Johnson



# Records for Country

- Numbers of specimens - (109) nos
- Record of Pathogen Association:
  - Positively Identified (22) species
  - Tentatively Identified ( 2) species
  - Unknown ( 2) species
- Total number of pathogen species (26)
- No.of records by others not found (6) species of fungi  
(1) specie of bacteria

## Positively Identified Pathogens

Sr. No.	Name of Pathogen	Disease	Plant part affected	Source
1	<i>Pestalotiopsis mangiferae</i> (P)	Grey leaf spot	leaf	CMI description No.676
2	<i>Lasiodiplodia theobromae</i> (P)	Stem end rot	Leaf, twig, fruit	This survey
3	<i>Colletotrichum gloeosporioides</i> (P)	Anthracnose	Leaf, twig, fruit, inflorescens	This survey
4	<i>Alternaria alternata</i> (P)	Leaf spot, Fruit rot	Leaf, fruit	This survey
5	<i>Botryosphaerea parva</i> (P)	Stem end rot	Leaf, twig, fruit	This survey
6	<i>Cladosporium</i> sp. (S)	-	Leaf, fruit	This survey
7	<i>Aspergillus niger</i> (S)	-	Leaf, fruit	CPC 2005
8	<i>Gonatofragmium mangiferae</i> (P)	Zonate leaf spot	Leaf,	More Dematiaceous Hypho:1976
9	<i>Curvularia</i> sp. (S)	-	Leaf	This survey
10	<i>Cytosphaera mangiferae</i> (P)	Leaf spot	Leaf	This survey
11	<i>Fusarium moniliforme</i> (P)	Malformation	Inflorescens, shoot	This survey
12	<i>Oidium mangiferae</i> (P)	Powdery mildew	Leaf, inflorescens, young fruit	This survey
13	<i>Denticularia mangiferae</i> (P)	Scab	Leaf, fruit	This survey
14	<i>Scolecostigma mangiferae</i> (P)	Stigmina leaf spot	Leaf	This survey
15	<i>Phomopsis mangiferae</i> (P)	Stem end rot	Leaf, fruit	This survey
16	<i>Capnodium mangiferae</i> (E)	Sooty mold	Leaf, fruit	This survey

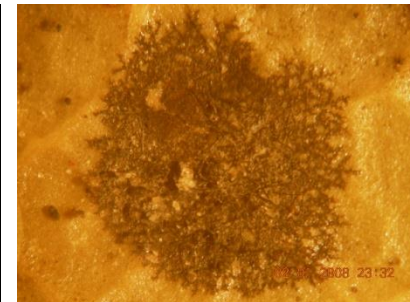
# Positively Identified Pathogens (Cont'd)

Sr. No	Name of Pathogen	Disease	Plant part affected	Source
17	<i>Cephaleuros virescens</i> (E)	Algal leaf spot	Leaf	This survey
18	<i>Diaporthe</i> sp (P)	Leaf spot	Leaf	This survey
19	<i>Xanthomonas axonopodis</i> pv. <i>mangiferaeindicae</i> (P)	Bacterial leaf spot	leaf	This survey
20	<i>Hemicriconemoides mangiferae</i> Siddiqi, 1961 (p)	-	Root	This survey
21	<i>Helicotylenchus dihystra</i> (Cobb, 1893) Sher, 1961 (p)	Common spiral nematode	Root	This survey
22	<i>Xiphinema americanum</i> Cobb, 1913 (p)	Dagger nematode	Root	This survey

# Tentatively Identified

Sr No	Name of Pathogen	Disease	Plant Part Affected	Source
1	<i>Meliola mangiferae</i> (E)	Black mildew	Leaf	This Survey
2	<i>Macrophoma mangiferae</i> (P)	Macrophoma leaf spot	Leaf	This Survey

*Meliola mangiferae*



*Macrophoma mangiferae*



# Unknown records

Pada mya nga mauk variety  
U Than Tun Farm,  
Singaing, Mandalay Div,  
Harvesting Time



# Positively Identified Diseases

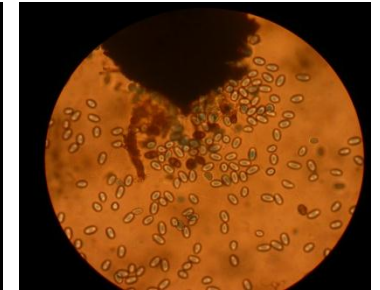
## Anthracnose

*Colletotrichum gloeosporioides*



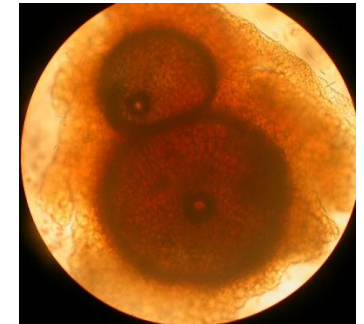
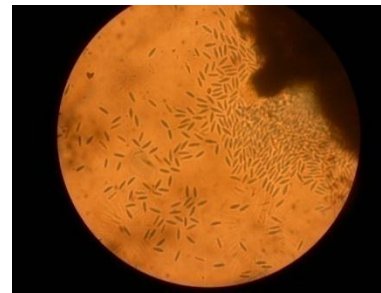
## Stem end rot

*Lasiodiplodia theobromae*



## Stem end rot

*Botryosphaeria parva*

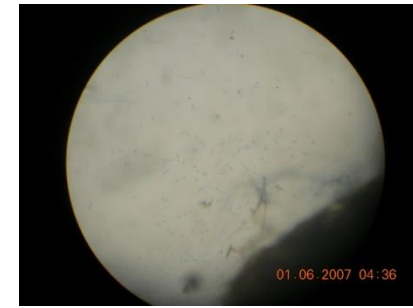
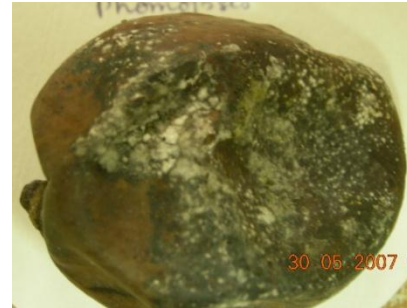




# Positively Identified Diseases

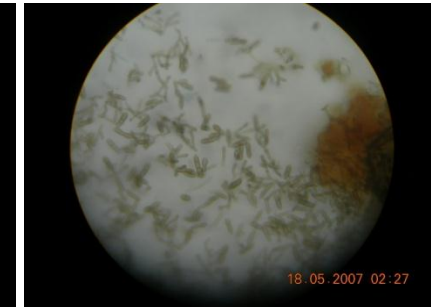
## Stem end rot

*Phomopsis mangiferae*



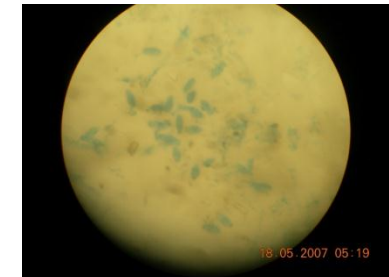
## Zonate leaf spot

*Gonatofragmium mangiferae*



## Powdery mildew

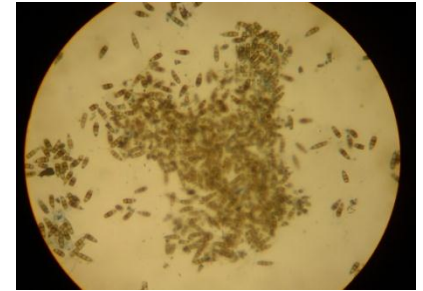
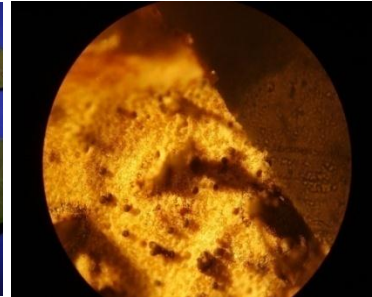
*Oidium mangiferae*



# Positively Identified Diseases

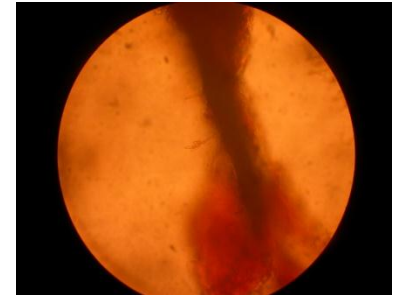
## Grey leaf spot

*Pestalotiopsis mangiferae*



## Scab

*Denticularia mangiferae*



## Stigmina leaf spot

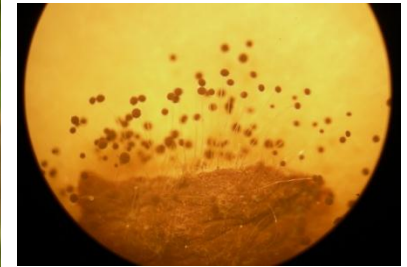
*Scolecostigmina mangiferae*



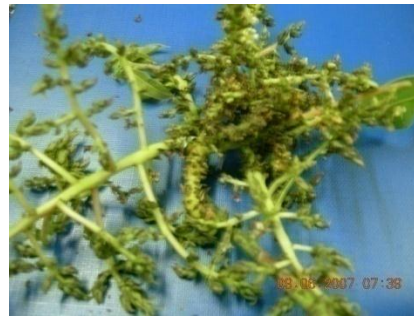


# Positively Identified Diseases

**Aspergillus rot**  
*Aspergillus niger*



**Malformation**  
*Fusarium moniliforme*



**Algal leaf spot**  
*Cephaleuros virescens*



# Positively Identified Diseases

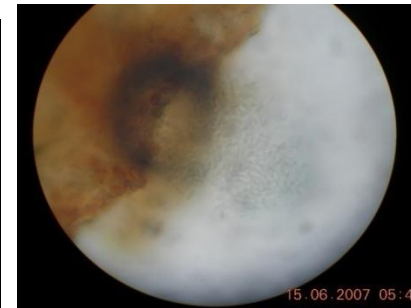
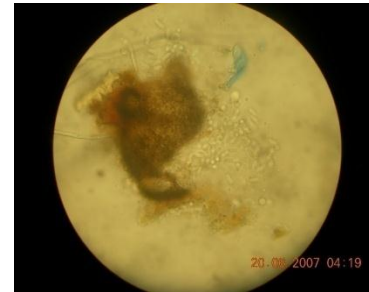
## Alternaria rot

*Alternaria alternata*



## Stem end rot

*Lasiodiplodia theobromae*



## Diaporthe leaf spot

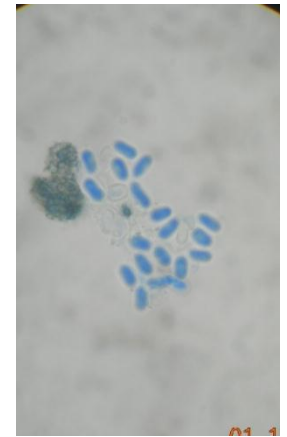
*Diaporthe* sp.



# Positively Identified Diseases

## Brown leaf spot

*Cytosphaera mangiferae*



## Sooty mould

*Capnodium mangiferae*



## Leaf spot

*Cladosporium* sp





# Positively Identified Diseases

## Bacterial black leaf spot

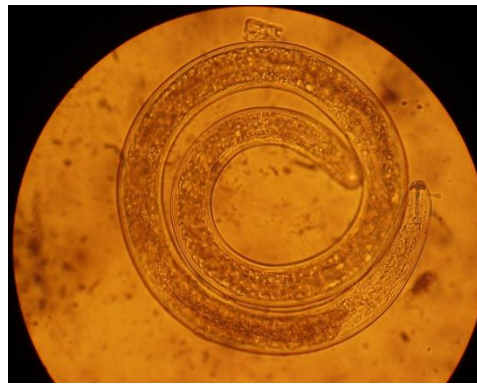
*Xanthomonas axonopodis* pv  
*mangiferaeindicae*



## 3 Nematode Diseases



*Xiphinema* sp.



*Helicotylenchus* sp.



*Hemicriconemoides* sp.

# Parasitic Plants





# Maintenance of collection and database

- Our collection does not have statutory protection.
- All are dried material specimen type.
- Each specimen has also slide collection.
- Dried material specimens are put in white card packets on or in which the label sheet is attached.
- Packets are placed in a freezer at 48 hours.( 6 month interval )
- They are kept in the plastic boxes in herbarium room at room temperature.
- Lactic acid and cotton blue mounting agent is used to prepare slide collection and sealed slides are kept in slide boxes placed at room temperature.
- All databases are putting backup copies in my own computer and CDs.



# Label Format for Specimen

Plant Protection Division, Myanmar  
Plant Pathology Herbarium

MYPC-----

Genus-----Species-----

Host genus-----Host species-----

Host variety/cultivar-----Common name-----

Symptom(s)-----

Collector(s)-----

Date collected-----Collector No.-----

Grower-----

Precise location-----

Town-----State-----Lat.-----Long.-----

Additional information-----

08.02.2008 20:43

# Constraints

- Budget - we do not have separate budget for survey from Ministry (transport, peridium, materials) and maintenance of herbarium
- Identification:
  - Bacterial spot like symptoms
  - lack of images of pathogen in references
  - Little knowledge of Ascomycetes and Basidiomycetes
- Cut out of electricity
- Insufficient lab facilities
- Insufficient manpower (staff and experts )
- Some difficulties during right time of mango growth stages (powdery mildew, harvest stage, different growth stage of different variety in one survey trip )
- Unexpected condition: Flooding in PPD in raining season (3 times)



# What more is needed ?

- Taxonomy workshops should be conducted for the most common pathogens of target crop
- More Taxonomy workshops for plant Pathology
- Expert mentoring in right time of growth stages
- Assistance for laboratory equipment
- Specialist visits for one crop season or one cycle of growth stages to achieve the complete pest list
- We have to look at and trace the CPC list of pathogens in Myanmar.
- During the limited time allowed for survey we are not able to conduct on trunk infection, root infection and Basidiomycetes group of fungi.
- It is necessary to extend the project for the accuracy of identification and complete and confirmed pest list.

# Good things learnt from this project

- Systematic survey technique (21 steps)
- Face to face discussions during the mentoring visits
- Laboratory methods for specific pathogens
- Herbarium maintenance techniques
- Use of internet website for Plant Pathology
- Use of Picasa Web Album for uploading Pest List and as Identification tool
- Good and useful experiences for further pest list surveys for other crops (eg. NZ AID surveillance programme)
- Useful literatures provided by Project trainers
- Establishment of country pest list of mango for Myanmar