Diseases

of

Food plants

in

Papua New Guinea

A compendium

Bruce R French

DEDICATION

This book is dedicated to
the God that Amos
the farmer of the Old Testament knew.
Amos saw both pest and disease
as an integral part of the world
under both God's control
and under people's responsible care

ACKNOWLEDGEMENTS

The financial assistance of CARE Australia in supporting me while I finalised the compilation of these books is very gratefully acknowledged.

My sincere thanks to Derek Tomlinson for checking the document in 1993

Many others have assisted me including many village people and farmers who have shown me around their gardens.

I regret that many diseases do not have photos available

Compiled 1994, Published as a pdf book 2006

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Contents

What is a plant disease?

If plants are not growing well or look unhealthy/sick there can be a number of reasons, including growing conditions, insects, pests, nutrients and diseases. It is important to be able to know or decide which thing is stopping the plant growing. Here is listed a description of the main reasons, to help you decide why the plants aren't growing well.

1. Wrong growing conditions. If a plant is in a place that is too cold or too wet or too shady or too dry or too salty or something else wrong with the conditions where you are trying to grow it, then it won't grow properly.

2. Insects. Insects can do damage in several ways. They can suck out the sap, chew the leaves, eat off young plants, bore into pods or stems, and by these methods they stop plants growing properly.

3. Other pests. Many of the larger pests like rats, snails and pigs don't often get confused with diseases. Small insect like animals called mites can make plants look sick like a disease. A group of very small worms called nematodes can damage the roots and other parts of plants. They are often too small to see without a microscope but they can make plants sick.

4. Nutrients (Gris). If a plant runs out of some of the nutrients or food that it needs to grow it will start to look unhealthy. The leaves, plant, fruit etc may change shape or colour or look different in some other way. Plants can also get sick by having too much of some nutrients or getting the wrong mixture of nutrients.

5. Disease. A small living thing can get into the plant and make it look sick and stop it growing properly. Often you can't see what this thing is because it is too small. It is this type of sickness or disease that this book is about.

The cause of disease

The small living things that get into plants and cause disease are of 5 different types.

1. Fungi. Fungi mostly grow as small threads and spread between plants often as small "seeds" called spores. These can blow in the wind. The diseases they cause are often dry, distinct, spots or marks on leaves, stems and fruit. A mushroom is an example of a very big fungus. Many plant disease fungi are small but can sometimes just be seen if you look very carefully. False rust on winged bean is a fungal disease many people know.

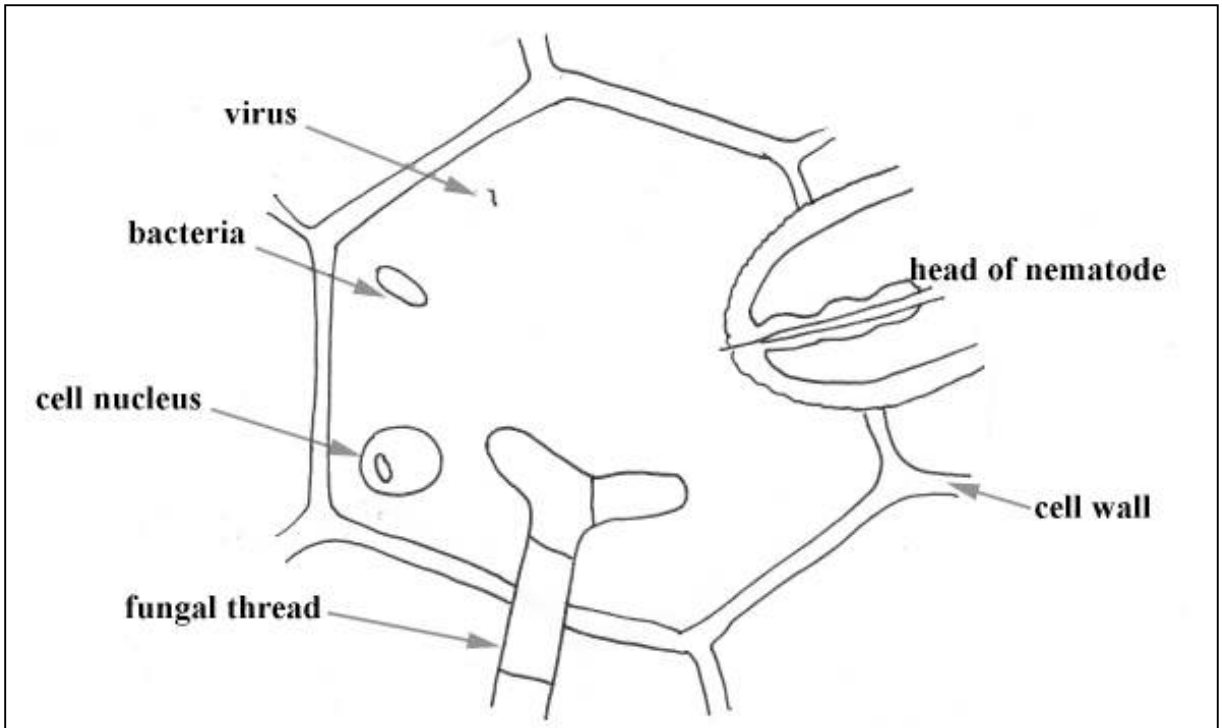
2. Bacteria. These are very small and are often square or round. You can't

see them with your eyes, but you can see them if you have a powerful microscope. Mostly they cause soft squashy rots in plants or cause plants to wilt. They normally spread between plants in water or soil or in sap of plants through planting material or when plants rub together.

3. Viruses. These are very, very small. You can't ever see them but they can take photos of them with a special machine called an electron microscope. They can only live inside plants and can't blow around in the wind or stay in the soil. Virus diseases are often spread by plants rubbing together, or through the planting material. The diseases they cause mostly look like indistinct yellow colours on leaves, or twisted leaves and other plant parts.

4. Viroids.

5. Mycoplasmas. These are similar to bacteria and like bacteria they can be controlled with chemicals called antibiotic



A comparison of the size of disease organisms and a plant cell

The difference in size of disease causing organisms compared to one of the small cells that make up plants.

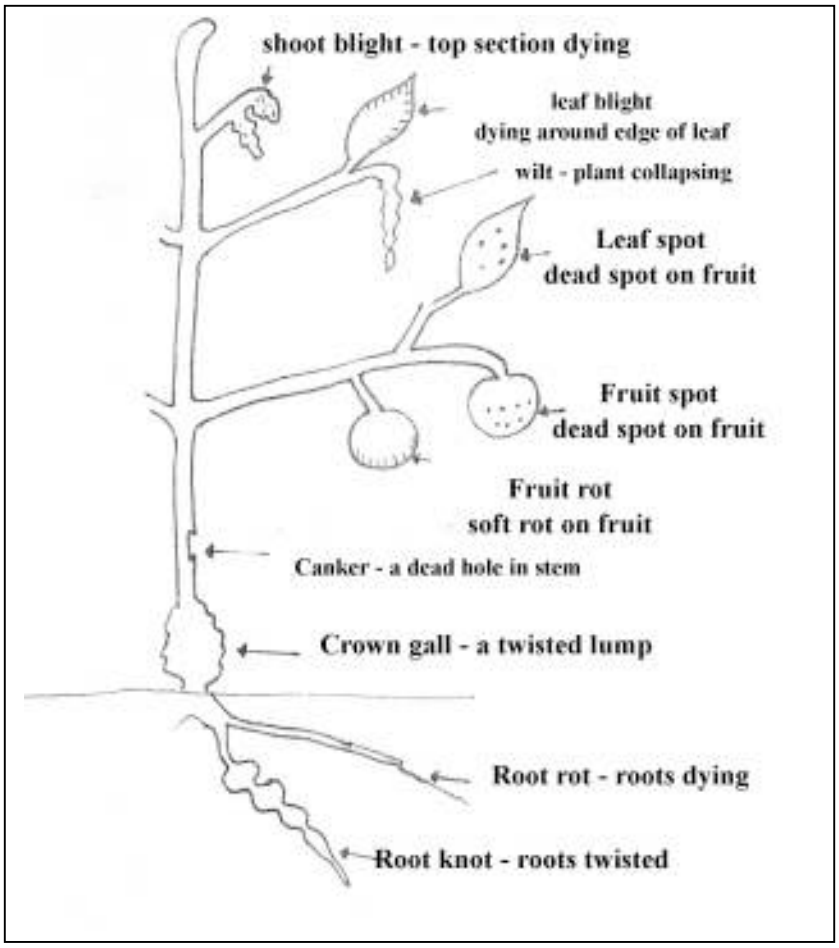
(Everything is drawn much larger than it really is.)

The signs of a disease

Village people have normally never had a chance to look down a microscope and see what causes a disease. So they often don't know much about what really causes a disease. They may in fact have learned by practice and careful observation that plants get less sick if they are grown a certain way but they may not understand the reasons for what they do. This is probably very true of traditional yam culture where people often blame sick yams on “lightning” for the disease called anthracnose, or “magic” for some of the virus diseases. Nevertheless they have learned by experience that if yam vines are carefully staked where the leaves can dry quickly and get air blowing around them then the disease (anthracnose) gets less. Similarly in Bougainville the people blamed the Japanese for poisoning their taro because they didn't understand about the taro blight fungus. Nevertheless they knew that taro would still grow in the hills even if they didn't understand that the fungus only occurs in hot wet places not in the cool hills.

Because of this, village people often do not know much about diseases. Lots of common diseases don't have names in local languages. People just say the leaves have gone dry or that the fruit “emi stink nating”. This doesn't mean that diseases do not occur or that they are not important. It often means that they are simply overlooked or people stop growing a particular plant. This is because people do not understand about how disease is caused.

When we talk about diseases of plants there are some standard words that are used. They describe what the disease looks like.



How to find the disease in this book?

Look under the name of the crop that you are interested in, then see if one of these standard words describes what you can see wrong with the plant. To be sure of the disease you would need to get it checked by a specialist but with some practice you can learn to recognise some of the more common diseases. When a specialist talks about one of these diseases, the information in this book will help summarise some of the basic information about it.

Diseases that affect many different plants

Some similar types of disease can occur on a number of plants, so they will be described as a group.

1. Sooty moulds. Many trees and other plants get a black sooty layer all over the surface of the leaves. This can occur on many trees such as fig, marita, karuka, citrus, mango, laulau and on lots of other plants. It is caused by a group of fungi called sooty moulds. Actually the fungi aren't growing in the leaves but are growing on the rubbish left behind by small insects that were on the leaves. You can easily check this by wetting your finger and then rubbing the fungus off the leaf. So these fungi aren't really damaging the leaves except by blocking out the sunlight. You can stop the disease by spraying the insect.

2. Root knot nematodes. Many plants look sick and when you pull them up it looks as if someone has tied the roots in knots. The roots have twists and lumps along them. (With beans be careful not to mix up damaged roots due to bad nematodes and the important root nodules due to useful bacteria.) The damage is due to small worms called nematodes burrowing into the roots. Not all plants get damaged equally badly but most plants get some damage. See page 255.

Bad damage	**Moderate damage**	**Slight damage**
Tomato	Potato	Chillies
Lettuce	Eggplant	Spring onions
Carrot	Cucumber	Leek
Pawpaw	Cabbage	Amaranth
	Beans	

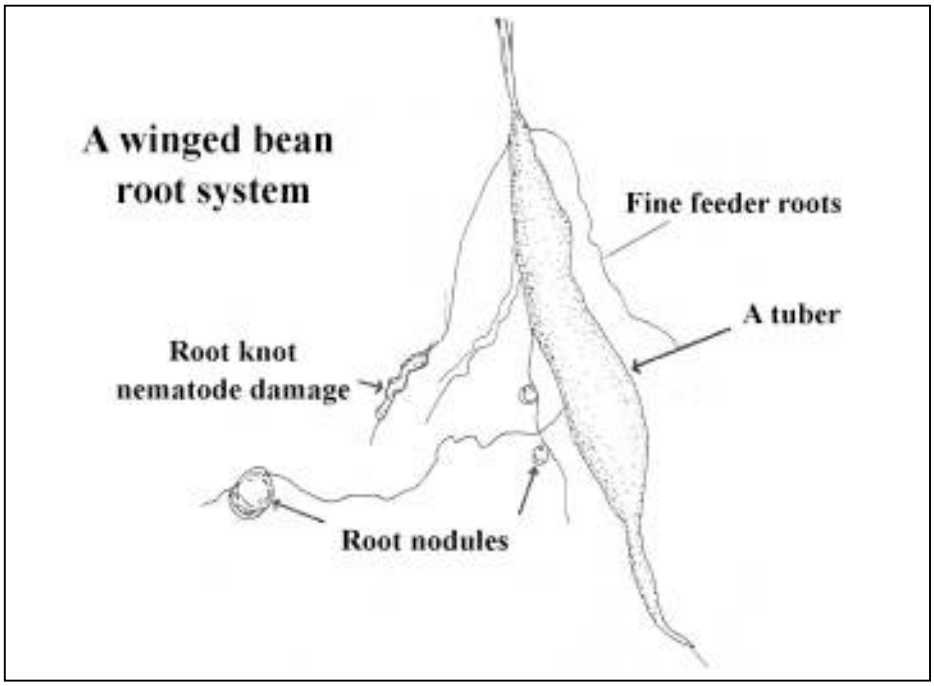
Some of the traditional Papua New Guinea vegetables have not been looked at carefully.

Often when a new garden is cleared the number of nematodes in the soil is much less. So crop plants are often less damaged the first time they are planted in a garden site. This means plants that get easily damaged need to be put first in a rotation in a new garden site.

Nematode damage is controlled by crop rotation, using resistant varieties of crops, and by building up the amount of rotting plant material in the soil. Many farmers have found that plants called African marigolds (*Tagetes sp.*) also help because the nematodes burrow into these plants but then die. The farmers grow a crop of marigolds before they plant a sensitive crop.

Other kinds of nematodes as well as root knot nematodes occur, but many of these have not yet been well studied.

Root knot nematode damage to lettuce roots



The diagram shows root knot damage to winged bean roots.

DISEASES ON FOOD CROPS

Plant

Symptom	Cause	Scientific name	Page
Aibika			
Aibika leaf spot	Fungus	*Myrothecium roridum*	36
Leaf blight	Fungus	*Colletotrichum sp.*	261
Leaf spot	Fungus	*Phyllosticta sp.*	
Powdery mildew	Fungus	*Oidium sp*	38
Collar rot/root rot	Fungus	*Phytophthora nicotianae* var. *nicotianae*	39
	and	*Fusarium sp.*	
	and	*Sclerotium rolfsii*	264
With root rot	Nematode	*Aphelenchus avenae*	
Basal stem rot	Fungus	*Sarcopodium vanillae*	
Green mottle	Virus		37
Aila nut (*Inocarpus fagifer*)			
	Fungus	*Helotium inocarpi*	
Amaranth			
Leaf spot	Fungus	*Alternaria sp.*	
Leaf blight	Fungus	*Colletotrichum sp.*	261
Wilt	Fungus	*Fusarium sp.*	
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne hapla*	271
Apple			
Angular leaf spot	Fungus	*Phoma pomorum*	
Fruit rot	Fungus	*Gloeosporium sp.*	261
		Botriodiplodia theobromae	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Avocado			
Bark canker	Fungus	*Phytophthora cinnamomi*	40
Root rot	Fungi	*Phellinus noxius*	
	and	*Rigidoporus microporus*	
	and	*Fusarium solani*	
Leaf spot	Fungus	*Corynespora sp.*	
Leaf spot	Fungus	*Phyllosticta sp.*	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Seedling wilt	Fungus	*Phytophthora nicotianae* var. *nicotianae*	
Stem canker & dieback	Fungus	*Phytophthora sp.*	
Algal spot (red rust)	Alga	*Cephaleuros virescens*	274
Bambara groundnut (*Voandzeia subterranea*)			
Leaf blight	Fungus	*Phyllosticta sp.*	

Bamboo

Leaf spot	Fungus	*Phaeoisariopsis bambusae*	
Leaf spot	Fungus	*Plectronidium minor*	

Banana

Armillaria corm rot	Fungus	*Armillaria mellea*	43
Leaf spot	Fungus	*Cladosporium musae*	55
Anthracnose of fruit	Fungus	*Colletotrichum musae*	42
Diamond leaf spot	Fungus	*Cordana musae*	51
Black spot	Fungus	*Deightoniella torulosa*	49
Malayan leaf spot	Fungus	*Haplobasidium musae*	56
Leaf spot	Fungus	*Phyllosticta sp.*	
Leaf spot	Fungus	*Microphoma sp.*	
Black leaf streak	Fungus	*Mycosphaerella fijiensis*	47
Sigatoka leaf spot	Fungus	*Mycosphaerella musicola*	48
Black cross	Fungus	*Phyllachora musicola*	45
Freckle	Fungus	*Guignardia musae*	52
Speckle	Fungus	*Ramichloridium musae*	54
Banana rust	Fungus	*Uredo musae*	46
Leaf spot	Fungus	*Veronaea musae*	
Root rot	Fungi	*Pythium splendens*	
	and	*Pythium vexans etc*	
Stem end rot fruit	Fungus	*Botryodiplodia theobromae*	265
Crown rot fruit	Fungus	*Verticillium theobromae*	
Bacterial corm rot	Bacterium	*Erwinia chrysanthemi*	44
Stalk rot	Bacteria	*Erwinia carotovora* subsp. *carotovora*	262
Algal leaf spot	Alga	*Cephaleuros virescens*	274
Infectious chlorosis	Virus	Cucumber mosaic virus	53
Root knot	Nematode	*Meloidogyne incognita*	271
Burrowing nematode	Nematode	*Radopholus similis*	50
Nematode	Nematode	*Helicotylenchus multicinctus*	
		Pratylenchus sp.	
		Rotylenchus sp.	

Banana passionfruit

Fruit spots	Fungus	*Colletotrichum sp.*	261

Bean-common

Leaf spot	Fungus	*Alternaria tenuis*	
Leaf spot	Fungus	*Ascochyta phaseolarum*	62
Grey mould	Fungus	*Botryotinia fuckeliana*	73
Anthracnose	Fungus	*Colletotrichum lindemuthianum*	61
Angular leaf spot	Fungus	*Phaeoisariopsis griseola*	60
Collar rots	Fungi	*Athelia rolfsii*	262
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Leaf spots	Fungi	*Cercospora canescens*	65
(on old leaves)	and	*Cladosporium oxysporum*	
	and	*Corynespora casiicola*	
	and	*Periconia byssoides*	
	and	*Phyllosticta sp.*	
Floury white mould	Fungus	*Mycovellosiella phaseoli*	71

Rust	Fungus	*Uromyces appendiculatus*	64
Mosaic	Virus	Bean common mosaic virus?	68
Root knot	Nematode	*Meloidogyne arenaria*	271
	and	*Meloidogyne incognita*	271
Bacterial blight	Bacteria	*Xanthomonas campestris* pv. *phaseoli*	
On seeds	Fungus	*Aspergillus sp.*	

Beetroot (See silver beet)

Root knot	Nematode	*Meloidogyne sp.*	271

Betel nut

Black leaf mould	Fungus	*Acroconidiellina arecae*	
Leaf spot	Fungus	*Guignardia calami*	
	and	*Glomerella cingulata*	82
	and	*Graphium sp.*	

Bitter cucumber

Leaf spot	Fungus	*Aschochyta sp.*	
Leaf spot	Fungus	*Cercospora citrullina*	161
Powdery mildew	Fungus	*Oidium sp*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Blackberried nightshade

Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	263

Bottle gourd

Powdery mildew	Fungus		164
Anthracnose	Fungus	*Colletotrichum orbiculare*	261

Breadfruit

Leaf spot	Fungus	*Pseudocercospora artocarpi*	84
Rust	Fungus	*Uredo artocarpi*	85

Broad bean

Leaf spot	Fungus	*Ascochyta sp.*	
Leaf spot	Fungus	*Cladosporium sp.*	
Sooty mould	Fungus	*Epicoccum sp.*	
Leaf blight	Fungus	*Fusarium sp.*	
Leaf spot	Fungus	*Phoma sp.*	
Rust	Fungus	*Uromyces viciae-fabae*	79

Broccoli

Grey leaf spot	Fungus	*Alternaria brassicae*	91
	and	*Botrytis sp.*	
Black leaf spot	Fungus	*Alternaria brassicicola*	88
Ring spot	Fungus	*Mycosphaerella brassicicola*	92
Downy mildew	Fungus	*Peronospora parasitica*	90
Collar rot	Fungus	*Thanatephorus cucumeris*	266
Damping off	Fungus	*Rhizopus sp.*	
Black rot	Bacterium	*Xanthomonas campestris* pv. *campestris*	89

Root knot	Nematode	*Meloidogyne sp.*	271

Brussels sprouts

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Black rot	Bacterium	*Xanthomonas campestris* pv. *campestris*	89

Bunching onion (*A. fistulosum*)

Leaf spot	Fungus	*Alternaria porri*	122

Cabbage

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Leaf spot	Fungus	*Colletotrichum sp.*	261
	and	*Phomopsis sp.*	
Ring spot	Fungus	*Mycosphaerella brassicicola*	92
Downy mildew	Fungus	*Peronospora parasitica*	90
Black rot	Bacterium	*Xanthomonas campestris* pv. *campestris*	89
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	87
Collar rot	Fungus	*Thanatephorus cucumeris*	266
Damping off	Fungus	*Pythium sp.*	*265*
Root knot	Nematode	*Meloidogyne incognita*	271

Candle nut

Leaf spot			

Cantaloupe (See Melon)

Cape gooseberry

Leaf spot	Fungus	*Cercospora physalidis*	

Capsicum

Leaf spot	Fungus	*Alternaria sp.*	233
Collar rot	Fungus	*Athelia rolfsii*	262
Fruit rot (Anthracnose)	Fungus	*Glomerella cingulata*	225
Fruit rot	Fungus	*Curvularia sp.*	
Leaf mould	Fungus	*Cercospora diffusa*	
	and	*Cladosporium sp.*	
Leaf blotch	Fungus	*Thanatephorus cucumeris*	266
Wilt	Fungus	*Fusarium solani*	
Root rot	Fungus	*Pythium sp.*	266
	and	*Fusarium sp.*	
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Storage rot	Bacterium	*Erwinia carotovora*	263
Bacterial leaf spot	Bacterium	*Xanthomonas campestris* pv. *vesicatoria*	
Leaf distortion	Virus	Possibly potato virus y	
Root knot	Nematode	*Meloidogyne incognita*	271

Carambola (See Five corner)

Cardamom

Leaf spot	Fungus	*Phyllosticta sp.*	
Leaf spot	Fungus	*Phoma sp.*	

Carrot

Leaf spot	Fungus	*Alternaria dauci*	245
Tuber rot	Fungus	*Athelia rolfsii*	
Leaf blight	Fungus	*Thanatephorus cucumeris*	266
Root knot	Nematode	*Meloidogyne javanica*	271

Cashew

Algal spot	Alga	*Cephaleuros virescens*	274
Twig dieback	Fungus	*Glomerella cingulata*	261

Cassava

Brown leaf spot	Fungus	*Cercosporidium henningsii*	94
Leaf spot	Fungus	*Periconia manihiticola*	
Leaf spot	Fungus	*Phyllosticta sp.*	
Blight leaf spot or tip die back	Fungus	*Colletotrichum capsici*	
	and	*Glomerella cingulata*	95
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Stem rot	Fungus	*Septobasidium sp.*	
Associated with root rot	Fungus	*Dictyosporium toriloides*	
Root rot and collar rot	Fungus	*Fusarium sp.*	
Root rot	Fungus	*Helicobasidium purpureum*	
	and	*Proboscispora manihotis*	
	and	*Rigidoporus lignosus*	
Storage rots			

Castanopsis chestnuts

Leaf spot	Fungus	*Aporhytisma urticae*	
Slimy brown mould			

Cauliflower

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Leaf spot/Ring spot	Fungus	*Mycosphaerella brassicicola*	92
Black rot	Bacterium	*Xanthomonas campestris* pv. *campestris*	89
Root knot	Nematode	*Meloidogyne sp.*	271

Celery

Septoria leaf spot	Fungus	*Septoria apiicola*	246
Root knot nematode	Nematode	*Meloidogyne sp.*	271

Ceylon spinach (*Basella*)

Large leaf spot	Fungus	*Thanatephorus cucumeris*	266
Leaf spot	Fungus	*Curvularia sp.*	
Leaf spot	Fungus	*Phyllosticta sp.*	

Chickory

Leaf spot	Fungus	*Alternaria cichorii*	

Chilli

Fruit rot	Fungus	*Glomerella cingulata*	225
Leaf & fruit blotch	Fungus	*Thanatephorus cucumeris*	266
Leaf mould	Fungus	*Cladosporium sp.*	
Root knot	Nematode	*Meloidogyne incognita*	271

Chinese cabbage

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Grey leaf spot	Fungus	*Alternaria brassicae*	91
Black leaf spot	Fungus	*Mycosphaerella brassicicola*	92
Leaf spot	Fungus	*Septoria sp.*	
Wet rot	Fungus	*Choanephora cucurbitarum*	267
Downy mildew	Fungus	*Peronospora parasitica*	90
Leaf wilt (Soft rot)	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Black rot	Bacterium	*Xanthomonas campestris* pv. *campestris*	89
Seedling wilt	Fungus	*Fusarium oxysporum*	
Root knot	Nematode	*Meloidogyne sp.*	271

Chinese cherry (See Lovi-lovi)

Chinese laurel

Rust	Fungus	*Crossopsora antidesmae-dioicae*	

Chinese taro

Root rot	Fungi	*Phytophthora citricola*	220
		Phytophthora nicotianae	
		Pythium arrhenomanes	
		Pythium vexans	
	and	*Rhizoctonia solani*	
	Nematode	*Aphelenchoides sp.*	
	Nematode	*Bursaphalenchus sp.*	
Leaf spot	Fungus	*Glomerella cingulata*	261
Leaf spot	Fungus	*Phyllosticta sp.*	
Leaf spot	Fungus	*Macrophoma sp.*	
Leaf wrinkle	Virus	Bobone	214
Leaf speckle	Virus	Dasheen mosaic	219

Chives

Purple blotch	Fungus	*Alternaria porri*	122
Leaf blotch	Fungus	*Aschochyta sp.*	

Choko

Leaf spot	Fungus	*Ascochyta sp.*	
Leaf blotch	Fungus	*Phyllosticta sp.*	
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Leaf spot	Possibly virus		

Citron

Scab	Fungus	*Sphaceloma fawcettii* var. *scabiosa*	103
Algal spot	Alga	*Cephaleuros virescens*	97

Cluster bean (Guar bean)

Powdery mildew	Fungus	*Oidium sp.*	267

***Clymenia* citrus**

Scab	Fungus	*Sphaceloma fawcettii*	103

Coastal pitpit

Leaf spot	Fungus	*Beniowskia spaeroides*	
Leaf spot	Fungus	*Cercospora longipes*	179
Leaf blight	Fungus	*Colletotrichum falcatum*	
Leaf spot	Fungus	*Cytoplea sp.*	
Leaf spot	Fungus	*Diplodia sp.*	
Veneer blotch	Fungus	*Deightoniella papuana*	196
Leaf spot	Fungus	*Drechslera sacchari*	191
Pokkah boeng	Fungus	*Gibberella fujikuroi*	188
Red rot	Fungus	*Glomerella tucumanensis*	191
Leaf spot	Fungus	*Leptosphaeria sacchari*	186
Yellow spot	Fungus	*Mycovellosiella koepkei*	197
Tar spot	Fungus	*Phyllachora sacchari*	195
Downy mildew	Fungus	*Peronosclerospora sp.*	181
Rust	Fungus	*Puccinia kuehnii*	186
Leaf stripe	Fungus	*Ramulispora sacchari*	
Fiji disease	Virus		183
Mosaic	Virus		194

Coconut

Sooty mould	Fungi	*Capnodium sp*	270
		Chaetothyrium sp.	270
		Meliola sp	270
Stem bleeding	Fungus	*Ceratocystis paradoxa*	110
Black leaf mould	Fungi	*Clasterosporium cocoicola*	
	and	*Sporidesmium macrurum*	
White thread blight	Fungus	*Corticium penicillatum*	
Leaf spots	Fungi	*Bipolaris incurvata*	108
	and	*Pestalotiopsis palmarum*	109
		Pseudoepicoccum cocos	
Petiole disease	Fungus	*Anthostomella fusispora*	
Root rot	Fungus	*Ganoderma lucidum*	105
	and	*Rigidoporus microporus*	
Brown root rot	Fungus	*Phellinus noxius*	106
Bud rot	Fungus	*Phytophthora palmivora*	107

Comfrey

Leaf blotch			

Coriander

Root knot	Nematode	*Meloidogyne sp.*	

Corn

Leaf spot	Fungus	*Bipolaris zeae*	116
Leaf spot	Fungus	*Curvularia lunata*	
Leopard leaf spot	Fungus	*Cladosporium sp.*	
Tropical rust	Fungus	*Puccinia polysora*	120
Rust	Fungus	*Puccinia sorghi*	112
Downy mildew	Fungus	*Peronosclerospora sacchari*	115
	and	*Peronosclerospora sorghi*	115
Leaf spot	Fungus	*Phoma sorghina*	118
Leaf blotch	Fungus	*Setosphaerica turcica*	114
Leaf spot	Fungus	*Cercospora sorghi*	117
Leaf blight	Fungus	*Cochliobolus heterostrophus*	116
Blister smut	Fungus	*Ustilago zeae*	113
Head smut	Fungus	*Sphacelotheca reiliana*	119
Irregular bleached areas	Fungus	*Thanatephorus cucumeris*	266
Collar rot	Fungus	*Pythium butleri*	265

Cowpeas (and snake bean)

Leaf spot	Fungus	*Alternaria sp.*	
Leaf spot	Fungus	*Ascochyta phaseolarum*	
Leaf spot	Fungus	*Cercospora canescens*	64
Leaf spot	Fungus	*Corynespora cassiicola*	
Root rot	Fungus	*Fusarium sp.*	
	and	*Athelia rolfsii*	264
Leaf spot	Fungus	*Phoma exigua*	62
Powdery mildew	Fungus	*Sphaerotheca fuliginea*	
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Rust	Fungus	*Uromyces appendiculatus*	64
Mosaic	Virus	Cowpea mosaic virus	68
Root knot	Nematode	*Meloidogyne javanica*	271
Storage rot	Fungus	*Botrydiplodia theobromae*	265

Cucumber

Leaf spot	Fungus	*Alternaria alternata*	
Leaf blight	Fungus	*Aschochyta phaseolorum*	
Leaf scorch	Fungus	*Cladosporium sp* associated	
Leaf spot	Fungus	*Corynespora cassiicola*	
With fruit rot	Fungus	*Choanephora cucurbitarum*	267
Gummy stem blight	Fungus	*Mycosphaerella melonis*	
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Leaf spot	Fungus	*Phyllosticta sp.*	
Damping off	Fungi	*Pythium butleri*	265
	and	*Pythium deliense*	
Fruit rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262

Root knot	Nematode	*Meloidogyne incognita*	271
Storage rot	Fungus	*Colletotrichum sp.*	261
	and	*Fusarium sp.*	
	and	*Phoma exigua*	
	and	*Pythium sp.*	265

Custard apple (See Sweetsop)

Daka (Betel pepper)

Diffuse black spot	Fungus	*Myrothecium roridum*	
Mosaic	Virus		

Durian

Root rot	Fungus	*Pythium sp.*	265

Eggplant

Leaf spot	Fungus	*Colletotrichum sp.*	225
Leaf spot	Fungus	*Phyllosticta sp.*	
Collar & stem rot	Fungus	*Pythium butleri*	265
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Root knot	Nematode	*Meloidogyne sp.*	271
Root rot	Fungus	*Fusarium oxysporum*	
Storage rot	Fungus	*Alternaria sp.*	
	and	*Botrydiplodia theobromae*	265
	and	*Curvularia lunata*	

Elephant foot yam

Leaf spot	Fungus	*Pseudocercospora protensa*	
Rough blotched leaves	Virus (unconfirmed)		

Endive

Leaf spot	Fungus	*Alternaria cichorii*	

***Ficus wassa* Kumu musong**

Tar spot	Fungus	*Phyllachora kaernbachii*	
Sooty mould	Fungus	*Capnodium thuemenii*	270
Rust	Fungus	*Cerotelium fici*	247

Finschia nuts

Black mould	Fungus	*Chaetothyrium fusisporum*	
Black leaf mould	Fungus	*Verrucispora proteacearum*	
Rust	Fungus	*Puccinia finschiae*	

Five corner

Fruit rot	Fungus	*Glomerella cingulata*	261
Leaf spot			

Five leaflet yam

Leaf spot	Fungus		
Rust	Fungus	*Uredo dioscoreae-sativae*	239

Galip (Canarium almond)

Heart rot	Fungus	*Phellinus noxius*	248

Garlic

Purple blotch	Fungus	*Alternaria porri*	122

Giant taro

Leaf spot	Fungus	*Mycosphaerella alocasiae*	
Rust	Fungus	*Uredo alocasiae*	
Collar rot	Fungus	*Athelia rolfsii*	262
Yellow spot	Alga	*Phyllosiphon sp.*	

Ginger

Leaf spot	Fungus	*Pyricularia zingiberi*	
Leaf spot	Fungus	*Phaeodactylium alpiniae*	
Leaf blotch	Fungi	*Curvularia sp.*	
	and	*Phoma sp.*	
	and	*Glomerella cingulata*	
&	Bacterium	*Corynebacterium sp* (not confirmed)	
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Granadilla

Stem death	Fungus	*Glomerella cingulata*	261
Chlorotic spot	Virus	Chlorotic spot virus	130

Grapefruit

Leaf spot	Fungus	*Glomerella cingulata*	261
Algal leaf spot	Alga	*Cephaleuros virescens*	97
Leaf spot	Fungus	*Glomerella cingulata*	261
Bacterial canker	Bacterium	*Xanthomonas campestris* pv. *citri*	98
Unthrifty plants	Nematode	*Tylenchulus semipenetrans*	101

Grapes

Downy mildew	Fungus	*Plasmopara viticola*	249
Powdery mildew	Fungus	*Uncinula necator*	250
Leaf spot	Fungus		
Root knot	Nematode	*Meloidogyne arenaria*	271

Greater yam

Anthracnose	Fungus	*Glomerella cingulata*	237
Leaf spot	Fungus	*Phyllosticta dioscoreae*	238
Rust	Fungi	*Goplana dioscoreae*	240
	and	*Goplana australis*	240
	and	*Uredo dioscoreae-sativae*	239
Silvering	Fungus	*Botriodiplodia theobromae*	241
Mosaic	Possibly virus		
Root knot	Nematode	*Meloidogyne sp*	271

Green gram bean

Leaf spot	Fungus	*Cercospora canescens*	65
Powdery mildew	Fungus	*Oidium sp.*	269
Yellow mosaic	Possibly virus		

Guava

Fruit rot	Fungus	*Botrydiplodia theobromae*	265
Fruit canker	Fungus	*Pestalotiopsis psidii*	
Fruit rot	Fungus	*Athelia rolfsii*	262
Algal spot (red rust)	Alga	*Cephaleuros virescens*	274

Highland kapiak

Sooty mould	Fungus	*Chaetothyrium boedijnii*	270

Highlands pitpit

Tar spot	Fungus	*Phyllachora minutissima*	201
Rust	Fungi	*Uredo palmifoliae*	200
	and	*Uromyces setariae-italicae*	200
Leaf spot	Fungus	*Bipolaris panici-miliacei*	199

Indian coral tree

Leaf spot	Fungus	*Ascochyta erythrinae*	
Leaf spot	Fungus	*Cercospora sp.*	
Sooty mould	Fungus	*Meliola erythrinae*	270

Jackbean

Leaves distorted	Possibly virus		

Jackfruit

Pink Disease	Fungus	*Phanerochaete salmonicolor*	260
Leaf spot	Fungus	*Colletotrichum sp.*	261

Japanese cherry

Root rot	Fungus	*Phellinus noxius*	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260

Java almond

Leaf spot	Fungus	*Cercospora catappae*	
Sooty mould	Fungus	*Lembosia terminaliae*	270

Jerusalem artichoke

Collar rot	Fungus	*Athelia rolfsii*	262

Job's tears

Leaf spot	Fungus	*Cercospora sp.*	
Tar spot	Fungi and	*Phyllachora coicis* *Phyllachora graminis*	
Rust	Fungus	*Puccinia operta*	
Leaf galls	Possibly virus		
Mosaic	Virus		

Kangkong

Leaf spot			

Karuka

Black leaf mould	Fungus	*Lembosia pandani*	127
Sooty mould	Fungus	*Meliola juttingii*	270
Large leaf spot			
Leaf spot			
Yellow spot mosaic	Probably virus		
On seeds	Fungus	*Macrophoma pandani*	
On rotting flowers	Fungus	*Rhizopus stolonifer*	

Kudzu

Yellow mould	Fungus	*Mycovellosiella puerariae*	
False rust	Fungus	*Synchytrium minutum*	69
Leaf spot			

Lablab bean

Leaf spot	Fungus	*Ascochyta dolichi*	
Angular leaf spot	Fungus	*Cercospora canescens*	65
Tip wilt	Fungus	*Choanephora cucurbitarum*	267
Leaf blight	Fungus	*Phyllosticta sp.*	
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Small twisted leaves	Probably virus		
Root knot	Nematode	*Meloidogyne arenaria*	271

Leek

Leaf blight	Fungus	*Alternaria porri*	122
Leaf rot	Fungi and	*Fusarium sp.* *Pythium sp.*	

Lemon

Leaf spots	Fungi and	*Ascochyta citri* *Glomerella cingulata*	261
Scab	Fungus	*Sphaceloma fawcettii*	103
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Green mould	Fungus	*Penicillium digitatum*	
Damping off	Fungus	*Rhizoctonia solani*	266
Bacterial canker	Bacteria	*Xanthomonas campestris* pv. *citri*	98

Lemon grass

Tar spot	Fungus	*Phyllachora sp.*	
Rust	Fungus	*Puccinia nakanishikii*	

Lesser yam

Leaf spot	Fungus	*Cylindrosporium dioscoreae*	
Leaf spot	Fungus	*Guignardia dioscoreae*	238
Dark brown leaf blotch	Bacteria	*Xanthomonas sp.* (Unconfirmed)	
Mosaic	Possibly virus		
Root knot	Nematode	*Meloidogyne incognita*	271

Lettuce

Collar rot	Fungus	*Athelia rolfsii*	251
Leaf spot	Fungus	*Septoria lactucae*	252
Leaf spot	Fungus	*Alternaria sp.*	
Leaf spot	Fungus	*Cercospora brassicicola*	
	and	*Cercospora longissima*	
Leaf spot	Fungus	*Phyllosticta sp.*	
Collar rot	Fungus	*Athelia rolfsii*	
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Mosaic	Possibly virus		
Root knot	Nematode	*Meloidogyne hapla*	271
	and	*Meloidogyne incognita*	271

Lima bean

Floury white mould	Fungus	*Mycovellosiella phaseoli*	71
Rust	Fungus	*Phakopsora vignae*	
Concentric spots	Fungus	*Phoma exigua*	62
Leaf spot	Fungus	*Phyllosticta sp.*	
Root knot	Fungus	*Meloidogyne incognita*	271

Lime

Sooty mould	Fungus	*Meliola citricola*	270
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Collar & root rot	Fungus	*Phellinus noxius*	
Green mould	Fungus	*Penicillium digitatum*	
Bacterial canker	Bacterium	*Xanthomonas campestris* pv. *citri*	98

Loquat

Brown rot fruit	Fungus	*Penicillium sp.*	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260

Lovi-lovi

Algal leaf spot	Alga	*Cephaleuros virescens*	274
Leaf spot			

Macadamia

Leaf spot	Fungus	*Pestalotiopsis sp.*	
Root rot	Fungus	*Armillaria mellea*	

Maize (See Corn)

Mandarin

Sooty mould	Fungus	*Meliola citricola*	270
Scab	Fungus	*Sphaceloma fawcettii*	103
Pink crust on stems	Fungus	*Podonectria sp*	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260

Mango

Sooty mould	Fungi	*Asterina sp*	270
	and	*Meliola mangiferae*	270
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Dead leaf edges	Fungus	*Pestaliopsis sp*. Associated	
Anthracnose/Dieback	Fungus	*Glomerella cingulata*	253
	and possibly	*Stigmina mangiferae*	

Mangosteen

Leaf spot			

Marita

Leaf spot			
Fruit rot	Bacterium	*Erwinia carotovora* sub sp. *carotovora*	126
Black leaf mould	Fungus	*Lembosia pandani*	127
Leaf mould	Fungus	*Leptosphaeria sp*.	

Melon (Rockmelon)

Black rot	Fungus	*Mycosphaerella melonis*	
Leaf blight	Fungus	*Aschochyta sp*.	
Powdery mildew	Fungus	*Oidium sp*.	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Root knot	Nematode	*Meloidogyne incognita*	271

Mint

Collar rot & wilt	Fungus	*Marasmiellus epochnous*	
Wilt	Fungus	*Thanatephorus cucumeris*	266
Rust			
Leaf spot	Fungus	*Alternaria sp*.	

Mulberry

Leaf spot	Fungus	*Phyllosticta sp*.	

Mung bean

Leaf spot	Fungus	*Alternaria sp*.	
Leaf spot	Fungus	*Phoma exigua*	62
Leaf spot	Fungus	*Phyllosticta sp*.	
Leaf spot	Fungus	*Myrothecium roridum*	
Collar rot	Fungus	*Athelia rolfsii*	262
Mosaic	Virus		
Root knot	Nematode	*Meloidogyne incognita*	271

Mustard

Leaf spot	Fungus	*Alternaria sp.*	

Naranjilla

Collar rot	Fungus	*Athelia rolfsii*	264

Okra

Distorted leaves	Possibly virus		
Root knot	Nematode	*Meloidogyne incognita*	271

Onion (bulb)

Leaf tip withering	Fungus	*Alternaria porri*	122
Smudge	Fungus	*Colletotrichum circinans*	124
Soft rot	Bacterium and	*Erwinia carotovora* subsp. *carotovora* *Pseudomonas cepacia*	262
Downy mildew	Fungus	*Peronospora destructor*	
Root rot	Fungus	*Fusarium spp.*	
Black mould	Fungus	*Aspergillus niger*	

Onion (bunching)

Purple blotch	Fungus	*Alternaria porri*	122
Leaf blotch	Fungus	*Aschochyta sp.*	
Downy mildew	Fungus	*Peronospora destructor*	
Root rot	Fungus	*Fusarium spp.*	
Root knot	Nematode	*Meloidogyne incognita*	271

Orange

Scab	Fungus	*Sphaceloma fawcettii*	103
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Leaf spot	Fungus	*Phyllosticta sp.*	
Leaf spot	Fungus	*Gloeosporium sp.*	
Unthriftiness	Nematode	*Tylenchulus semipenetrans*	101
Sooty mould	Fungus	*Meliola citricola*	270

Parsley

Leaf spot	Fungus	*Septoria sp.*	
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Parsnip

Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Passionfruit

Brown leaf spot	Fungus	*Alternaria passiflorae*	129
Seedling wilt	Fungus	*Phytophthora nicotianae*	131
Leaf spot	Fungus	*Colletotrichum sp.*	
	and	*Phoma sp.*	
Blight of flowers	Fungus	*Aspergillus sp.*	
Fruit rot	Fungus	*Fusarium sp.*	
Root knot	Nematode	*Meloidogyne javanica*	271

Pawpaw

Butt rot	Fungus	*Athelia rolfsii*	262
Leaf spot	Fungus	*Cercospora papayae*	
Shot hole leaf spot	Fungus	*Corynespora cassiicola*	137
Anthracnose	Fungus	*Glomerella cingulata*	261
Powdery mildew	Fungus	*Oidium caricae*	135
Leaf spot	Fungus	*Phyllosticta sp.*	
	and	*Phoma sp.*	
Root rot	Fungus	*Phytophthora palmivora*	136
Leaf spot & fruit rot	Fungus	*Mycosphaerella caricae*	133
Fruit rot/Leaf mould	Fungus	*Botrydiplodia theobromae*	265
Fruit rot	Fungus	*Fusarium oxysporum*	
Stem rot	Bacterium	*Pseudomonas cepacia*	
Mosaic	Virus		134
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Pea

Leaf spot	Fungus	*Mycosphaerella pinodes*	74
Brown mould	Fungus	*Fulvia fulvum*	
Powdery mildew	Fungus	*Oidium sp.*	269
Leaf spot	Fungus	*Phyllosticta sp.*	
	and	*Macrophoma sp.*	
Mosaic	Possibly virus		
Root knot	Nematode	*Meloidogyne incognita*	271
Dry rot seeds	Fungus	*Penicillium sp.*	

Peach

Peach leaf curl	Fungus	*Taphrina deformans*	254
Rust	Fungus	*Tranzschelia pruni-spinosae*	255

Peanut

Seedling death	Fungus	*Aspergillus niger*	142
Collar rot	Fungus	*Athelia rolfsii*	140
	and	*Botryodiplodia theobromae*	265
Large leaf spot	Fungus	*Leptosphaerulina trifolii*	145
Leaf spot	Fungus	*Colletotrichum sp.*	
Leaf spot	Fungi	*Mycosphaerella arachidis*	141
	and	*Mycosphaerella berkeleyi*	141
Collar rot	Fungus	*Phomopsis sp.*	
Rust	Fungus	*Puccinia arachidis*	144
Root rot	Fungus	*Pythium sp.*	

	and	*Rhizoctonia*	
Blackening stems	Fungus	*Thanatephorus cucumeris*	266
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	139
Mosaic	Virus		
Leaf mottle	Virus	Marginal leaf chlorosis virus	142
Mild mottle	Virus	Cowpea mild mottle virus	143

Pepper

Leaf spot	Fungus	*Glomerella sp.*	261
Horse hair blight	Fungus	*Marasmius crinisequi*	
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Root rot	Fungus	*Phellinus noxius*	
Dead patches	Fungus	*Thanatephorus cucumeris*	260
Algal spot	Alga	*Cephaleuros virescens*	274

Pigeon pea

Leaf spot	Fungus	*Mycovellosiella cajani*	75
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
On seeds	Fungus	*Aspergillus niger*	
	and	*Chaetomium sp.*	
	and	*Curvularia lunata*	
	and	*Fusarium solani*	
	and	*Penicillium sp.*	
	and	*Nigrospora oryzae*	

Pineapple

Water blister	Fungus	*Cerotocystis paradoxa*	256
Leaf blotch	Fungi	*Cochliobolus lunatus*	
	and	*Stachylidium bicolour*	
	and	*Trichobotrys pannosa*	
Leaf spot	Fungus	*Asterina sp.*	
	and	*Nigrospora sp.*	
Wilt outside leaves	Fungus	*Pythium vexans*	

Pitpits - see Coastal pitpit and Highland pitpit.

Polynesian arrowroot

Leaf spot	Fungus	*Cercospora taccae*	

Pomelo

Collar rot	Fungus	*Athelia rolfsii*	262

Potato

Target spot	Fungus	*Alternaria solani*	156
Collar rot & wilt	Fungus	*Athelia rolfsii*	264
Dry rot & wilt	Fungus	*Fusarium oxysporum*	150
Storage rot	Fungus	*Fusarium solani*	
Leaf spot	Fungus	*Leptosphaerulina trifolii*	
Leaf spot	Fungus	*Phyllosticta sp.*	
Late blight	Fungus	*Phytophthora infestans*	151
Collar rot	Fungus	*Sclerotium rolfsii*	
Powdery scab	Fungus	*Spongospora subterranea*	155
Common scab	Fungus	*Streptomyces scabies*	149
Black scurf	Fungus	*Thanatephorus cucumeris*	266
Verticillium wilt	Fungus	*Verticillium albo-atrum*	157
Black leg	Bacterium	*Erwinia carotovora* subsp. *atroseptica*	
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Bacterial wilt	Bacterium	*Erwinia chrysanthemi*	262
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	148
Leaf roll	Virus	Leaf roll virus	152
Interveinal mottling	Virus	Potato virus x (Unconfirmed)	153
Mosaic & dying leaves	Virus	Potato virus y (Unconfirmed)	154
Root knot	Nematode	*Meloidogyne javanica*	271

Potato yam

Brown mould	Fungus	*Pseudocercospora ubi*	242
Rust	Fungus	*Uredo dioscorae-sativae*	239

Pumpkin

Storage rot	Fungus	*Colletotrichum orbiculare*	162
Sooty mould	Fungus	*Epicoccum sp.*	
Powdery mildew	Fungus	*Erysiphe cichoracearum*	164
Stem rot	Fungus	*Fusarium solani*	
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
With storage rot	Fungus	*Rhizoctonia sp.*	266
Mosaic	Virus	Melon mosaic virus	163

Radish

Leaf spot	Fungus	*Alternaria raphani*	
Damping-off	Fungus	*Pythium sp.*	

Rambutan

Leaf spot	Fungus	*Colletotrichum sp.*	
Heart rot	Fungus	*Phellinus sp.*	
Root rot	Fungus	*Fusarium oxysporum*	
	and	*Athelia rolfsii*	262

Raspberry (Red)

Rust	Fungus	*Hamaspora acutissima*	

Rice

Rot at base of plant	Fungus	*Athelia rolfsii*	262
Narrow brown leafspot	Fungus	*Cercospora oryzae*	173
Leaf spot & on grains	Fungi	*Cochliobolus cynodontis*	
(As Brown spot)	and	*Cochliobolus geniculatus*	
	and	*Cochliobolus hawaiiensis*	
	and	*Cochliobolus miyabeanus*	167
Leaf smut	Fungus	*Entyloma oryzae*	171
Seedling blight	Fungus	*Fusarium lateritium*	
Foot rot	Fungus	*Gibberella fujikuroi*	169
Brown sheath rot	Fungus	*Gaeumannomyces graminis*	166
Stem rot rice	Fungus	*Magnaporthe salvinii*	176
Leaf blotch	Fungus	*Metasphaeria oryzae-sativae*	
White leaf streak	Fungus	*Mycovellosiella oryzae*	177
Glume blotch	Fungus	*Phaeoseptoria oryzae*	170
Sheath blight	Fungus	*Thanatephorus sasakii*	175
Leaf spot	Fungus	*Trichoconiella padwickii*	172
False smut	Fungus	*Ustilaginoidea virens*	168
Root knot	Nematode	*Meloidogyne sp.*	271

(Also several fungi isolated off stored rice grain.)

Rice bean

Blossom blight	Fungus	*Choanephora cucurbitarum*	267
False rust	Fungus	*Synchytrium phaseoli*	69
Rust	Fungus	*Uromyces sp.*	64
Root knot	Nematode	*Meloidogyne arenaria*	271
	and	*Meloidogyne javanica*	271
On seeds	Fungus	*Aspergillus niger*	
	and	*Penicillium sp.*	
	and	*Periconia byssoides*	
	and	*Rhizopus nigricans*	
	and	*Verticillium sp.*	

Rockmelon (See Melon)

Rungia

Leaf spot	Fungus	*Cercospora sp.*	

Sago

Sooty mould	Fungus	*Borinquenia sp.*	270
Black mould on leaves	Fungi	*Melanographium sp.*	
	and	*Tripospermum sp.*	
	and	*Zygosporium gibbum*	
Parallel sided leaf spot	Fungus	*Sphaerulina sp.*	
Leaf spot	Fungus		

(Also several fungi isolated from processed sago)

Shallot

Leaf tip burn	Fungus	*Alternaria porri*	122
Leaf tip wither	Fungus	*Botryotinia fuckeliana*	123
Smudge	Fungus	*Colletotrichum circinans*	124

Silver beet and beetroot

Leaf spot	Fungus	*Cercospora beticola*	257
Blossom blight	Fungus	*Choanephora cucurbitarum*	267
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Snake bean (See Yard-long bean)

Snake gourd

With leaf spot	Fungus	*Colletotrichum orbiculare*	162
Leaf spot	Possibly bacterial		

Sorghum

Rust	Fungus	*Puccinia purpurea*	

Soursop

Sooty mould	Fungi	*Capnodium sp.*	270
	and	*Chaetothyrium sp.*	270
	and	*Microxyphium sp.*	270
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Blossom blight	Fungus	*Glomerella cingulata*	261
Algal leaf spot	Alga	*Cephaleuros virescens*	274

Soybean

Leaf spot	Fungus	*Ascochyta sp.*	
	and	*Cercospora canescens*	64
Angular leaf spot	Fungus	*Phaeoisariopsis griseola*	60
Rust	Fungus	*Phakopsora pachyrhizi*	80
Bacterial leaf spot	Bacterium	*Xanthomonas campestris* pv. *glycine*	63
Leaf distortion	Possibly virus		
Mosaic	Possibly virus		
Yellow mosaic	Virus		
Root knot	Nematode	*Meloidogyne sp.*	271

Squash and marrow

With storage rot	Fungus	*Aspergillus sp.*	
Leaf spot	Fungus	*Cercospora sp.*	161
Storage rot	Fungus	*Colletotrichum orbiculare*	164
	and	*Fusarium sp.*	
Stem rot	Fungus	*Fusarium solani*	
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Mould under leaf	Fungus	*Cercospora citrullina*	161
Possible virus			

Strawberry

Leaf spot	Fungus	*Cercospora vexans*	
Leaf spot	Fungus	*Colletotrichum sp.*	261
Scorch	Fungus	*Diplocarpon earlianum*	259
Eye spot	Fungus	*Mycosphaerella fragariae*	258
On roots		*Trichoderma viridae*	
Roots	Nematode	*Aphelenchoides sp.*	

Sugarcane

Red rot leaf sheath	Fungus	*Athelia rolfsii*	264
Eye spot	Fungus	*Bipolaris sacchari*	182
Pineapple disease	Fungus	*Ceratocystis paradoxa*	187
Brown spot	Fungus	*Cercospora longipes*	179
Veneer blotch	Fungus	*Deightoniella papuana*	196
Brown stripe	Fungus	*Bipolaris stenospila*	180
Pokkah boeng	Fungus	*Gibberella fujikuroi*	188
Red rot	Fungus	*Glomerella tucumanensis*	191
Ring spot	Fungus	*Leptosphaeria sacchari*	185
Yellow spot	Fungus	*Mycovellosiella koepkei*	197
Downy mildew	Fungus	*Peronosclerospora sacchari*	181
Rind disease	Fungus	*Phaeocytostroma sacchari*	193
Tar spot	Fungus	*Phyllachora sacchari*	195
Rust, orange	Fungus	*Puccinia kuehnii*	186
Red leaf streak	Fungus	*Ramulispora sacchari*	
Leaf scorch	Fungus	*Stagnospora sacchari* (Unconfirmed)	184
Ramu stunt	Possibly viroid		
Ramu scorch			189
Red stripe	Bacteria	*Pseudomonas rubrilineans*	192
Fiji disease	Virus	Sugarcane Fiji disease virus	183
Mosaic	Virus		194
Leaf scald	Bacterium	*Xanthomonas albilineans*	

Sunflower

Collar rot	Fungus	*Athelia rolfsii*	262
Mould on head	Fungus	*Botryotinia fuckeliana*	
Rust	Fungus	*Puccinia helianthi*	
Root knot	Nematode	*Meloidogyne javanica*	271

Surinam cherry

Scab fruit	Fungus and	*Pestalotia eugeniae* *Pyrenochaeta sp.*	

Swamp taro

Algal leaf spot	Alga	*Cephaleuros virescens*	274

Sweet potato

Stem & leaf blight	Fungus	*Alternaria alternata*	
Leaf spot	Fungus	*Ascochyta convolvuli*	207
Collar rot	Fungus	*Athelia rolfsii*	262
Leaf spot	Fungus	*Cercospora bataticola*	207
Black rot	Fungus	*Ceratocystis fimbriata*	209
Leaf spot	Fungus	*Didymella sp.*	
Scab	Fungus	*Elsinoe batatas*	208
Scurf	Fungus	*Moniliochaetes infuscans*	
Leaf spot	Fungus	*Phoma sorghina*	
Stems with internal browning	Fungus	*Phomopsis ipomoea-batatas*	206
Leaf spot	Fungus	*Phyllosticta sp.*	
Foot rot	Fungus	*Plenodomus destruens*	
Leaf spot	Fungus	*Pseudocercospora timorensis*	205
Soft rot	Fungus	*Rhizopus stolonifer*	210
Tuber rot	Fungus	*Botrydiplodia theobromae*	265
and	Bacteria	*Erwinia sp.*	
and	Bacteria	*Erwinia chrysanthemi*	262
and	Fungus	*Fusarium sp.*	
Fusarium wilt/tuber rot	Fungus	*Fusarium oxysporium*	204
	and	*Fusarium lateritium*	
	and	*Fusarium solani*	
Storage rot	Fungus	*Aspergillus sp.*	
	and	*Choanephora sp.*	
	and	*Mucor sp.*	
Blue mould rot	Fungus	*Penicillium sp.*	
Charcoal rot	Fungus	*Macrophomina phaseolina*	203
Little leaf & vein clearing	Mycoplasma like organism		211
Leaf chlorosis & vein clearing	Virus	Sweet potato feathery mottle virus	
	and	Caulimo-like virus	
Potyvirus leaf curling	Virus		
Root knot	Nematode	*Meloidogyne sp.*	271

Sweetsop

Blossom blight	Fungus	*Glomerella cingulata*	261
Pink disease	Fungus	*Phanerochaete salmonicolor*	260

Taro

Leaf spot	Fungus	*Cercospora sp.*	
Blossom blight	Fungus	*Choanephora cucurbitarum*	267
Brown leaf spot	Fungus	*Cladosporium colocasiae*	216
Leaf spot	Fungus	*Colletotrichum sp.*	
Leaf spot	Fungus	*Leptosphaerulina trifolii*	
Leaf spot	Fungus	*Neojohnstonia colocasiae*	218
Shot hole	Fungus	*Phyllosticta sp.*	221
Blight	Fungus	*Phytophthora colocasiae*	222
Leaf blight	Fungus	*Thanatephorus cucumeris*	217
Root rot	Fungus	*Pythium spp.*	220
Mosaic	Virus	Dasheen mosaic virus	219
Dwarfed plants	Viruses	Alomae & Bobone viruses.	214
Mitimiti disease	Nematode	*Hirschmanniella miticausa*	
Root rot	Fungus	*Fusarium solani*	
	and	*Periconia sp.*	
Root knot	Nematode	*Meloidogyne sp.*	271
With corm rot	Fungus	*Botrydiplodia theobromae*	265
	and	*Chaetophoma sp*	
	and	*Rhizoctonia sp.*	266
	and	*Athelia rolfsii*	262
Corm and stem rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Bacterial leaf blight	Bacterium	*Xanthomonas campestris* pv. *aracearum*	215

Tomato

Target spot	Fungus	*Alternaria solani*	233
Fruit rot	Fungus	*Athelia rolfsii*	264
	and	*Phytophthora nicotianae*	229
Collar rot	Fungus	*Athelia rolfsii*	264
	and	*Pythium butleri*	266
	and	*Thanatephorus cucumeris*	266
Anthracnose	Fungus	*Colletotrichum sp.*	226
Leaf spot	Fungus	*Curvularia sp.*	
Leaf spot	Fungus	*Corynespora cassiicola*	
	and	*Phoma destructive*	
	and	*Septoria lycopersici*	231
Fruit spot	Fungus	*Didymella lycopersici*	230
Brown mould	Fungus	*Fulvia fulvum*	228
Wilt and collar rot	Fungus	*Fusarium equiseti*	
	and	*Fusarium oxysporum*	
Leaf spot	Fungus	*Helminthosporium sp.*	
Brown leaf mould	Fungus	*Pseudocercospora fuligena*	227
Small leaf spot	Fungus	*Stemphylium lycopersici*	
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Bacterial leaf spot	Bacterium	*Xanthomonas campestris* pv. *vesicatoria*	
Soft rot fruit	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Mosaic	Virus	Tobacco mosaic virus	232
Spotted wilt	Virus		234
Root knot	Nematode	*Meloidogyne arenaria*	271
		Meloidogyne incognita	271
		Meloidogyne javanica	271

Tree tomato

Leaf spot	Fungus	*Ascochyta sp.*	
	and	*Phyllosticta sp.*	
Anthracnose/Fruit rot	Fungus	*Glomerella cingulata*	261
Powdery mildew	Fungus	*Oidium sp.*	
Root rot	Fungus	*Phytophthora palmivora*	
	and	*Pythium sp.*	266
Root knot	Nematode	*Meloidogyne sp.*	271

Turmeric

Large leaf spot	Fungus	*Phaeodactylium alpiniae*	

Turnip

Leaf spot	Fungi	*Alternaria brassicae*	91
		Alternaria brassicicola	92
Black rot	Bacteria	*Xanthomonas campestris* pv.*campestris*	89

Ullucu

Tuber rot	Fungus	*Fusarium sp.*	
	and	*Penicillium sp.*	

Watercress

Leaf spot			

Watermelon

Leaf spot	Fungus	*Cercospora citrullina*	161
Leaf spot	Fungus	*Colletotrichum orbiculare*	162
	and	*Leptosphaerulina trifolii*	
	and	*Aschochyta sp.*	
Black rot/Gummy stem blight	Fungus	*Mycosphaerella melonis*	
Powdery mildew	Fungus	*Oidium sp.*	164
Damping off	Fungus	*Pythium irregulare*	265
Mosaic	Possibly virus		163
Root knot	Nematode	*Meloidogyne incognita*	271

Winged bean

Flower blight	Fungus	*Choanephora cucurbitarum*	72
Anthracnose	Fungus	*Colletotrichum lindemuthianum*	61
Leaf spot	Fungus	*Didymella sp.*	
Collar rot	Fungus	*Macrophomina phaseolina*	67
	and	*Fusarium spp.*	
	and	*Thanatephorus cucumeris*	58
Sooty mould	Fungus	*Meliola erythrinae* var *psophocarpi*	270
Powdery mildew	Fungus	*Oidium sp.*	77
Angular leaf spot	Fungus	*Phaeoisariopsis griseola*	55
Leaf spot	Fungus	*Pseudocercospora psophocarpi*	81
False rust	Fungus	*Synchytrium psophocarpi*	70
Leaf curl	Possible virus		
Little leaf		Possible mycoplasma like organism	
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

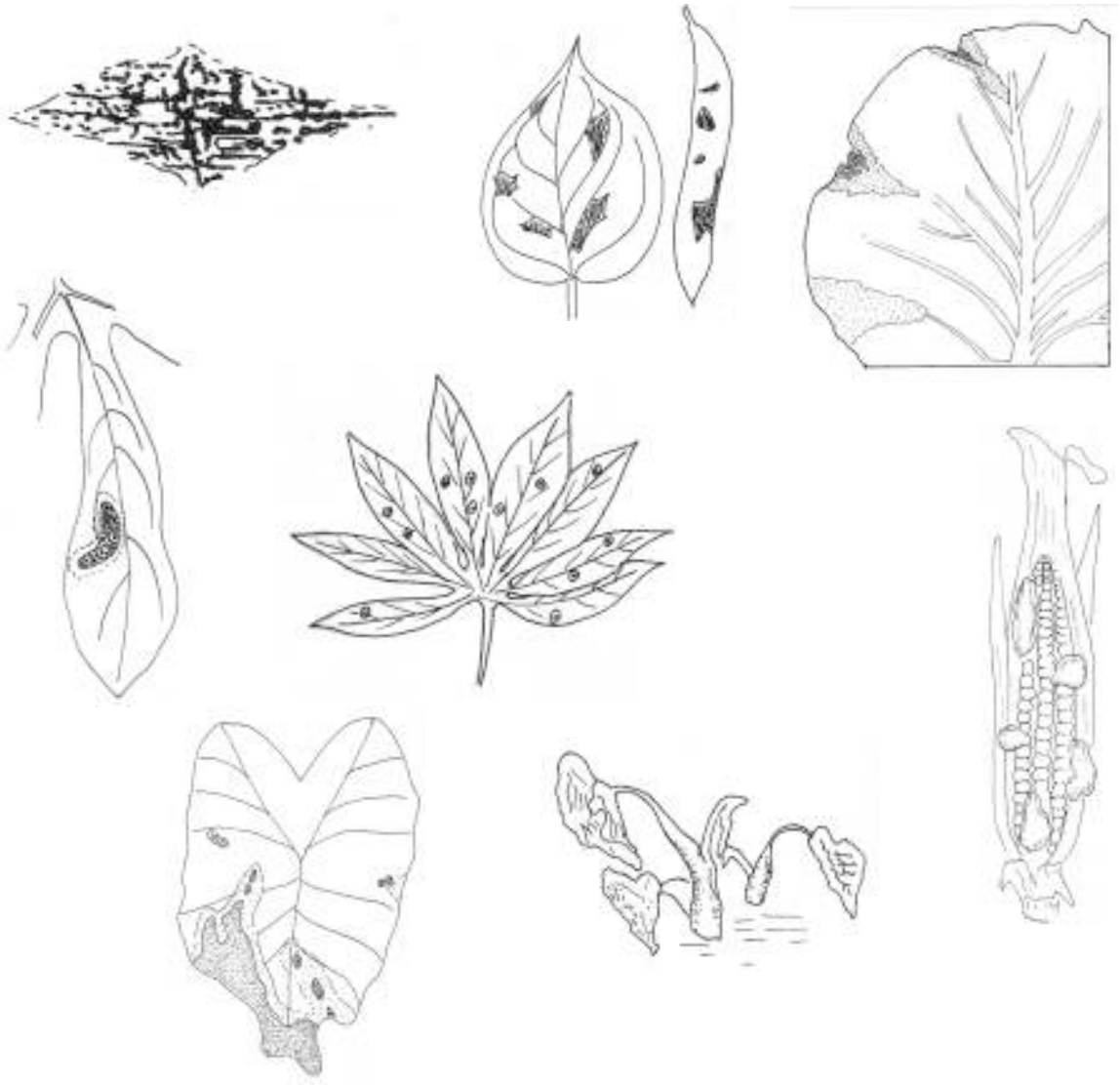
Yard-long bean (Snake bean)

Leaf spot	Fungus and	*Choanephora cucurbitarum* *Cercospora sp.*	267
Leaf blight	Fungus	*Phyllosticta sp.*	
Powdery mildew	Fungus	*Sphaerotheca fuliginea*	78
Rust	Fungus	*Uromyces appendiculatus*	56
Mosaic	Virus	Cowpea mosaic virus	76

Yam (See also Greater yam, lesser yam and five leaflet yam.)

Zucchini

Leaf spot	Fungus	*Alternaria cucumerina*	
Fruit rot	Fungus	*Choanephora sp.*	267
Powdery mildew	Fungus	*Erysiphe cichoracearum*	164
Storage rot	Fungus	*Fusarium sp.*	
Stem rot	Fungus	*Fusarium solani*	
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160



Aibika diseases

Aibika leaf spot	Fungus	*Myrothecium roridum*	36
Leaf blight	Fungus	*Colletotrichum sp.*	261
Leaf spot	Fungus	*Phyllosticta sp.*	
Powdery mildew	Fungus	*Oidium sp*	38
Collar rot/root rot	Fungus	*Phytophthora nicotianae* var. *nicotianae*	39
	and	*Fusarium sp.*	
	and	*Sclerotium rolfsii*	264
With root rot	Nematode	*Aphelenchus avenae*	
Basal stem rot	Fungus	*Sarcopodium vanillae*	
Green mottle	Virus		37

Disease: **Aibika leaf spot**

Scientific name: *Myrothecium roridum* Tode ex Fr.

What it looks like: Dead spots occur on leaves. A poison produced by the fungus starts to kill the leaf around the spot so that the dead brown spot is surrounded by a yellow ring.

The cause: The disease is caused by a fungus. The fungus lives on many plants and occurs in many places.

The conditions it likes: It gets worse in warm humid places. (Probably 28°C -32°C)

How the disease spreads: The fungus can live on dead plant material in the soil. The fungus can spread in soil or on seed and planting material.

The damage: Dead spots form on leaves and stems. Young plants can also die.

Other plants that get the disease: The fungus also attacks coffee, eggplant, mung bean, daka, cowpea, tomatoes, okra, pumpkins and some flowers.

Control:

1. Avoid diseased garden sites.
2. Get rid of diseased plant remains.
3. Chemical fungicides can be used for control.

References:

CMI descriptions of Pathogenic Fungi No 253, 1970
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge p 285

Other diseases that are similar:

Leaf spots on aibika can also be caused by another fungus called *Phyllosticta sp*. Spots due to this fungus normally have a hole in the centre. It is not a strong fungus at attacking plants so does not cause serious damage to plants.

Another fungus called *Colletotrichum sp*. is a very common fungus causing a group of diseases called anthracnose. With these, leaves normally start dying around the edges.

Disease: **Mottle of aibika**

Scientific name:

What it looks like: A pattern of light green and dark green occurs over the leaves. The leaves become more wrinkled than normal.

The cause: The disease is possibly caused by a virus. Two or three different viruses may be involved.

The conditions it likes:

How the disease spreads: These viruses can be spread mechanically by plant rubbing together or by sap being spread between plants in other ways such as knives when cutting plants.

The damage: Although obvious, the disease does not appear to reduce the yield very much.

Other plants that get the disease:

Control:

References:

Disease: **Powdery mildew of Aibika**

Scientific name: *Oidium sp.*

What it looks like: A white powdery growth of fungus develops over the leaves that then shrivel and die. The powdery growth is more common on the upper surface of the leaf.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus grows well in warm, humid conditions. It can cause serious disease in dry weather.

How the disease spreads: The powdery growth on the leaves is made up of chains of spores. The spores are blown from plant to plant by the wind. The spores of powdery mildews can develop without water provided the humidity is high.

The damage: The fungus causes damage by growing of the surface of leaves and absorbing food from the leaves. The fungal growth also prevents light reaching the leaves. When there is a lot of fungal growth the leaves shrivel and die.

Other plants that get the disease: Similar powdery mildew fungi attack plants in the pumpkin family and also pawpaw.

Control:

1. Improving plant spacing normally assists control.
2. Some chemical sprays will control the disease although this is not usually necessary. You would need to see a didiman before you used sprays.

References:

Disease: **Root rot aibika**
(And other plants)

Scientific name: *Phytophthora nicotianae* var. *parasitica*

What it looks like: The lower leaves start turning yellow and the tips of the plant start to wilt. Leaves then drop off. The bottom of the stem near the ground turns black and begins to rot. Plants eventually die.

The cause: This disease is caused by a fungus. This fungus lives in the soil.

The conditions it likes: It occurs mostly in the lowland areas. The best temperature for the disease is about 30° to 32°C.

How the disease spreads: The fungus can spread with rain or through wet soil. It can more easily attack the plant if the surface of the stem near the ground is damaged. Spores can also blow in the wind.

The damage: Plants can die.

Other plants that get the disease: This fungus also causes seedling wilt of passionfruit. It also grows on pineapple, strawberry, citrus, tomato, tobacco and a number of other plants.

Control:

1. Spacing plants to make them less crowded.
2. Mulching around plants to prevent the fungus splashing from the soil during rain.
3. Planting material or plants can be treated with chemical. See Plant Pathology note 27.

References:

CMI Description of Pathogenic Fungi No 35. 1964
Plant Pathology Note No 27. or Harvest 11(2) p82

Other diseases which are a little similar:

Stem rot of aibika due to the fungus *Sarcopodium vanillae* has also been recorded. This is a fungus that normally attacks vanilla.
Other fungi common in the soil such as *Fusarium sp*. and *Athelia rolfsii* can also attack aibika stems and roots. As well a nematode *Aphelenchus avenae* has also been found associated with this damage.

Disease: **Avocado Root Rot**

Scientific name: *Phytophthora cinnamomi* Rands

What it looks like: The leaves turn yellow and drop off. New leaves are small. The tree starts to die from the top. Fruit eventually become smaller. The roots are blackened and fine feeder roots die.

The cause: The disease is caused by a fungus. Two different kinds of fungal threads occur and these can unite to produce oospores or sexual spores. It also has two kinds of asexual spores.

The conditions it likes: The disease probably gets worse where temperatures are 24°C - 28°C. It only occurs above 750 m altitude in Papua New Guinea. It occurs in poorly drained soils. Soil pH between 5 and 7.5 suits the disease.

How the disease spreads: The fungus lives in the soil and can live for many years. It can spread in soil water. Roots are attacked when air is cut off from roots by poor drainage. The initial damage occurs where young roots are growing rapidly.

The damage: Trees are killed. Sometimes other fungi are associated with the root rot.

Other plants that get the disease: Pineapple, avocado, cinchona and many other trees are damaged by the same fungus.

Control:

1. Avoid poorly drained soils.
2. Don't transplant trees from infected nurseries. Sterilise seedbeds.
3. Treat seed with hot water at 49°C for 30 minutes.
4. Grow cover crops and keep mulch around trees.
5. Chemicals are used to control the disease in commercial plantings.

References:

Graham, K.M., Plant Diseases of Fiji HMSO p 9.
CMI Descriptions of Pathogenic Fungi No 113 1966
Kranz, J et al (ed), 1977, Diseases, Pests and Weeds in Tropical Crops Verlag Paul Parey p 76
Persley, D.M., et al (eds), 1989, Fruit and Nut Crops - a disease management guide. Queensland DPI. Information Series QI 88018
Vock, N.T., 1978, A Handbook of plant diseases in Colour Vol 1 Queensland DPI.

Pink disease & algal leaf spot also occur on avocado. See pages 233, 257. *Corynespora sp* fungus also causes a leaf spot on avocado. Normally these are spots that form zones or rings of darker colour and sometimes a hole in the centre. This type of disease is described under shothole of pawpaw. See page...

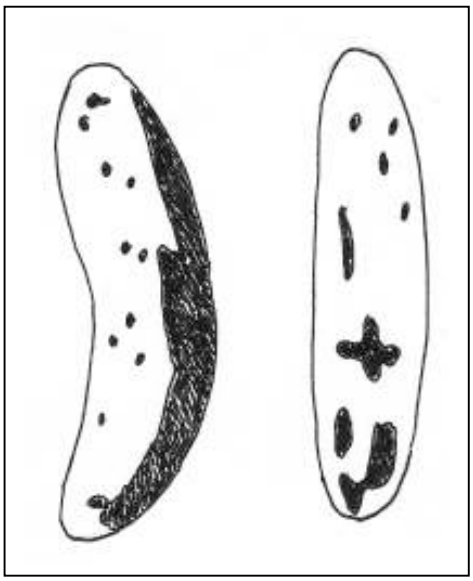
Banana diseases

Symptoms	Cause	Scientific name	Page
Anthracnose fruit	Fungus	*Colletotrichum musae*	42
Armillaria corm rot	Fungus	*Armillaria mellea*	43
Black cross	Fungus	*Phyllachora musicola*	45
Banana rust	Fungus	*Uredo musae*	46
Black leaf streak	Fungus	*Mycosphaerella fijiensis*	47
Black spot	Fungus	*Deightoniella torulosa*	49
Burrowing nematode	Nematode	*Radopholus similis*	50
Diamond leaf spot	Fungus	*Cordana musae*	51
Freckle	Fungus	*Guignardia musae*	52
Leaf speckle	Fungus	*Ramichloridium musae*	54
Leaf spot	Fungus	*Cladosporium musae*	55
Malayan leaf spot	Fungus	*Haplobasidion musae*	56
Sigatoka leaf spot	Fungus	*Mycosphaerella musicola*	48
Leaf spot	Fungus	*Phyllosticta sp.*	
Root rot	Fungi and	*Pythium splendens* *Pythium vexans* etc	
Stem end rot fruit	Fungus	*Botrydiplodia theobromae*	
Algal leaf spot	Alga	*Cephaleuros virescens*	274
Root knot	Nematode	*Meloidogyne incognita*	271
Nematode	Nematode	*Helicotylenchus multicinctus* *Pratylenchus sp.* *Rotylenchus sp.*	
Infectious chlorosis	Virus	Cucumber mosaic virus	53
Stalk rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Bacterial corm rot	Bacterium	*Erwinia chrysanthemi*	44

Disease: # Anthracnose of banana

Scientific name: *Colletotrichum musae* (Berk Curt.) Arx
[Synonym: *Gloeosporium musarum* Cooke & Massee]

What it looks like: On ripening banana fruit small black spots appear over the surface. The spots get larger and can cover the whole fruit.



The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse during the wet season. It also develops more on fruit as they ripen. The fungus can survive hot temperatures and different amounts of moisture in the air.

How the disease spreads: The small fungal spores can live on banana flowers and on old leaves. During wet weather it is splashed by rain onto the young banana fruit. The small spores can also be spread by insects.

The damage: It causes ripe banana fruit to rot. It is the main cause of wastage of bananas in storage.

Other plants that get the disease: The fungus *Colletotrichum* exists in many different forms that attack a large number of different plants usually causing leaf, stem and fruit spots. See page 247.

Control:

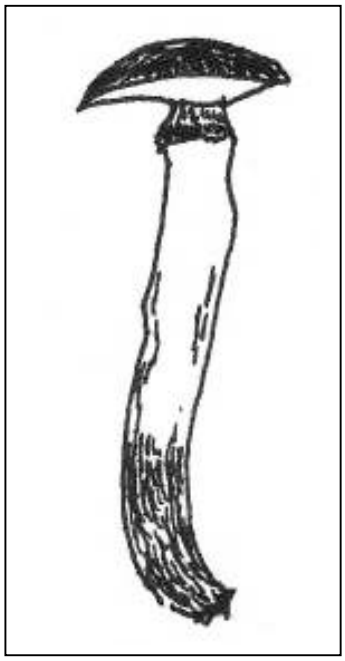
1. Harvest the fruit at the correct stage before they get too ripe.
2. Handle fruit carefully to reduce bruising.
3. Store bananas under cool conditions.
4. Varieties of bananas differ in how much they get the disease.
5. Keep dead banana leaves away from fruit as they can spread the disease.
6. Bananas can be dipped in chemicals to stop the disease.

References:

CMI Descriptions of Pathogenic Fungi No 222
Graham, K.M., Plant Diseases of Fiji HMSO p 11
Holliday, P, 1980, Fungus Diseases of Tropical Crops. Cambridge.
Kranz, J., et al (eds), 1977, Diseases, Pests and Weeds in Tropical Crops Verlag Paul Parey p 196

Disease: # Armillaria Corm rot of Bananas

Scientific name: *Armillaria mellea* (Vahl: Fr.) Kummer
[**Synonym:** *Armillariella mellea* (Vahl ex Fr.) P.Karst]



What it looks like: The leaves turn yellow and die from the base upwards. The plant can be pushed over or breaks off just below ground level. The dry brown corm has white fungal threads growing through it.

The cause: The disease is caused by a fungus. The fungus attacks the roots.

The conditions it likes: Normally it only occurs above 1000 metres altitude in cooler areas.

How the disease spreads: The disease normally occurs when bananas are planted on land recently cleared from forest. The fungus spreads from large forest trees**.** It damages the roots.

The damage: The disease is not widespread but can kill bananas where it occurs.

Other plants that get the disease: It has been recorded on tea and coffee. It has also been recorded causing root rot of yams in other countries. It attacks almost all types of trees and shrubs.

Control:

1. Dig out, chop up and burn infected plants.
2. Don't re-plant in the same hole.
3. Planting bananas in newly cleared rainforest where the disease occurs is a risk.

References:

CMI Descriptions of Pathogenic Fungi No 321, 1972 and map 143

Kranz, J., et al, 1977, Diseases, Pests and Weeds of Tropical Crops Verlag Paul Parey p 145

Pest Control in Bananas PANS Manual No 1 p 47 1977

Stover, R.H., 1972, Banana, Plantain and Abaca Diseases CAB p 186

Disease: **Bacterial corm rot banana**

Scientific name: *Erwinia chrysanthemi*

What it looks like: This bacterial disease produces a wet rot of the rhizome. Normally there is a bad smell.

The cause: The disease is caused by a bacterium. This bacterium and another one called *Erwinia carotovora* are similar.

The conditions it likes: It mostly spreads to damaged plants. Some strains are adapted to warm climates and others to cool places.

How the disease spreads: It can live in soil that contains plant debris. It lasts longer in heavy clay soils and soils with high soil moisture (>80%). It survives longer in neutral or alkaline soils. The bacteria are encouraged if the roots are damaged letting plant sap leak from the roots.

The damage: Young plants can die. With older plants the false trunk can be pushed over.

Other plants that get the disease: Some strains of the bacterium can attack potatoes, tomatoes, pineapples and many other plants. In pineapples it causes heart rot.

Control:

1. Most likely AAB type bananas get more damage than the AAA sweet bananas.
2. Avoid planting into very wet soil or in very wet conditions.
3. Avoid damaging the stem and planting material.

References:

Plant pathology note 18 of Harvest 8(3) p141

Tomlinson, D.L., King, G.A. and Ovia, A., Bacterial corm and rhizome rot of banana in Papua New Guinea. Tropical Pest Management, 1987, 33(3), 196-199

Disease: **Banana black cross**

Scientific name: *Phyllachora musicola* Booth & Shaw

What it looks like: The disease causes a black spot the shape of a cross on the leaves of bananas.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease most commonly occurs when the weather is hot and humid with daily rainfall. The signs are seen more clearly when bananas are grown in dense clumps.

How the disease spreads: The fungus produces ascospores in flask-like structure embedded in the leaf tissue. These ascospores are shot out from these structures when infected leaves become wet and are spread by wind and rain.

The damage: It damages B group Java type bananas most. It does not appear to cause serious damage. It may allow diamond spot fungus to get started as a disease on leaves.

Other plants that get the disease: This disease only infects bananas.

Control:

Normally control is not needed.

References:

Booth, C et al, 1961, PNG Ag Journ. 13(4) p 157-159
Graham, K.M., Plant Diseases of Fiji. HMSO. p 12
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 330
Pest Control in Bananas PANS Manual No 1 p 31, 1977
Stover, Banana, Plantain & Abaca Diseases CMI p 109

Disease: **Banana rust**

Scientific name: *Uredo musae* Cummins
(Very similar to *Uromyces musae* P.Henn that occurs in Africa. The two names are often confused.)

What it looks like: On the upper surface small brown streaks occur which are not very clear. On the lower surface the streaks are very noticeable, are up to 1mm wide and 5 mm long and feel rough.

The cause: The disease is caused by a fungus.

The conditions it likes: It is more common in moist cool areas.

How the disease spreads: The rust spots are produced on the streaks on the lower surface. It is these masses of developing spores that cause the streaks to be raised and feel rough to the touch.

The damage: The damage is normally only slight and its effect is not considered important. It increases on some varieties in the cool season. Some diploids get most damage. The disease has not so far been a problem in Papua New Guinea.

Other plants that get the disease: This particular rust fungus only affects bananas although other rust fungi affect many plants.

Control: Probably not normally necessary.

1. Some varieties get less damage
2. In the Pacific countries where bananas are grown commercially the chemicals that are used to control black leaf streak also give some protection against rust.

References:

CMI Descriptions of Pathogenic Fungi No 295, 1971
Firman, I.D., 1976, Banana rust in Fiji & other Pacific Islands. Fiji Agric. J. 38:85-86
Graham, K. M, 1971, Plant Diseases of Fiji HMSO p 28
Wardlaw, C. N., 1971, Banana Diseases Longmans. p 404

Disease: # Black leaf streak of banana (Black Sigatoka)

(Very similar to Sigatoka leaf spot.)

Scientific name: *Mycosphaerella fijiensis* var. *difformis* Morelet
Asexual: *Paracercospora fijiensis* (Morelet)
[**Synonyms:** *Cercospora fijiensis* Mor. &
Pseudocercospora fijiensis (Mor.) Deight.]

What it looks like: The signs first appear as small dark streaks (1mm x 2mm) on the younger leaves. The streaks enlarge and turn black as the leaves get older and the spots then merge into large brown dead areas normally at the leaf edges or tip. The spots are more reddish brown and on the undersurface of the leaf than Sigatoka. Dense bands of streaks occur on both sides of the leaf mid-ribs and leaves are killed before banana bunches mature. This causes fruit to ripen early or be lost.

The cause: It is caused by a fungus.

The conditions it likes: It gets worse in wet windy weather.

How the disease spreads: It spreads more quickly than Sigatoka and is harder to control. It can spread by blowing in the wind. As well it can spread on leaves and suckers as they are moved around.

The damage: This disease causes serious damage in PNG. It can cause serious loss of leaf in wet conditions. Fruit bunches therefore don't ripen properly and fruit don't fill out properly.

Other plants that get the disease: The disease only occurs on banana.

Control:

1. It can be controlled by regular sprays with chemical fungicides.
2. Some of the tradition AA type diploid bananas in PNG get this disease less.
3. The practice of planting different kinds of bananas in village gardens probably helps in keeping disease levels low as some banana varieties are less susceptible to the disease than others.

References:

CMI Descriptions of Plant Pathogenic fungi No 413, 1972 and map 500
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge p 278
Kranz, J, and others, 1977, Diseases, Pests and Weeds in Tropical Crops Verlag, Paul Parey. p 132

Disease: # Sigatoka of bananas (Yellow Sigatoka)

(A leaf spot) It is similar to Black leaf streak.

Scientific name: *Mycosphaerella musicola* Leach
Asexual: *Cercospora musae* Zimm.

What it looks like: A yellowish green speck on banana leaves gradually turns into a streak then turns brown. The brown centre has a yellow ring around it. The centre of the spot can turn grey. Large dead areas can develop.

The cause: It is caused by a fungus that is very similar to the fungus causing black leaf streak. It is possible that this disease does not occur in PNG. All samples of bananas said to be infected with Sigatoka disease were, in fact, infected with black leaf streak disease.

The conditions it likes: The disease spreads in much the same way as black leaf streak although it is often less severe and easier to control. It gets worse with temperatures of 23°C-28°C and humid conditions. It spreads in wet windy weather.

How the disease spreads: The spores spread by splashing water and by being flicked into the air. (Conidia form if temperatures 15°-30°C; ascospores between 17° & 27°C).

The damage: The leaves can die early so that the fruit is smaller, doesn't fill out and ripen properly and is slower getting ready.

Other plants that get the disease: The disease only infects bananas.

Control:

1. Some varieties (B group) get the disease less.
2. It can be controlled with oil sprays.
3. Wider spacing helps control.
4. Disease is less in fertile soil.
5. Remove and burn dead leaves.

References:

CMI Descriptions of Pathogenic Fungi No 414, 1974 & CMI map 7, 1968.
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 29
Kranz, J.et al, 1977, Diseases, Pests & Weeds in Tropical Crops.Verlag Paul Parey p 129
Persley, D.M, *et al* (eds), 1989, Fruit and Nut Crops - a disease management guide. Queensland DPI Information Series QI 88018 p 12
Stover, R.H., 1972, Banana, Plantain & Abaca Diseases CMI p 37

Disease: **Black Spot of Banana**

Scientific name: *Deightoniella torulosa* (Sydow) M.B.Ellis

What it looks like: Small spots develop on old leaves. They have a dark edge. They have a smoky colouring over a lighter tan background. It also causes black spots on the tips of fruit.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse under poor growing conditions and high humidity.

How the disease spreads: The fungus lives on decaying vegetation and is blown in the wind. The spores are more commonly spread in the morning, and after rain.

The damage: Not normally serious.

Other plants that get the disease: Abaca.

Control:

1. Improve growing conditions, drainage and fertility.
2. Covering fruit bunches with plastic bags with holes, reduces the damage to fruit.

References:

CMI Descriptions of Pathogenic Fungi No 165, 1968 and Map 175
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge. p 124
Pests Control in Bananas PANS Manual No 1 p 31 & 64, 1977
Stover, R.H., Banana, Plantain & Abaca Diseases CAB p 93

Disease: Burrowing nematode of Banana

Scientific name: *Radopholus similis* (Cobb)

What it looks like: It causes a root rot in bananas. Roots can have reddish brown dead spots and cracks. This weakened root system causes the plant to fall over. As well leaf growth is poor and leaves die. Plant growth is less and fewer suckers are produced. Young plants turn yellow and become stunted.

The cause: The disease is caused by a very small worm that burrows into the plant. It is too small to see without a microscope.

The conditions it likes: Between 24° and 32°C the nematode can complete a life cycle in 20-25 days. Without banana plants, they cannot survive in the soil for more than 12 weeks.

How the disease spreads: It gets into gardens on the roots of banana plants and suckers. It can spread in water washing down gardens.

The damage: The damage can be severe. Diseased banana plants age prematurely and carry smaller bunches than healthy plants. It can mean plants need to be replanted each year into clean fresh soil and also mean other root rots can more easily get started**.**

Other plants that get the disease: The nematode can attack a large number of plants including citrus, pepper, sugarcane, tea, coffee, maize and vegetables. It is thought that different strains of the nematode attack different crops.

Control:

1. Rotate bananas with other crops that do not get damaged.
2. Peel off the diseased outer layer from corms or suckers before planting and remove all discoloured roots.
3. Banana corms may be soaked in hot water (55°C for 20 minutes) before planting.
4. Some varieties of bananas get less damage (B group).
5. Don't use cowpeas, sorghum grasses or stylo as cover crops near bananas.
6. Soils can be treated by flooding for 5 to 6 months.
7. Chemicals called nematicides can be used in commercial plantings but this is expensive and not recommended for small holders.

References:

Kranz, J, and others, 1977, Diseases, Pests and Weeds in Tropical Crops VPP p 164

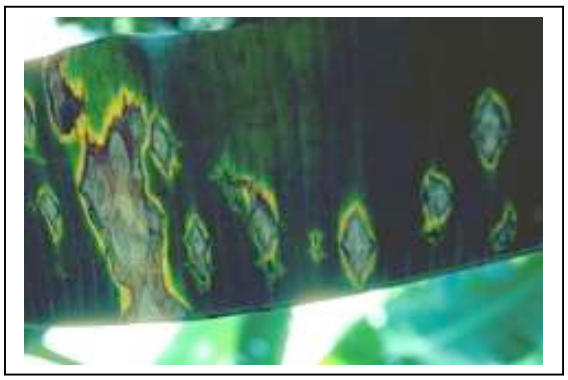
Persley, D.M., *et al* (eds), 1989, Fruit and Nut Crops - a disease management guide. Queensland DPI. Information Series QI 88018 p 14

Other nematodes have also been recorded from bananas including root knot nematode *(Meloidogyne sp.)* and *Helicotylenchus multicinctus; Pratylenchus sp.; Rotylenchus sp*.

Disease: # Diamond leaf spot banana

(Also called *Cordana* Leaf spot)

Scientific name: *Cordana musae* (Zimm.) Hohnel
[**Synonym:** *Scolecotrichum musae* Zimm.]



What it looks like: The spots are yellow or light brown and oval shaped. Often rings can be seen inside the spots. There is a yellow ring around the spot. Spots are often near the edge of the leaf and this has an uneven bright zigzag yellow band. On the lower side of the leaf spots are often covered by a grey velvety layer of spores.

The cause: It is caused by a fungus.

The conditions it likes: It gets worse during the wet season. It gets worse under shaded conditions. It gets worse in cool weather.

How the disease spreads: The fungus may get started when some other fungus leaf spot has already damaged the leaf. Large numbers of spores are produced on the underside of leaves and spread during wet windy weather.

The damage: Normally the damage is not serious but it can be more serious on B group bananas.

Other plants that get the disease: The disease only occurs on bananas.

Control: Not normally required.

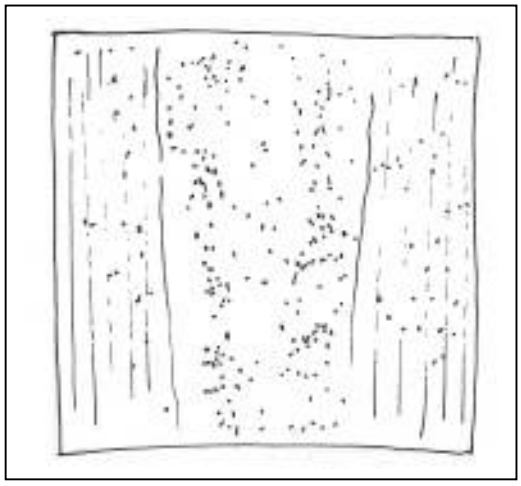
1. It can be controlled with the same fungicide sprays that are used to control black leaf streak.

References:

CMI Descriptions of Pathogenic Fungi No 350,1972 & Map 168
Graham, K.M., 1971, Plant Diseases of Fiji. HMSO. p 18
Holliday, P, 1980, Fungus diseases of Tropical Crops. Cambridge.
Pest Control in Bananas PANS Manual No 1 p 28, 1977
Stover, R.H., 1972, Banana Diseases CMI/CAB p 89
Wardlaw, C.W., 1961, Banana Diseases. Longmans. p 386

Disease: # Freckle of Bananas

Scientific name: *Phyllostictina musarum* (Cooke) van de Aa
[Synonyms: *Macrophoma musae* (Cooke) Berl & Vogl.
Phoma musae (Cooke) Sacc.
& Phyllostictina musarum (Cooke) Petrak**]**
Sexual stage: *Guignardia musae* Racib.



What it looks like: Small black speckled stripes develop on banana leaves. They are on old leaves and go from the midrib to the leaf edge. They are mostly on the upper leaf surface. They are raised and feel rough to touch. They can spread to fruit. On fruit the entire surface can be covered by black dots each with a narrow watersoaked edge. The symptoms on fruit are most noticeable at harvest.

The cause: The disease is caused by a fungus.

The conditions it likes: It needs rainy weather. The disease occurs mainly in the wet season.

How the disease spreads: The fungus spreads in wind and rain. Spores are produced in the black dots. These are washed off by rain and cause secondary infections on the leaves or fruit.

The damage: The damage is not serious. Some of the AAB type horn plantains (The bananas with only a few really large fruit) can get this disease worse. The damage to the fruit is probably worse than to the leaves.

Other plants that get the disease: The disease only occurs on bananas.

Control: Not normally necessary.

1. Some varieties are resistant.
2. Covering fruit bunches stops damage to fruit.
3. It can be controlled with fungicide chemicals.

References:

CMI Descriptions of Pathogenic Fungi No 467, 1969
Graham, K.M., 1971, Plant diseases of Fiji HMSO p 20
Holliday, P, 1980, Fungus Diseases of Tropical Crops. Cambridge. p 236
Stover, R.H., 1972, Banana diseases CMI/CAB p 102, 131

Disease: **Infectious chlorosis banana**

Scientific name: Cucumber mosaic virus

What it looks like: A yellow streak or pattern of light and dark green (mosaic) develops on leaves. The edges of leaves can curl. The young central leaves and false stem may rot in cool weather. With young plants the pale pattern goes across the leaves.

The cause: The disease is caused by a virus. This virus can infect many other plants.

The conditions it likes: The disease is spread by aphids that prefer cool dry conditions.

How the disease spreads: The disease is spread by small sap sucking aphid insects such as the cotton aphid (*Aphis gossypii*), corn leaf aphid (*Rhopalosiphum maidis*) and banana aphid (*Pentalonia nigronervosa*). It is mostly spread from pumpkin family plants to bananas.

The damage: It only occurs occasionally and is not serious.

Other plants that get the disease: Pumpkin family plants, tomatoes, maize, some traditional greens and some weeds.

Control: Not normally necessary

1. Keep infected pumpkin family plants separate from bananas.
2. If a plant is infected the plant and suckers need to be destroyed.
3. Since the virus can be present without any symptoms showing it is important to use only clean planting material from older plantings which appear perfectly healthy.

References:

Graham, K.M., 1971, Plant Diseases of Fiji, HMSO p22.

PANS Manual No 1 Pest Control in Bananas p 52,1977.

Persley, D.M., et al, (eds), 1989, Fruit and nut Crops - a disease management guide. Queensland DPI. Information series QI 88018. p 15.

Disease: # Leaf speckle of bananas

Scientific name: *Ramichloridium musae* (Stahel ex M.B. Ellis) de Hoog
[**Synonyms:** *Veronaea musae* and *Periconiella musae*]

What it looks like: Round yellow blotches about 3-4 cm across with small black specks in them develop on banana leaves. They are mostly on the upper surface.

The cause: The disease is caused by a fungus.

The conditions it likes: It likes hot humid conditions. Older leaves in damp shady places get most damage. It gets worse during the rainy season, especially when bananas are planted close together.

How the disease spreads: Spots are produced on the underside of banana leaves. These are spread by wind and rain to healthy leaves.

The damage: Normally only very slight damage occurs.

Other plants that get the disease: The disease only occurs on bananas.

Control: Not normally necessary.

References:

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 31
Pest Control in Bananas PANS Manual No 1 p 31, 1977
Stover, R.H., 1972, Banana Diseases CMI/CAB p 97

Disease: # Leaf spot of bananas

(Sometimes called Leaf speckle of bananas)

Scientific name: *Cladosporium musae* Mason

What it looks like: Pale brownish flecks develop on both side of leaves. It often occurs with another leaf spot caused by *Chloridium musae*.

The cause: The disease is caused by a fungus.

The conditions it likes: It likes humid conditions. It grows on older leaves.

How the disease spreads: Spores are blown in the wind.

The damage: It damages AAA type bananas and B group bananas are resistant.

Other plants that get the disease: *Cladosporium musae* only infects bananas although there are many other species of *Cladosporium* that infect a wide range of plants.

Control: Control is not normally necessary.

1. Wider spacing.
2. Use of resistant varieties.

References:

CMI Descriptions of Pathogenic Fungi No 958, 1988
Stover, R.H., 1972, Banana Diseases CMI/ CAB p 100

Disease: # Malayan leaf spot of bananas

(Also called diamond leaf spot)

Scientific name: *Haplobasidion musae* M.B.Ellis

What it looks like: The spots are brown or red brown at first and on the upper side of the leaf. Later they develop a distinct diamond shape with a dark brown or black edge and light brown or grey centre. The spots are about 6 mm long. On the underside of the leaf the spots are covered by a black layer of conidiophores and spores.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in cooler areas with high rainfall. In Papua New Guinea this is areas like the Southern Highlands.

How the disease spreads: Probably the spores develop on the lower leaf surface and spread by wind and rain. Disease development is apparently favoured by cool wet weather. Infection is more severe on older leaves.

The damage: In a severe attack spots can cover the entire surface of the leaf causing yellowing.

Other plants that get the disease: The disease only infects bananas.

Control: Control is not normally necessary.

1. Oil sprays alone can increase the disease.
2. It can be controlled with fungicides used to control black sigatoka.

References:

CMI Descriptions of pathogenic Fungi No 496, 1976
PANS Manual No 1 Pest Control in Bananas p28, 1977

Bean diseases

Bean	Cause	Scientific name	Page
Bean-common			
Leaf spot	Fungus	*Alternaria tenuis*	
Leaf spot	Fungus	*Ascochyta phaseolarum*	62
Grey mould	Fungus	*Botryotinia fuckeliana*	73
Anthracnose	Fungus	*Colletotrichum lindemuthianum*	61
Angular leaf spot	Fungus	*Phaeoisariopsis griseola*	60
Collar rots	Fungi	*Athelia rolfsii*	262
	and	*Rhizoctonia solani*	
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Leaf spots	Fungi	*Cercospora canescens*	65
	and	*Cladosporium oxysporum*	
	and	*Corynespora casiicola*	
	and	*Periconia byssoides*	
Floury white mould	Fungus	*Mycovellosiella phaseoli*	71
Rust	Fungus	*Uromyces appendiculatus*	64
Mosaic	Virus	Bean common mosaic virus (unconfirmed)	68
Root knot	Nematode	*Meloidogyne arenaria*	271
	and	*Meloidogyne incognita*	271
Bacterial blight	Bacterium	*Xanthomonas campestris pv phaseolini*	
On seeds	Fungus	*Aspergillus sp.*	
Broad bean			
Leaf spot	Fungus	*Ascochyta sp.*	
Leaf spot	Fungus	*Cladosporium sp.*	
Sooty mould	Fungus	*Epicoccum sp.*	
Leaf blight	Fungus	*Fusarium sp.*	
Leaf spot	Fungus	*Phoma sp.*	
Rust	Fungus	*Uromyces viciae-fabae*	79
Cluster bean (Guar bean)			
Powdery mildew	Fungus	*Oidium sp.*	267
Cowpeas (and snake bean)			
Leaf spot	Fungus	*Alternaria sp.*	
Leaf spot	Fungus	*Ascochyta phaseolarum*	
Leaf spot	Fungus	*Cercospora canescens*	64
Leaf spot	Fungus	*Corynespora cassiicola*	
Root rot	Fungus	*Fusarium sp.*	
	and	*Athelia rolfsii*	264
Leaf spot	Fungus	*Phoma exigua*	62
Powdery mildew	Fungus	*Sphaerotheca fuliginea*	70
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Rust	Fungus	*Uromyces appendiculatus*	56
Mosaic	Virus	Cowpea mosaic virus	68
Root knot	Nematode	*Meloidogyne javanica*	271
Storage rot	Fungus	*Botrydiplodia theobromae*	265

Green gram bean

Leaf spot	Fungus	*Cercospora canescens*	65
Powdery mildew	Fungus	*Oidium sp.*	269
Yellow mosaic	Possibly virus		

Jackbean

Leaves small & distorted	Probably virus		

Kudzu

Yellow mould	Fungus	*Mycovellosiella puerariae*	
False rust	Fungus	*Synchytrium minutum*	69
Leaf spot			

Lablab bean

Leaf spot	Fungus	*Ascochyta dolichi*	
Angular leaf spot	Fungus	*Cercospora canescens*	65
Tip wilt	Fungus	*Choanephora cucurbitarum*	267
Leaf blight	Fungus	*Thanatephorus cucumeris*	66
Small twisted leaves	Probably virus		
Root knot	Nematode	*Meloidogyne arenaria*	271

Lima bean

Rust	Fungus	*Phakopsora vignae*	
Concentric spots	Fungus	*Phoma exigua*	62
Root knot	Fungus	*Meloidogyne incognita*	271

Mung bean

Leaf spot	Fungus	*Alternaria sp.*	
Leaf spot	Fungus	*Phoma exigua*	62
Leaf spot	Fungus	*Phyllosticta sp.*	
Leaf spot	Fungus	*Myrothecium roridum*	
Collar rot	Fungus	*Athelia rolfsii*	262
Mosaic	Virus		68
Root knot	Nematode	*Meloidogyne incognita*	271

Pea

Leaf spot	Fungus	*Ascochyta pinodes*	
Leaf spot	Fungus	*Mycosphaerella pinodes*	74
Brown mould	Fungus	*Fulvia fulvum*	
Powdery mildew	Fungus	*Oidium sp.*	269
Leaf spot	Fungus	*Phyllosticta sp.*	
Mosaic	Probably virus		
Root knot	Nematode	*Meloidogyne incognita*	271
Dry rot seeds	Fungus	*Penicillium sp.*	

Pigeon pea

Leaf spot	Fungus	*Mycovellosiella cajani*	75
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
On seeds	Fungus	*Aspergillus niger*	
	and	*Chaetomium sp.*	
	and	*Curvularia lunata*	

	and	*Fusarium solani*	
	and	*Penicillium sp.*	
	and	*Nigrospora oryzae*	

Rice bean

Blossom blight	Fungus	*Choanephora cucurbitarum*	267
False rust	Fungus	*Synchytrium phaseoli*	69
Rust	Fungus	*Uromyces sp.*	64
Root knot	Nematode	*Meloidogyne arenaria*	271
	and	*Meloidogyne javanica*	271
On seeds	Fungus	*Aspergillus niger*	
	and	*Penicillium sp.*	
	and	*Periconia byssoides*	
	and	*Rhizopus nigricans*	
	and	*Verticillium sp.*	

Soya bean

Leaf spot	Fungus	*Ascochyta sp.*	
	and	*Cercospora canescens*	64
Rust	Fungus	*Phakopsora pachyrhizi*	80
Bacterial leaf spot	Bacteria	*Xanthomonas campestris* pv *glycines*	63
Leaf distortion	Possibly virus		
Mosaic	Possibly virus		
Yellow mosaic	Virus		
Root knot	Nematode	*Meloidogyne sp.*	271

Winged bean

Flower blight	Fungus	*Choanephora cucurbitarum*	72
Anthracnose	Fungus	*Colletotrichum lindemuthianum*	61
Leaf spot	Fungus	*Didymella sp.*	
Collar rot	Fungus	*Macrophomina phaseolina*	67
	and	*Fusarium spp.*	
	and	*Thanatephorus cucumeris*	58
Sooty mould	Fungus	*Meliola erythrinae* var *psophocarpi*	270
Powdery mildew	Fungus	*Oidium sp.*	77
Leaf spot	Fungus	*Pseudocercospora psophocarpi*	81
False rust	Fungus	*Synchytrium psophocarpi*	70
Leaf curl	Possible virus		
Little leaf	Possible mycoplasma like organism		
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271

Yard-long bean (Snake bean)

Leaf spot	Fungus	*Choanephora cucurbitarum*	267
Powdery mildew	Fungus	*Sphaerotheca fuliginea*	78
Rust	Fungus	*Uromyces appendiculatus*	56
Mosaic	Virus	Cowpea mosaic virus	76

Peanut diseases are dealt with separately.

Disease: **Angular leaf spot of beans**

Scientific name: *Phaeoisariopsis griseola* (Sacc.) Ferraris
[**Synonym:** *Isariopsis griseola* Sacc.]

What it looks like: This disease grows on common bean, lima bean, peas and cowpeas. It causes angular brown spots on the leaves. They are angular in shape because the edges of the spots are bounded by the veins of the leaf. It can also cause reddish-brown spots on the stems and pods. Leaves fall off early.

The cause: The cause of this disease is a fungus. It belongs to a group of fungi called imperfect fungi because it only produces asexual spores and the sexual stage of the fungus has not yet been found.

The conditions it likes: It is favoured by a temperature between 20°-25°C and high humidity or moisture. These kinds of temperatures occur in the mid altitude range from about 1000 to 2000 m altitude. It gets worse when beans are grown among corn than among kaukau.

How the disease spreads: The most important way the disease spreads is by wind blown spores coming from old bean plant remains left lying around in a garden. The spores can live on this type of bean plant material for up to 18 months. It can also spread to some extent on bean seed.

The damage: It can cause severe yield losses.

Other plants that get the disease: Common bean, Lima bean, Pea and cowpea. It also attacks some other legumes and okra.

Control:

1. Crop rotation is important. There needs to be a 2-year gap between bean crops.
2. Sanitation. This means removing or burying deeply any plant remains from bean crops.
3. Resistant varieties. Some varieties of beans get the disease less severely.
4. Planting disease free seed.

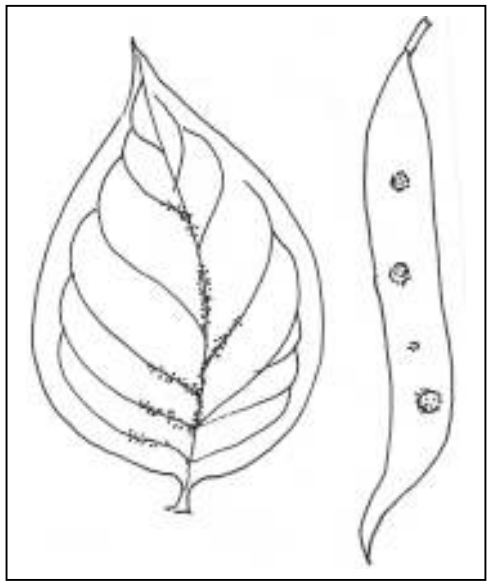
References:

CMI Descriptions of Pathogenic Fungi No 847, 1986 Map 328
Graham, K.M., 1971, Plant Diseases of Fiji. HMSO. p 124
Schwartz, H.F. & Galvez, G.E. (ed), 1980, Bean production problems CIAT

Disease: **Anthracnose of beans**

Scientific name: *Colletotrichum lindemuthianum* (Sacc & Magn) Bri& Cav

What it looks like: Brown spots can occur on bean leaves near the veins especially on the underside. Dead spots can occur on stems and round spots on the pods. The centre of the spots is light coloured.



The cause: The disease is caused by a fungus.

The conditions it likes: It is probably favoured by temperatures between 16° and 25°C and reduced by high temperatures. High humidity or damp leaves are essential.

How the disease spreads: It mostly spreads on seeds. It can also spread from old diseased bean plants. Wind, rain and movement of people can spread the disease within the crop.

The damage: The main damage is to the quality of the pods.

Other plants that get the disease: It attacks lima bean, scarlet runner bean, cowpea, broad bean, green gram, rice bean, lablab bean, mung bean, and common bean.

Control:

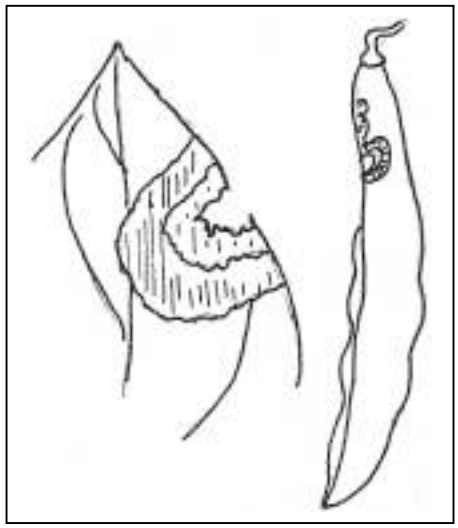
1. Clean seed can be produced in hot dry places.
2. Seeds can be treated with chemicals.
3. Get rid of old diseased bean plants.
4. Rotate bean crops.
5. Try not to walk past bean plants when the leaves are wet.

References:

CMI Descriptions of Pathogenic Fungi No 316, 1971 & map 177
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge. p 104
Schwartz, H.F. & Galvez, G.E.(ed), 1980, Bean Production Problems CIAT p 39-54
Vock, N.T., 1978, A Handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: **Ascochyta leaf spot of beans**
(Sometimes called Aschochyta blight)

Scientific name: *Phoma exigua* Desm.
[Probably syn. *Ascochyta phaseolorum* Sacc.]



What it looks like: Young leaf spots are round with grey brown centres and light green edges**.** As spots get older the centre tissue falls out. Rings can often be seen in the spots.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in cool conditions during rainy weather. It mostly attacks plants that aren't growing well. It gets bad in areas exposed to winds.

How the disease spreads: The disease can stay on the seed for over 2 years. It can also spread from old plant tissue and diseased plants.

The damage: Bad attacks can cause loss of crop.

Other plants that get the disease: The disease also attacks Jack bean, soya bean, lablab bean, rice bean, lima bean, mung bean common bean, cowpea, snake bean and other beans.

Control:

1. Use healthy seed.
2. Get rid of diseased old plants.
3. Protect plants from wind damage and grow plants well.
4. Chemical fungicides (zineb) can be used.
5. Growing beans and maize together reduces the disease.
6. The disease can spread from tropical legume pastures.

References:

Allen, D.J., 1983, The Pathology of Tropical Food Legumes, Wiley-Interscience p 209
CMI Descriptions of Pathogenic Fungi No 81, 1966
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 34
Vock, N.T., 1978, A Handbook of plant disease in Colour Vol.1 Queensland DPI

Disease: # Bacterial pustule of Soybean

Scientific name: *Xanthomonas campestris* pv. *glycines*

What it looks like: Raised red lumps occur on upper and lower surfaces of the leaf. At first they are very small green lumps with raised centres. As the disease develops leaves become torn and ragged and fall off early.

The cause: The disease is caused by a bacterium.

The conditions it likes: It can occur under cool or hotter coastal conditions.

How the disease spreads: The disease spreads on the seed.

The damage: Crop losses are not serious.

Other plants that get the disease: There are many strains of *Xanthomonas campestris* that attack a wide range of crops. Each strain is however specific to a single crop. For example *Xanthomonas campestris* pv. *glycines* is specific to soya bean.

Control:

1. Some varieties get less disease.
2. Use clean seed.

References:

Allen, D.J., 1983, The Pathology of Tropical Food Legumes. Wiley- Interscience. p 140-141

Disease: **Bean rust**

Scientific name: *Uromyces appendiculatus* (Pers.) Unger
[Synonyms: *Uromyces phaseoli* (Reben) Wint.
and *Uromyces vignae* Barcl.
and *Uromyces dolichi* Cooke**]**

What it looks like: The disease starts as white spots on the leaves and these develop reddish-brown masses of spores in the centre. They look like small lumps. They can also grow on the pods. The fungus can only grow on beans.

The cause: The cause of this disease is a fungus.

The conditions it likes: The fungus more easily attacks the bean plant if there are moderate temperatures of between 21°-27°C and a high humidity of greater than 95% for 10-18 hours. The disease also attacks more easily under cloudy conditions with low light intensity. That is cool damp conditions where there are mists or fogs.

How the disease spreads: The disease is spread by the rust spores being blown from off old bean plants and being blown about by local wind currents.

The damage: When the disease gets bad the leaves can turn yellow and fall off. Pods can be spoilt and watery rots develop on them. It can be serious if the disease gets on the plant before the bean has flowered.

Other plants that get the disease: Common bean, lima bean, scarlet runner bean, cowpeas.

Control:

1. Sanitation. Get rid of old bean plants preferably by digging them in.
2. Crop rotation. Beans should not be planted in the same place as the last crop and beans should not be planted so that crops of different ages are always growing near each other at the same time.
3. Resistant varieties. Some varieties get less damaged by the disease.
4. The disease could be controlled by fungicide chemicals.

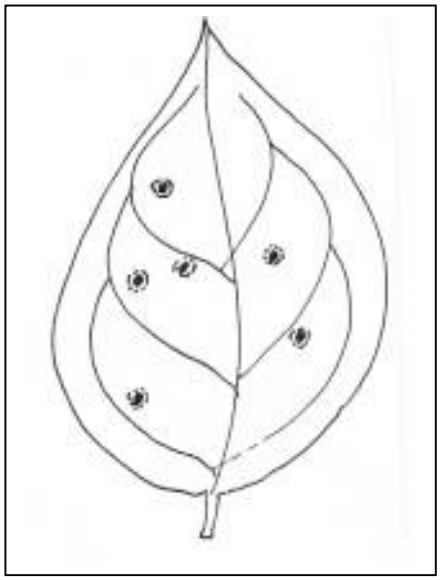
References:

CMI Descriptions of Pathogenic Fungi No 57 1965
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 182
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge. p 523
Vock, N.T., 1978, A Handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: # Cercospora leaf spot of beans.

Also occurs on cowpea and other beans

Scientific name: *Cercospora canescens* Ell. & Martin
Also *Mycosphaerella cruenta* Latham
Asexual: *Pseudocercospora cruenta* (Sacc.)Deighton
[**Synonym:** *Cercospora cruenta* Sacc.]
(Other leaf spots can be caused by other fungi such as *Corynespora cassiicola* and *Phoma exigua* - see Aschochyta leaf spot and Angular leaf spot.)



What it looks like: The spots are round or sometimes slightly angular. They are grey with reddish edges. They occur on older leaves only. The spots are on both surfaces of the leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: It is common in warmer places. It is favoured by light.

How the disease spreads: In humid weather a grey mould covers the leaf spots. This mould is made up of millions f spores which are easily knocked off the leaves and blown for long distances by the wind. Spores can also be carried on the seed.

The damage: Because the disease is mostly on older leaves that are already dying the damage is normally not serious.

Other plants that get the disease: The fungus will grow on cowpea, long bean, common bean, soybean, lablab bean and green gram bean.

Control:

1. Not normally required.
2. Some resistance occurs in some varieties.
3. Use clean seed.

References:

Allen, D.J., 1983, The Pathology of Tropical Food Legumes. Wiley-Interscience. p 205-206

CMI Descriptions of Pathogenic Fungi No 985, 1990

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge. p 67

Disease: # Collar rot and leaf blight of beans

(Also causes leaf blight of beans which is also called Web blight)

Scientific name: *Thanatephorus cucumeris* (Frank)Donk.
[**Synonym:** *Pellicularia filamentosa* (Pat.)Rogers)
and *Corticium solani* (Prill. & Del.)Bourd. & Galz**.**]
Asexual: *Rhizoctonia solani* Kuhn.
(Collar rots can also be caused by *Corticium rolfsii* Curzi - see peanut collar rot.) (Bean blights caused by bacteria have recently been recorded in Papua New Guinea.)

What it looks like: A mass of grey fungal threads develop on the roots and stem near the ground, for collar rot. It starts as small water-soaked spots that grow on lower leaves and leaves die off around the edge. The top surface can have a powdery appearance.

The cause: The disease is caused by a fungus. It causes collar rot of beans in cooler areas and leaf blight in hot humid places.

The conditions it likes: It mainly attacks young or damaged plant tissues. It grows where plants are weak and soil moisture levels are high.

How the disease spreads: This fungus lives in the soil and can live on weakened or dead plant material. It can spread from the soil by the fungal threads just growing over and into the plant. It can probably also spread by spores. It can be on bean seed.

The damage: It causes the plants to rot off just near ground level for collar rots. It can help kill plants under crowded and poor damp growing conditions both as collar rot and leaf blight.

Other plants that get the disease: This fungus has been recorded on a large number of plants. In the bean group it is recorded on winged bean, lablab bean, common bean, cowpea, peanut, and some cover crop legumes. It also attacks bananas, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, tomato, mint, pepper, potato, sorghum, corn, ginger & some tree crops.

Control:

1. Plant seeds in well-drained soil. Avoid very wet damp soils.
2. In some sites raised beds may be needed to minimise collar rot.
3. Seeds should not be too deep.
4. Wider spacing can reduce the disease by improving air circulation.
5. Mulching with straw around plants may help control.

References:

Allen, D.J., 1983, The Pathology of Tropical Food Legumes. Wiley-Inter. p 207
CMI Descriptions of Pathogenic Fungi No 406, 1974
Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge. p 503

Disease: # Collar rot winged bean

Scientific names: *Macrophomina phaseolina*
Rhizoctonia solani
Fusarium equiseti
Fusarium semitectum
Fusarium moniliforme (Sex. *Gibberella fujikuroi*)

What it looks like: The bean seedlings rot off near the ground level.

The cause: The disease is caused by a group of fungi that are common in the soil and can affect many different plants.

The conditions it likes: The disease gets worse where the conditions are warm and there is a moderate to high level of moisture.

How the disease spreads: These fungi are very widely distributed in the soil and also occur in the air. Some of them cannot easily attack a healthy plant but together they can kill weakened plants.

The damage: Seedlings can fall over and die. When this occurs the condition is called "damping off".

Other plants that get the disease: Many other plants can be attacked by these same fungi.

Control:

1. Shallow planting in well-drained soils.

References:

Price, T.V.; Munro, P.E., Fungi Associated with collar rot of winged bean in Papua New Guinea. PANS (1978) 24(1)53-56.

Disease: # Common mosaic bean

Scientific name: Bean common mosaic virus

What it looks like: The leaves become cupped and twisted. They have patches of light green and dark green scattered over the leaf. Sometimes the dark green patches are bubbled near the vein. Pods are fewer, small and curled.

The cause: The disease is caused by a virus.

The conditions it likes: The disease will occur wherever infected bean seeds are planted. The best conditions for development of the disease are thought to be warm, dry weather which favour the growth and movement of the insects which carry the disease.

How the disease spreads: The disease can be carried in the seed. It can also be spread by small sap sucking aphid insects.

The damage: It can be serious when diseased seed is planted.

Other plants that get the disease: Other bean family plants can carry the disease.

Control:

1. Use disease free seed.
2. Plant kinds of beans that get less disease.
3. Do not plant beans close to existing bean crops where the disease is suspected to occur.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour. Vol.1.Queensland DPI.

Persley, D.M. et al (eds) 1989, Vegetable Crops - a disease management guide Queensland DPI Information Series QI 88019. p 6

Disease: # False rust of rice bean

Scientific name: *Synchytrium phaseoli* Weston

What it looks like: Small light brown or orange fungal spots develop on the leaves and stems. They are obvious. The leaves become twisted.

The cause: The disease is caused by a fungus.

The conditions it likes: Disease development is favoured by high relative humidity.

How the disease spreads: The fungal spores blow in the wind and are splashed by rain.

The damage: Leaves can fall off and seedlings can be killed.

Other plants that get the disease: This disease can occur on a number of beans including rice bean, lima bean, green gram as well as siratro and phasey bean and *Rhynchosia minima*.

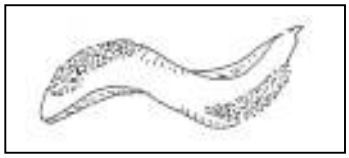
Control:

References:

CMI Descriptions of Plant pathogenic fungi No 758, 1983

A similar disease called false rust of kudzu (*Pueraria lobata*) caused by a similar fungus *Synchytrium minutum* (Pat) Gaum causes very light-red to orange powdery spores to form in patches over the leaves.

Disease: **False rust of winged bean**



Scientific name: *Synchytrium psophocarpi* (Rac.) Gaum.

What it looks like: Yellow lumps develop on leaves, stems, pods and flowers. They particularly develop on the veins and can cause plant parts to become twisted. They are usually clumped together and raised above the plant surface. The fungus grows on both sides of the leaf.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus probably spreads most rapidly at temperatures between 10° and 25°C with high relative humidity and with moisture on the leaves. The disease attacks young leaves.

How the disease spreads: The fungal spores are spread by wind. The seeds from infected plants do not carry the disease. Spores can spread about 15 metres. They spread mostly in the evening.

The damage: Growth of leaves and plants can be severely restricted. Plant parts are made less attractive to eat. It is not harmful to eat plant parts with the fungus.

Other plants that get the disease: The fungus only grows on winged bean.

Control:

1. Removing early signs of the disease is claimed to help.
2. As the spores only live for a short time when the weather is humid and moist cleaning up old plant material should help.

References:

CMI Descriptions of Pathogenic Fungi No 760, 1983
Drinkall, M.J., 1978, False Rust Disease of the Winged Bean PANS 24(2): 160-166
Drinkall, M.J. & Price, T.V., 1979, Studies of *Synchytrium psophocarpi* on winged bean in PNG. Trans. Br. Mycol. Soc. 72(1): 91-98.
Drinkall, M.J. & Price, T.V., 1986, Studies of the infection of the winged bean by *Synchytrium psophocarpi* in Papua New Guinea. Ann.Appl. Biol. 109(1): 87-94.

Disease: # Floury white mould of bean

Scientific name: *Mycovellosiella phaseoli* (Drummond)Deighton
[**Synonym:** *Ramularia phaseoli* (Drummond) Deighton]

What it looks like: Under the leaves of beans there is a white floury type of growth that has an irregular shape. These white spots may join. On the top surface of the leaf there may be a light green coloured spot.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in places where there are moderate temperatures and moisture. It suits the high altitude tropics.

How the disease spreads: The disease gets onto the old leaves first. Spores are blown in the wind.

The damage: It can cause leaves to fall off. It can cause moderately severe problems in the Highlands.

Other plants that get the disease: Only common bean gets the disease.

Control:

1. Crop rotation
2. Resistant varieties
3. Use of chemical fungicides eg dithane.

References:

CMI Descriptions of Pathogenic Fungi No 870, 1986 & map 436
Schwartz, H.F., & Galvez, G.E.(ed), 1980, Bean Production Problems CIAT p 138

A similar disease Yellow leaf mould of Kudzu (*Pueraria lobata*) caused by a similar fungus *Mycovellosiella puerariae* D. Shaw & Deighton (Syn. *Ramularia puerariae* Sawada) occurs on kudzu a traditional root crop legume but has not been seen on Puero (*Pueraria phaseoloides*) in PNG. References: Shaw, D.E. et al, 1970, Trans. Br. Mycol. Soc. 54:326. and Holliday,P.,1980, Fungus Diseases of Tropical Crops. Cambridge.

Disease: # Flower blight of winged bean

Scientific name: *Choanephora cucurbitarum* (Berk. & Rav.)Thaxter
[**Synonym:** *Mucor cucurbitarum* Berk. & Rav.]

What it looks like: It is a wet rot of the flower and can also affect the pods.

The cause: The disease is caused by a common fungus that occurs in the soil.

The conditions it likes: It gets worse under humid conditions. After rain flowers become affected. It can spread well at temperatures from 25°C to 31°C.

How the disease spreads: This is a fungus that occurs very widely on plant material as it rots. It can be spread around by insects, wind and water. On winged beans flowers and pods are much more likely to be attacked if the flowers or pods are already damaged by insects or other means.

The damage: Flowers can fall off and seedpods may not be produced. Leaves can also be attacked.

Other plants that get the disease: This fungus can cause blossom blights and disease on several other plants. These include beetroot, pawpaw, taro, rice bean, amaranth, okra, cowpea, cassava.

Control:

1. Fungicides used early can reduce the initial rate of disease attack.
2. For climbing beans making sure they are well staked and well spaced probably helps.

References:

Gunasekara S.A. *et al*, *Choanephora* blight of winged bean flowers in Sri Lanka. Transactions of the British Mycol. Society (1985) 85 (2) 344-345

Oladiran, A.O., *Choanephora* Pod rot of cowpea in Southern Nigeria. Tropical Pest Management 26(4): 396-402

Disease: # Grey mould/pod rot of beans

Scientific name: *Botryotinia fuckeliana* (de Bary) Fuckel
[Synonym: *Sclerotinia fuckeliana* (de Bary) Fuckel]
Asexual: *Botrytis cinerea* Pers. ex Pers.

What it looks like: Water soaked grey greenish areas develop on the flowers, pods or other plant parts.

The cause: The disease is caused by a fungus.

The conditions it likes: Rain or frequent irrigation make the disease worse. High moisture and low temperatures make the disease worse i.e. mostly in the highlands.

How the disease spreads: It can be seed borne. It often gets first onto the flowers then spreads from them to damaged or cut plant parts.

The damage: It causes grey mould of young or fleshy plant tissues. The pods can be spoilt.

Other plants that get the disease: Strawberry fruit, cabbages, lettuces and other plants can also get the disease.

Control:

1. Use wider plant spacing.
2. Take care not to damage plants.

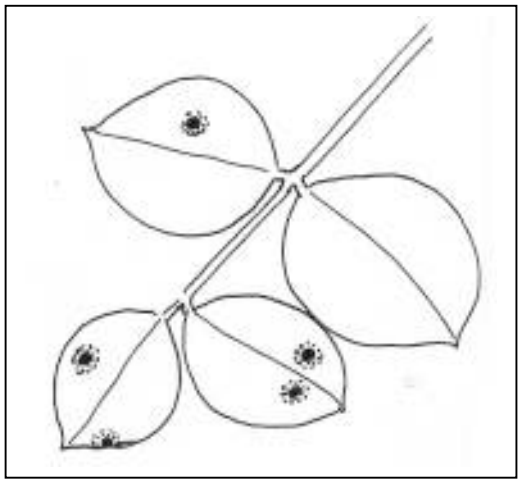
References:

CMI Descriptions of pathogenic Fungi No 431, 1974.

Disease: # Leaf spot of peas

Scientific name: *Mycosphaerella pinodes* (Berk. & Blox.)Vestergr.
Asexual: *Ascochyta pinodes* Jones

What it looks like: Very small purple spots develop on the pea plant. These spots get larger, become dark at the centre and have an irregular outline.



The cause: The disease is caused by a fungus.

The conditions it likes: It tends to be worse in cool areas with temperatures between 18°C and 24°C. It gets worse with high humidities (including those from close plant spacing.)

How the disease spreads: It can be spread by wind and water but also on the seed. It can survive on dead plants in the soil. Spores can blow for long distances in the wind.

The damage: The neck of the plant can be attacked killing the plant. Infested flowers lead to poorly filled pods and damaged seeds. It is usually not serious.

Other plants that get the disease: The fungus can grow on peas and some other beans.

Control:

1. Use disease free seed.
2. Remove old crop debris.
3. Rotate areas used for peas.
4. Some varieties get less disease.
5. Chemical fungicides can be used to treat seed.

References:

CMI Descriptions of Pathogenic Fungi No 340, 1972 & Map 316
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 282

Disease: # Leaf spot of Pigeon Pea

Scientific name: *Mycovellosiella cajani* (P.Henn.) Rangel ex Trotter
Asexual: *Cercospora cajani* P.Henn.

What it looks like: An irregular shaped pale yellow leaf spot on the upper surface of the leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: Warm humid conditions favour disease development.

How the disease spreads: Long slender spores invisible to the naked eye form in clusters on leaf surfaces in rainy or humid conditions. The spores are easily dislodged from the leaves and can be blown long distances by the wind or wind driven rain. When spores come to rest on the pigeon pea crops they grow into the leaves and cause a new infection.

The damage: The damage is to the leaves. If infection is heavy individual leaf spots can join up forming large brown areas on the leaf surface. Under heavy infection leaves may be killed and yields reduced.

Other plants that get the disease: Although fungi in the Cercospora group can attack a wide range of plants each individual fungus in the group is specialised to infect only one or a small number of host plants.

Control:

1. Some varieties get less damage. This is not an important food crop in Papua New Guinea and probably only a few varieties occur.

References:

CMI Descriptions of Plant pathogenic fungi No. 628, 1979
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge
Onim, J.F.M., 1976, SABRAO Journ. 8:121

Disease: **Mosaic of yard-long bean**

Scientific name: Cowpea mosaic virus

What it looks like:

The cause: The disease is caused by a virus.

The conditions it likes:

How the disease spreads:

The damage:

Other plants that get the disease:

Control:

References:

Disease: # Powdery mildew of winged bean

Scientific name: *Erysiphe cichoracearum*
Asexual*:* As *Oidium sp.*

What it looks like: Older leaves get the disease and become pale green then the leaves turn brown and die.

The cause: The disease is caused by a fungus. It is probably the same fungus that causes powdery mildew on cucumbers.

The conditions it likes: It grows under conditions that occur in the highlands.

How the disease spreads: The disease spreads by spores that develop on the upper surfaces of older leaves. These blow in the wind.

The damage: 1. It causes leaves to die off early.

Other plants that get the disease: Powdery mildews get on a wide range of plants.

Control:

1. Keeping plants well spaced where sun and wind can dry the leaves probably reduces the disease.
2. Most likely newer systemic fungicides would control the disease. This would make it dangerous to eat the leaves and flowers, as commonly occurs during pruning of plants for root production.

References:

Price, T.V., 1977, Powdery Mildew, a new disease of the Winged bean in Papua New Guinea. Plant Disease Reporter 61(5): 384-385

Disease: # Powdery mildew of snake bean

(Also occurs on cowpea)

Scientific name: *Sphaerotheca fuliginea* (Schlecht. : Fr.) Pollaci
Asexual: *Oidium sp*.

What it looks like: A powdery white mould occurs over the surface of the leaves. They start as small white patches that spread out in a circle to cover the leaf on both surfaces.

The cause: The disease is caused by a fungus. This fungus occurs very widely on many plants.

The conditions it likes: The fungus thrives under hot dry conditions and gets less with rain.

How the disease spreads: The fungus blows in the wind. It also develops very quickly so that disease outbreaks can occur rapidly.

The damage: It can reduce plant growth by blocking out sunlight. Leaves can dry up and shrivel and fruit can be distorted.

Other plants that get the disease: The fungus can cause powdery mildew on pumpkin family plants.

Control:

1. Some crops have some resistance.
2. Sulphur sprays can be used (But not with pumpkin family plants.)

References:

Disease: # Rust of broad bean

Scientific name: *Uromyces viciae-fabae* (Pers.) Schroet.
[Synonym: *Uromyces fabae* (Pers.) de Bary**]**

What it looks like: Rust coloured spots develop on the leaves.

The cause: It is caused by a fungus.

The conditions it likes: Favoured by high humidity and moisture. It is probably favoured by temperatures below 25°C.

How the disease spreads: It can be carried on seed. It can also live for a long time on old plant material.

The damage: Leaves can fall off early.

Other plants that get the disease: Peas and lentils can also get this disease.

Control:

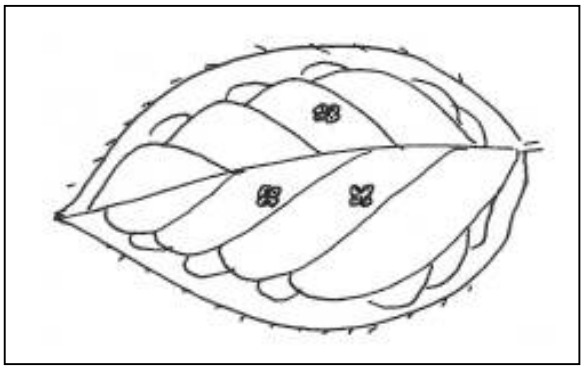
1. Use varieties with high levels of resistance.
2. Chemical fungicides can be used.

References:

CMI Descriptions of Pathogenic Fungi No 60, 1965

Disease: **Rust of Soybean**

Scientific name: *Phakopsora pachyrhizi* Syd. & Syd.



What it looks like: It is a brown rust. The cup shaped spore carrying bodies are on the underside of the leaves. The spots start as small pale spots and become angular and brown.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease is more important in humid areas. It probably gets worse with temperatures about 20°C. The disease does not occur if temperatures are over 27°C. Dew is essential on the leaves for the disease to spread.

How the disease spreads: It is spread by wind borne spores.

The damage: Leaves fall off early and pods can have no seeds. Seeds also are less safe to re-plant. Losses can be serious.

Other plants that get the disease: It attacks a number of beans including lablab, soya bean and common bean.

Control:

1. Some soya bean varieties have more resistance.
2. It can be controlled with chemical fungicides.

References:

Allen, D.J., 1983, The Pathology of Tropical Food Legumes. Wiley-Interscience, p 136
CMI Descriptions of Pathogenic Fungi No 589, 1978 & Map 504
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 318

Disease: # Leaf spot of winged bean

Scientific name: *Pseudocercospora psophocarpi* (Yen) Deighton
[**Synonym:** *Cercospora psophocarpi* Yen]

What it looks like: The leaves first develop small yellow spots on the top. Underneath the leaf the spots have a white mass that becomes grey then turns black**.** The whole leaf can become infected causing the leaf to die.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease can spread with temperatures from 10° reaching a maximum at 30°C. It is favoured by high humidity.

How the disease spreads: The spores of the fungus are long lived and can survive on dead leaves. Most likely the disease is spread by wind and rain.

The damage: It can cause significant loss of leaf.

Other plants that get the disease: None so far known.

Control:

1. It can be controlled by fungicides.

References:

Price, T.V., 1978, Diseases of the Winged Bean, in The Winged Bean. 1st Int. Symp. on Developing the Potentials of the Winged bean, Manila Philippines. p 241-243

Price, T.V., & Munro, P.E., 1978, *Pseudocercospora psophocarpi* on winged bean in Papua New Guinea Trans. Br. Myc. Soc. 70(1):47-55

Price, T.V., 1982, Studies of the incidence, severity and distribution of false rust, leaf spot and powdery mildew on winged bean in Papua New Guinea. Ann. Appl. Biol. 101:473-482.

Disease: # Anthracnose of betel nut

Scientific name: *Colletotrichum gloeosporoides* (Penz.)Penz. and Sacc.
Sexual: *Glomerella cingulata* (Stonem) Spauld and Schrenk

What it looks like: It normally attacks the young developing parts of the plants causing these parts to wilt and die back.

The cause: The disease is caused by a fungus

The conditions it likes: It mainly occurs in the warm and wet areas.

How the disease spreads: The fungus can live on old plant remains as well as on many other plants.

The damage:

Other plants that get the disease: This is a very common fungus and gets on many different plants. It causes diseases like anthracnose of mango, wither tip of cassava and dieback of yams.

Control:

1. It can be controlled by spraying with Bordeaux mixture.
2. Normally improving plant spacing and allowing light and air between palms reduces the damage from this fungus.

References:

Yashoda, H. & Hegde, R.K., Studies of anthracnose of arecanut (*Areca catechu*) caused by *Colletotrichum gloeosporoides* (Penz) Panz. & Sacc. Plant Pathology Newsletter (1986) 4(1-2) 24

See also Anthracnose p 250

Betel nut can also get a disease called Black leaf mould due to a fungus *Acroconidiellina arecae* (Berk & Broome) M.B.Ellis [Syn. *Brachysporium arecae* (Berk & Br.) Sacc.]

Diseases of Breadfruit family

Breadfruit

Leaf spot	Fungus	*Pseudocercospora artocarpi*	84
Rust	Fungus	*Uredo artocarpi*	85

Jackfruit

Pink Disease	Fungus	*Phanerochaete salmonicolor*	260
Leaf spot	Fungus	*Colletotrichum sp.*	261

Disease: **Leaf spot of breadfruit**

Scientific name: *Pseudocercospora artocarpi* (H.Sydow & Sydow) Dei.
[**Synonym:** *Cercospora artocarpi* H & P Sydow]

What it looks like: Dead spots develop on the leaves. They are more clearly seen from underneath the leaf.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease develops best in warm rainy conditions in the wet season.

How the disease spreads: The fungal spores blow in the wind.

The damage: It tends to get worse on older leaves causing them to fall off early. It does not seem to be serious.

Other plants that get the disease: No other plants are infected by this particular fungus although many other similar fungi attack a wide range of crops.

Control: No control is normally needed.

References:

Deighton, Mycol. Papers 140:139. 1976.

Disease: **Rust of breadfruit**

Scientific name: *Uredo artocarpi* Berk & Br.

What it looks like: Raised brown rust coloured spots develop on the leaves. They are often surrounded by a yellow patch of leaf. They are more clearly seen on the top surface of the leaf.

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: The disease spreads by wind-blown spores.

The damage: Leaves can be killed when infection is heavy.

Other plants that get the disease:

Control: This is probably not necessary.

References:

(Cummins, Mycologia Vol 32, 1940, p 372.)

Cabbage family diseases

Broccoli

Grey leaf spot	Fungus	*Alternaria brassicae*	91
	and	*Botrytis sp.*	
Black rot	Bacterium	*Xanthomonas campestris*	89
Root knot	Nematode	*Meloidogyne sp.*	271

Brussels sprouts

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Black rot	Bacterium	*Xanthomonas campestris*	89

Cabbage

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Leaf spot	Fungus	*Colletotrichum sp.*	261
Ring spot	Fungus	*Mycosphaerella brassicicola*	92
Downy mildew	Fungus	*Peronospora parasitica*	90
Black rot	Bacterium	*Xanthomonas campestris*	89
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	87
Collar rot	Fungus	*Thanatephorus cucumeris*	266
Damping off	Fungus	*Pythium sp.*	
	and	*Rhizoctonia sp.*	
Root knot	Nematode	*Meloidogyne incognita*	271

Cauliflower

Black leaf spot	Fungus	*Alternaria brassicicola*	88
Leaf spot	Fungus	*Mycosphaerella brassicicola*	92
Black rot	Bacterium	*Xanthomonas campestris*	89
Root knot	Nematode	*Meloidogyne sp.*	271

Chinese cabbage

Grey leaf spot	Fungus	*Alternaria brassicae*	91
Black leaf spot	Fungus	*Mycosphaerella brassicicola*	92
Leaf spot	Fungus	*Septoria sp.*	
Wet rot	Fungus	*Choanephora cucurbitarum*	267
Downy mildew	Fungus	*Peronospora parasitica*	90
Leaf wilt (Soft rot)	Bacterium	*Erwinia carotovora* subsp. *carotovora*	89
Black rot	Bacterium	*Xanthomonas campestris*	89
Seedling wilt	Fungus	*Fusarium oxysporum*	

Radish

Leaf spot	Fungus	*Alternaria raphani*	

Turnip

Leaf spot	Fungi	*Alternaria brassicae*	91
	and	*Alternaria brassicicola*	92
Black rot	Bacterium	*Xanthomonas campestris*	89

Watercress

Leaf spot	Probably fungus		

Disease: # Bacterial soft rot cabbage

Scientific name: *Erwinia carotovora* subsp. *carotovora*

What it looks like: A soft squashy rot occurs on the heads of Chinese and other cabbage family plants. It has a bad smell. A slime of bacteria can be seen on the damaged parts.

The cause: The disease is caused by bacteria.

The conditions it likes: It gets worse in hot wet weather. It needs damaged plants.

How the disease spreads: The bacterium commonly occurs on rotting plant material in the soil. It can get onto plants by splashing water and on knives and other tools used for harvesting. When cabbages are stored together it can spread by contact.

The damage: The cabbages become rotten and unusable. Mostly it spreads on cabbages after they are being harvested, but it can rot stems and cabbages in the field in wet conditions.

Other plants that get the disease: It can attack all plants in the cabbage family. It also causes fruit rot of marita. Other vegetables can be damaged.

Control:

1. Avoid harvesting cabbages when the crop is wet.
2. Handle harvested plants very carefully.
3. Don't cut a rotten plant then another cabbage with the same knife until it is cleaned.
4. Old crops should be dug into the ground.

References:

CMI Descriptions of Plant pathogenic bacteria No. 552 1977

Persley, D.M., et al (eds), 1989, Fruit and Nut Crops - a disease management guide. Queensland DPI Information Series QI 88018 p 27

Plant Pathology Note No 18 or Harvest 8(3) p141

Vock, N.T., 1978, A Handbook of plant diseases in colour Vol.1 Queensland DPI

Disease: # Black leaf spot of cabbage

(Also on other cabbage family plants)

Scientific name: *Alternaria brassicicola* (Schw.) Wiltshire

What it looks like: Dark brown spots up to 10 mm across with rings inside them develop on leaves. On cauliflowers the curd can develop dark sunken areas.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets severe in the wet season. Temperatures of 20°C to 30°C favour the disease. Leaves need to be wet for about 16 hours.

How the disease spreads: It is carried on seed. Spores can continue to live on leaves for several weeks if they are dropped in gardens after harvest.

The damage: It can invade pods and cause a loss of seeds in a seed crop. It can cause damping off of seedlings. It is more serious than Grey leaf spot.

Other plants that get the disease: Cabbage, cauliflower and probably other plants in the cabbage family.

Control:

1. Seed treatment can be used. (Hot water at 50°C for 20-30 mins.)
2. Fungicides can be used eg mancozeb.
3. Remove infected old plants from the garden.

References:

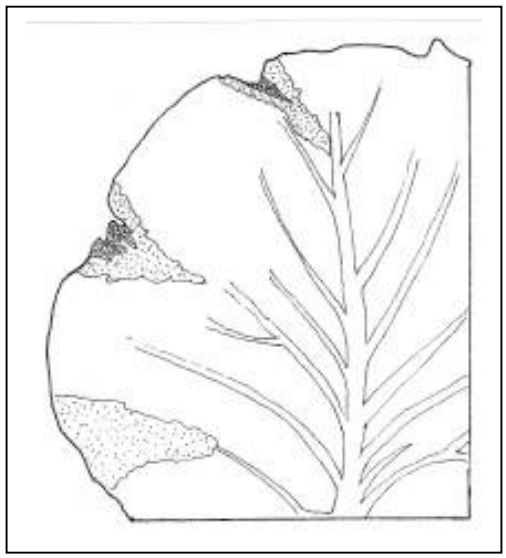
CMI Descriptions of Pathogenic Fungi No 163 1968 & map 457

Disease: # Black rot of cabbage

(and other cabbage family plants)
(Also called Bacterial leaf scald)

Scientific name: *Xanthomonas campestris* (Pamm.)Dowson pv *campestris*

What it looks like: Yellow or dry brown areas develop near the edge of the leaf. These extend in from the leaf edge. When the stem is cut across, a black ring will be seen in the water-conducting tissues just below the bark. The leaf scald form of the disease causes small brown water-soaked spots over the surface of the leaf.



The cause: The disease is caused by bacteria.

The conditions it likes: It gets worse in the wet season and in the hot areas.

How the disease spreads: The bacteria are spread by wind and rain. It can be introduced in seed and can survive on old cabbage family plants. Plants damaged by insects are more easily attacked. The disease can be spread by insects.

The damage: Leaves can be severely damaged.

Other plants that get the disease: It damages cabbage family plants such as cabbage, chinese cabbage, chinese radish, cauliflower, brussels sprouts etc.

Control:

1. Don't plant cabbage plants in the same area more often than two years apart.
2. Treat seed if crop grown from seed. (In hot water at 50°C for 20-30 mins). Only treat untreated and vigorous seed and just before planting.
3. Some kinds get less damage.
4. Keep seedlings well spaced.
5. Use sterile soil in seedbeds.
6. Get rid of seedling plants that are affected.

References:

CMI Description of Pathogenic bacteria No. 47 1965 and CMI Map 136
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 36
Plant pathology Note No 28 or Harvest 11(3) p 124
Talekar, N.S. & Griggs, T.D. (ed), Chinese Cabbage Proc 1st Int. Sympos. AVRDC p 176

Disease: # Downy mildew cabbage

Scientific name: *Peronospora parasitica* (Pers.: Fr.)Fr.

What it looks like: Yellow or pale green spots develop on the leaves. On the underside of the leaves white fungal threads can be seen. In wet weather the spots enlarge then with dry weather the spots dry out and die. On cauliflower heads dark brown colours can occur.

The cause: The disease is caused by a fungus.

The conditions it likes: Cool moist weather helps the disease develop quickly. It develops particularly in nursery seedbeds.

How the disease spreads: The spores can spread with wind and water.

The damage: It is usually of little importance in the gardens but can be serious in nurseries.

Other plants that get the disease: All cabbage family plants get the disease.

Control:

1. Seed bed areas need to be away from cabbage family plants.
2. Seedlings can be sprayed with fungicides.

References:

Persley, D.M. *et al* (eds), 1989, Vegetable Crops - a disease management guide. Queensland DPI. Information Series QI 88019 p 25

Vock, N.T., 1978, A Handbook of Plant diseases in colour Vol 1 Queensland DPI

Disease: # Grey leaf spot of cabbage

(Also called *Alternaria* blight and affects the cabbage family)

Scientific name: *Alternaria brassicae* (Berk.) Sacc.

What it looks like: Small round yellow spots appear on young leaves. These spots become large and have rings within them. The old spots are dark brown.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse when temperatures are between 18°C and 24°C. It is also favoured by high humidity. The disease gets worse where the light is poor. The disease can exist where temperatures are between 2° and 30°C.

How the disease spreads: The disease can spread from old cabbage family plants. It is also carried on seed.

The damage: It particularly affects Chinese cabbage.

Other plants that get the disease: Cabbage family plants.

Control:

1 Seed treatment is used in some places.

References:

CMI Descriptions of Pathogenic Fungi No 162,1968 & Map 353

Talekar, N.S. & Griggs, T.D., (ed), 1981 Chinese Cabbage Proc. 1st Int. Sympos. AVRDC p 176

Disease: **Ring spot of cabbage**

Scientific name: *Mycosphaerella brassicicola*
Synonym: *Cercospora brassicicola* Henn.

What it looks like: Small dark round spots develop on leaves. These get larger (up to 2 cm) and become light grey in the centre. Circles of black spots can be seen in the spots.

The cause: It is caused by a fungus.

The conditions it likes: It gets worse in cool wet weather.

How the disease spreads: The disease spreads from old cabbage family plants. They are carried by wind.

The damage: Leaves can be severely damaged as leaf spots enlarge and merge into one another. Crop yields can be severely reduced and surviving crops may be unsaleable because of their appearance.

Other plants that get the disease: In PNG it has been seen on cabbage and Chinese cabbage but also gets on cauliflower and probably other cabbage family plants.

Control:

1. Get rid of crop residues after harvesting.
2. Use clean areas for planting cabbages.
3. Chemical fungicides can be used.

References:

CMI Description of Pathogenic Fungi No 722 1982

Persley, D.M. et al (eds), 1989, Vegetable Crops - a disease management guide. Queensland DPI Information Series QI 88019 p 25

Vock, N.T., 1978, A Handbook of plant diseases in colour Vol.1 Queensland DPI

Cassava diseases

Brown leaf spot	Fungus	*Cercosporidium henningsii*	94
Leaf spot	Fungus	*Phyllosticta sp.*	
Blight leaf spot or Tip die back	Fungus	*Colletotrichum capsici*	
	and	*Glomerella cingulata*	95
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Associated with root rot	Fungus	*Dictyosporium toruloides*	
Collar rot	Fungus	*Fusarium sp.*	
Root rot	Fungus	*Helicobasidium purpureum*	
	and	*Proboscispora manihotis*	
	and	*Rigidoporus lignosus*	
Storage rots			

Disease: # Brown leaf spot of cassava

Scientific name: *Mycosphaerella henningsii* Sivan
Asexual: *Cercosporidium henningsii* (Allescher) Deigh
[**Synonym:** *Cercospora henningsii* Allesch]

What it looks like: Brown spots are produced particularly on the older leaves of cassava. As the spots get larger they become angular with leaf veins as the edges. The spots are light brown with a slightly raised darker brown border. Spots are easier to see on the upper surface. They are 1 to 8 mm across.

The cause: It is caused by a fungus.

The conditions it likes: The disease gets worse in warm wet conditions. It gets worse on old cassava plants (over 5 months old).

How the disease spreads: The fungus can continue to live on old fallen leaves. Spores blow in the wind and rain. They are produced on the lower leaf surface.

The damage: It does not get serious but the amount of food produced is less because the leaves fall off early.

Other plants that get the disease: This disease only affects cassava.

Control:

1. Wider spacing of plants.
2. During the dry season badly diseased leaves can be removed to prevent the disease spreading quickly when the rains start.
3. Crop rotations of 3 to 5 years help control.
4. Planting in the wet season so that crops are in the susceptible 6 to 8 month old stage in the dry season helps.

References:

CMI Descriptions of Pathogenic Fungi No 912 1987
Gerlach, W.W.O., 1988, Plant Disease of Western Samoa, GTZ pp56-57
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 202
Lozano, J.C. et al, 1976, Field problems in Cassava. CIAT p 24
Pest Control in Tropical Root Crops PANS Manual No4 p 97

Disease: # Wither tip of cassava

(Also called Anthracnose and blight leaf spot)

Scientific name: *Glomerella cingulata* (Stonem) Spauld & Schrenk
[Synonym: *Glomerella manihotis* Chev
Colletotrichum manihotis Henn.
*Gloeosporium manihotis***]**

What it looks like: The edges of young cassava leaves die. Leaves can also have spots and be twisted.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets bad in the wet season and under shaded and poor growing conditions.

How the disease spreads: Spores develop in warm wet conditions and are spread by wind and wind-blown rain.

The damage:

Other plants that get the disease: A very large number of plants get anthracnose from infection by this or similar fungi.

Control:

1. Avoid planting in the middle of the wet season.
2. Use healthy planting material.

References:

Lozano, J.C.& Booth, R.H., Diseases of cassava CIAT Series DE-5, p 29
Pest Control in Tropical Root crops PANS Manual No 4 p 104

Citrus diseases

Crop Disease	Cause	Scientific name	Page
Citron			
Scab	Fungus	*Sphaceloma fawcettii*	103
Algal spot	Alga	*Cephaleuros virescens*	97
***Clymenia* citrus**			
Scab	Fungus	*Sphaceloma fawcettii*	103
Grapefruit			
With leaf spot	Fungus	*Glomerella cingulata*	261
Algal leaf spot	Alga	*Cephaleuros virescens*	97
Bacterial canker	Bacterium	*Xanthomonas campestris* pv *citri*	98
Citrus nematode	Nematode	*Tylenchulus semipenetrans*	101
Lemon			
Leaf spots	Fungi	*Ascochyta citri*	
	and	*Glomerella cingulata*	261
Scab	Fungus	*Sphaceloma fawcettii*	103
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Bacterial canker	Bacterium	*Xanthomonas campestri* pv *citri*	98
Lime			
Sooty mould	Fungus	*Meliola citricola*	270
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Collar & root rot	Fungus	*Phellinus noxius*	
Bacterial canker	Bacteria	*Xanthomonas campestris* pv *citri*	98
Mandarin			
Sooty mould	Fungus	*Meliola citricola*	270
Pink crust of stems	Fungus	*Podonectria sp.*	
Orange			
Scab	Fungus	*Sphaceloma fawcettii*	103
Pink disease	Fungus	*Phanerochaete salmonicolor*	260
Citrus nematode	Nematode	*Tylenchulus semipenetrans*	101
Pomelo			
Collar rot	Fungus	*Athelia rolfsii*	262
On citrus fruit			
Blue mould	Fungus	*Penicillium digitatum*	100
Green mould	Fungus	*Penicillium italicum*	101
On citrus in general			
Melanose	Fungus	*Diaporthe citri*	94

Disease: # Algal spot of Citrus

Scientific name: *Cephaleuros virescens* Kunze

What it looks like: Velvety spots that are usually orange-red in colour but sometimes greenish, appear on the surface of the leaves. Sometimes the spots merge together to form large irregular patches on the leaves.

The cause: The disease is caused by an alga.

The conditions it likes: The disease only occurs in warm wet conditions. The algal spores require a film of water for survival and spread of infection.

How the disease spreads: This alga is very common in the rainforest and can spread from many trees. It occurs on cocoa, guava, coffee, vanilla and many other perennial crops.

The damage: Unlike diseases caused by fungi and bacteria the algae that cause leaf spots do not feed off the host plant but obtain their food in the same way as other plants by using light energy from the sun. The algal leaf spots prevent light getting to the leaves of the host plant in severe attacks and may reduce growth.

Other plants that get the disease: A wide range of perennial crops get the disease mainly in hot, wet lowland conditions.
(See also page 257.)

Control: Control is not normally necessary. The "disease" generally becomes established on plants growing under poor cultural conditions resulting in loss of vigour.

References:

Gerlach, W.W.P., 1988, Plant Diseases of Western Samoa, GTZ pp 108-109

Disease: # Bacterial canker of Citrus

Scientific name: *Xanthomonas campestris* (Pammel) Dowson
[Synonym: *Xanthomonas citri* (Hasse) Dowson**]**

What it looks like: Small watery green raised lumps appear on the leaves particularly underneath. These spots turn grey and burst showing a light brown spongy mass in the centre. It is yellow around the spots. Similar spots occur on twigs and fruit.

The cause: The disease is caused by bacteria.

The conditions it likes: It can spread in very wet windy conditions. The disease gets more severe in hot humid coastal areas. Temperatures between 20° and 30°C are when the disease gets worse. It gets started most easily on young tissues that are covered with moisture for 20 minutes or more.

How the disease spreads: The disease mostly spreads by rain washing bacteria off diseased leaves onto new leaves. The bacteria can live on old citrus wood for long periods.

The damage: It badly affects production of good citrus. It causes unsightly spots on fruit and also causes fruit to drop off and leaves to fall off early. Some other diseases produce symptoms that can easily be mistaken for citrus canker. You should ask your didiman for advice if you think your citrus has this disease.

Other plants that get the disease: Grapefruit gets the disease badly, sweet orange and lime moderately and lemon and mandarin get little disease. Citron gets little damage.

Control:

1. Grow kinds of citrus that get the disease less.

References:

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 52

Disease: # Blue mould of Citrus

Scientific name: *Penicillium italicum* Wehm

What it looks like: A blue green fungus grows over the skin of the fruit. It is soft and wet around the edge of the disease. The fruit becomes dry. Only the fruit are affected.

The cause: The disease is caused by a fungus.

The conditions it likes: If the temperature is between 18°C & 26°C it causes rapid rotting of fruit. It is fastest at 24°C.

How the disease spreads: It is spread especially by contact between diseased fruit. The fungus causing the rot is in both the soil and spread with soil and blown in the wind and can affect only damaged fruit.

The damage: It is a storage rot of citrus fruit.

Other plants that get the disease: Citrus fruit.

Control:

1. Avoid damaging the skin of the fruit.
2. Remove diseased fruit.
3. Chemical dips can be used.
4. Pick fruit when it is dry.

References:

CMI Descriptions of Pathogenic Fungi No 99 1966
Graham, K.M., 1971, Plant Diseases of Fiji, HMSO p51
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 299

Disease: # Green mould of Citrus

Scientific name: *Penicillium digitatum* Saccardo

What it looks like: The surface of citrus fruit becomes covered with a white mould. The mould turns light green and the fruit softens and shrinks.

The cause: The disease is cause by a fungus.

The conditions it likes: It particularly infects fruit if the peel is damaged. Temperatures near 24°C allow fruit to rot quickly.

How the disease spreads: It particularly spreads by contact between fruit. The disease spreads in the same way as blue mould, infecting only damaged fruit.

The damage: It is mainly a storage rot of citrus fruit.

Other plants that get the disease: Citrus fruit

Control:

1. Avoid damaging the skin of the fruit.
2. Remove diseased fruit.
3. Chemical dips can be used.
4. Pick fruit when it is dry.

References:

CMI Description of Plant Pathogenic Fungi No 96 1966
Graham, K.M., 1971, Plant Diseases of Fiji, HMSO p51

Disease: # Citrus nematode

Scientific name: *Tylenchulus semipenetrans*

What it looks like: Trees are stunted and slowly decline in health. When the roots are examined there is a jelly like material along the roots with soil attached and the soil is not easily washed off.

The cause: The problem is caused by very small nematode worms that burrow into the roots. They are too small to see without a microscope.

The conditions it likes: The disease may occur wherever citurs is grown although in new plantings the disease is most likely to occur after introduction on planting material from already infested areas.

How the disease spreads: The nematodes can only get into the soil in an area by being brought in on the planting material or in soil brought into the area. They can wash down hill in the rain. Spread of nematodes through the soil is slow and not more than about 1.5 to 2.0 cm per month when roots of adjacent citrus trees are in contact.

The damage: Plants grow less well and produce less fruit. Leaves may turn yellow and fall early. Twigs may die back and yields may be reduced to unprofitable levels.

Other plants that get the disease: No other plants have been recorded as susceptible to this nematode in PNG. In other countries nematode has been recorded on grapevine, olive, lilac as well as a number of other plants.

Control:

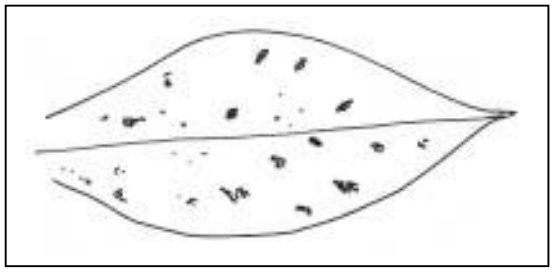
1. Make sure all planting material is free of nematodes.
2. Don't plant new trees down hill from infected trees.
3. Don't replant citrus in old infected areas.
4. Grafted trees on resistant rootstocks should be used.
5. A fallow of 2 years without citrus trees should be allowed before replanting.
6. Good care of trees reduces the damage.

References:

Agrios, G.N., 1978, Plant Pathology p 638-639

Disease: # Melanose of Citrus

Scientific name: *Diaporthe medusaea* Nits
[Synonym: *Diaporthe citri* Wolf]
Asexual: *Phomopsis cytosporella* Penz & Sacc
[Synonym: *Phomopsis citri* Fawcett**]**



What it looks like: Small (1 mm across) raised dots appear on the surface of leaves and fruit giving them a rough feel. Leaves can fall off early.

The cause: The disease is caused by a fungus. The fungus produces 2 kinds of spores.

The conditions it likes: It gets worse in high rainfall areas. It is worse with high humidity and temperatures between 21°C and 27°C. Fruit need to be wet for 12 hours at 25°C to get the disease. Cloudy weather helps the disease get started.

How the disease spreads: The fungus particularly spreads from dead wood. It is washed by water. The disease attacks new leaves and young twigs and fruit.

The damage: The leaves are distorted and can fall off early. It gets into the stem end of the fruit and causes stored fruit to rot.

Other plants that get the disease: It occurs on lime, sour orange, pomelo, lemon, mandarin, and orange. It can also damage avocado, mango, pawpaw and other plants.

Control:

1. Prune and burn all dead wood.
2. It can be controlled with chemical fungicides (Copper sprays).
3. Cut out infected branches and get rid of rotten fruit.

References:

CMI Descriptions of Pathogenic Fungi No 396, 1973 & Map 126
Cook, A.A., 1975, Diseases of Tropical & Sub Tropical fruits & nuts Hafner p 114
Graham, K.M., 1971, Plant Diseases of Fiji. HMSO p 61
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 128
Kranz, J., et al, (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 108

Another fungal disease called Leaf spot of lemon (Also called Ascochyta leaf spot citrus) is caused by the fungus *Ascochyta citri* Penz.

Disease: # Scab of Citrus

Scientific name: *Elsinoe fawcettii* Bitanc & Jenk.
Asexual: *Sphaceloma fawcettii* Jenkins

What it looks like: The leaves, twigs and fruit develop raised corky scabs. Each scab develops on only one side of the leaf. The leaves of lemon can be badly distorted because the scabs form on the veins of the leaf. Infected fruit can be deformed and fall off. It can be mistaken for citrus canker in some areas.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in cool places (13° - 23°C) when it is moist at night. (100% R.H.)

How the disease spreads: The small spores wash off diseased leaves in the rain and these can be spread around by wind.

The damage: Leaves are distorted and young trees can die. Fruit are made unattractive.

Other plants that get the disease: Bush lemon, sour orange and *Clymenia*.

Control:

1. It can be controlled by spraying a chemical called Bordeaux at times when trees are undergoing rapid new growth.
2. Sweet orange and lime tend to be resistant to the disease. Also resistant varieties of the other fruits occur.
3. It is important to get rid of old diseased leaves, fruit and branches.

References:

CMI Descriptions of Pathogenic Fungi No 438, 1974 Map 161 & 125
Cook, A.A., 1975, Diseases of Tropical & Subtropical fruits & nuts Hafner p 116
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 65
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 147
Kranz, J. et al, (eds), 1977, Diseases of Tropical Crops VPP p 108
Vock, N.T., 1978, A Handbook of plant diseases in colour Vol 1 Queensland DPI

Coconut diseases

Disease	Cause	Scientific name	Page
Sooty mould	Fungi and and	*Capnodium sp.* *Chaetothyrium sp.* *Meliola sp.*	
Stem bleeding	Fungus	*Ceratocystis paradoxa*	102
Black leaf mould	Fungi and	*Clasterosporium cocoicola* *Sporidesmium macrurum*	
White thread blight	Fungus	*Corticium penicillatum*	
Leaf spots	Fungi and and	*Bipolaris incurvata* *Pestalotiopsis palmarum* *Pseudoepicoccum cocos*	100 101
Root rot	Fungus and	*Ganoderma lucidum* *Rigidoporus microporus*	97
Brown root rot	Fungus	*Phellinus noxius*	98
Bud rot	Fungus	*Phytophthora palmivora*	99

Disease: # Basal stem rot of coconut

(Also called Butt rot and Ganoderma wilt)

Scientific name: *Ganoderma lucidum* [(W.Curt) Fr.] Karst
(There have been problems with the consistent and correct naming of this organism especially in the tropics. It may be other species involved. This species tends to be in cooler places.)

What it looks like: The new fronds fail to open and the palm looks wilted and paler green. The older fronds then wilt and die from the tips. At the base of the palm dead spots occur with dead roots. Near the dead spot there is a bright yellow zone. The white fungal threads are visible. Bracket fungal bodies develop. The top of these has zones and a shiny appearance. Underneath is soft.

The cause: The disease is caused by a fungus.

The conditions it likes: Dry weather allows the wilting to get worse. Poor drainage, heavy weed growth and poor soil fertility possibly help a little in the disease attack.

How the disease spreads: The fungus is common on rotting trees. It can attack old coconut stumps. When new palms are planted near these the fungus spreads via the roots. Often the new palm does not show damage for 10-15 years.

The damage: This type of fungus is common in forests on old rotting trees. Affected palms can die in 6 -12 months.

Other plants that get the disease: Oil palm and other rotting tree stumps.

Control:

1. Fungicides that move inside plants (systemic) have so far failed to stop this disease causing palms to die.
2. It is important to get rid of all likely infected stumps before re-planting old plantations.

References:

CMI Descriptions of Pathogenic Fungi No 445, 1975

Holliday, P., 1980, Fungus disease of Tropical crops. Cambridge. p 198-200

Kranz, J., *et al,* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey.p 156-158

Disease: # Brown root rot of coconut

Scientific name: *Phellinus noxius* (Corner) G.H. Cunn.
[**Synonym:** *Fomes noxius* Corner]

What it looks like: Dead spots develop on the trunk. The trunk collapses. Sometimes before this occurs the leaves may turn yellow, wilt and hang down. The spots on the trunk are dark brown with dark brown zones. Once symptoms appear on the trunk the root system is already infected and the palm cannot survive.

The cause: The disease is caused by a fungus.

The conditions it likes: It mostly attacks palms over 10 years old. Palms in poor soil conditions especially low potassium get the disease more.

How the disease spreads: Spores can blow in the wind. The disease takes 1 to 3 years before the palm is killed.

The damage: The disease infects stumps of felled trees left in the ground. It grows down through these stumps into the roots and generally infects other trees growing close by spreading from root to root.

Other plants that get the disease: It also attacks oil palm. It can attack avocado, cacao, coffee, rubber, kapok, mandarin, mangosteen, rambutan and other trees.

Control:

1. Spots need to be found early and cut out. The area needs to then be treated with coal tar.
2. Dead palms should be removed, including all infected roots.

References:

CMI Description of Pathogenic Fungi No. 195, 1968

Kranz, J., *et al,* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 162

Disease: **Bud rot of coconut**

Scientific name: *Phytophthora palmivora* (Butler) Butler

What it looks like: Spots develop especially on young nuts and at the stalk end.

The cause: The disease is caused by a fungus.

The conditions it likes: It occurs in warm areas with a high rainfall.

How the disease spreads: The fungus often occurs around the roots of coconuts and may spread from here. The disease mostly starts following damage to the young nuts.

The damage: Nuts fall off early.

Other plants that get the disease: It attacks cacao (Black pod), rubber (black stripe), pawpaw (fruit rot) and over 135 other plants.

Control: Chemicals can be used to control the disease if necessary.

References:

CMI Descriptions of pathogenic Fungi No 831, 1985.

Krantz, J *et al,* (eds), 1977, Diseases, Pests and Weeds in Tropical Crops Verlag Paul Parey p 121

Disease: # Drechslera leaf spot of coconut

Scientific name: *Bipolaris incurvata* (Ch.Bernard) Alcorn
Asexual: *Drechslera incurvata* (Ch.Bernard) M.B.Ellis
[Synonym: *Helminthosporium incurvatum* Ch.Bernard.]

What it looks like: Small spots develop on young coconuts. The spots are oval and brown but get larger and turn pale in the centre. The edges of the leaves can become dead.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse when young coconuts are overcrowded or in heavy shade or have poor soil fertility. Heavy nitrogen fertiliser increases the amount of disease. It gets worse when there is dew on the leaves.

How the disease spreads: The spores blow in the wind.

The damage:

Other plants that get the disease:

Control: Control is not normally necessary.

1. Increase the spacing of plants.
2. Improve the soil fertility.
3. Make the nursery less shaded.
4. Fertilise young plants with potassium and phosphorus fertilisers.
5. Use shade cloth to reduce dew.

References:

CMI Descriptions of Pathogenic Fungi No 342, 1972
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 143

Disease: # Grey leaf spot of coconut

Scientific name: *Pestalotiopsis palmarum* (Cooke) Steyaert
Synonym: *Pestalotia palmarum* Cooke

What it looks like: Small yellow brown spots develop on the leaves. These become white to grey and have a brown edge. The spots are oval and about 1 cm long.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse under poor growing conditions. This includes wet conditions, planting close together and where there is heavy shade. It often follows attack by insects. It gets worse with poor soil fertility.

How the disease spreads: The fungus spores blow in the wind then grow and penetrate the upper surface of the leaf.

The damage: It is mostly a problem of seedling coconuts.

Other plants that get the disease: It also gets on Betel nut and Oil palm.

Control: Normally not necessary.

1. Space seedlings more widely.
2. Sprays of chemical fungicides can be used eg Bordeaux or Zineb.
3. Using potassium fertiliser reduces the disease.
4. The addition of seawater (200-1000 ml) and seaweed salt (20-100 g) to bagged seedlings reduced the disease.

References:

Brown, J.S., 1975, Isolation and inoculation with *Pestalotiopsis palmarum* Papua New Guinea Agric. J. 26:31

CIM Descriptions of Pathogenic Fungi No 319, 1971

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 313-314

Disease: # Stem bleeding of coconut

(Stem bleeding can have other causes.)

Scientific name: *Ceratocystis paradoxa* (Dade) Moreau
Asexual: *Thielaviopsis paradoxa* (de Seynes) Hohnel

What it looks like: A rusty brown discolouration of the bark occurs. The disease produces a characteristic smell

The cause: The disease is caused by a fungus. The fungus has a resting stage in its cycle.

The conditions it likes: The fungus grows well between temperatures of 25°-32° C.

How the disease spreads: The fungus occurs very widely. It is spread through soil and plant remains.

The damage:

Other plants that get the disease: It causes pineapple disease of sugarcane. The fungus can attack pineapples, bananas, betel nut palms, oil palm, sweet potato, sorghum, cacao and corn.

Control:

1. Avoid damaging the trunks of coconuts.

References:

CMI Descriptions of pathogenic Fungi No. 143, 1967
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 62-64
Kranz, J., *et al*, (eds), 1977, Diseases, Pests & Weeds of Tropical crops Verlag Paul Parey p 102-104

Corn (maize) diseases

Name	Cause	Scientific name	Page
Common rust	Fungus	*Puccinia sorghi*	104
Tropical rust	Fungus	*Puccinia polysora*	112
Blister smut	Fungus	*Ustilago zeae*	105
Leaf blotch	Fungus	*Setosphaeria turcica*	106
Downy mildew	Fungus	*Peronosclerospora sacchari*	107
	and	*Peronosclerospora sorghi*	107
Leaf blight	Fungus	*Cochliobolus heterostrophus*	108
Leaf spot	Fungus	*Phoma sorghina*	110
Leaf spot	Fungus	*Cercospora sorghi*	109
Leaf spot	Fungus	*Bipolaris zeae*	108
Leaf spot	Fungus	*Curvularia lunata*	
Head smut	Fungus	*Sphacelotheca reiliana*	111
Irregular bleached areas	Fungus	*Thanatephorus cucumeris*	
Collar rot	Fungus	*Pythium butleri*	

Disease: # Common rust of Corn

Scientific name: *Puccinia sorghi* Schw.

What it looks like: Small powdery lumps occur on both surfaces of the leaves. The lumps are dark brown to black.

The cause: It is caused by a fungus.

The conditions it likes: It mostly occurs at high altitudes (over 1200 metres). It spreads in humid weather.

How the disease spreads: In the tropics it can spread between corn plants without *Oxalis* alternate host. It can blow in the wind, spread with seed or on diseased plant material.

The damage: Leaves can go yellow and die. It does not greatly affect yield as the disease mostly occurs after cobs are developing.

Other plants that get the disease: This disease is specific to corn.

Control:

1. Use kinds of corn that get the disease less.
2. Chemical fungicides are of little use.

References:

CMI Descriptions of Pathogenic Fungi No 3, 1964

Kranz, J., *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 164

Vock, N.T., 1978, A Handbook of Plant Diseases in colour Vol 2 Queensland DPI

Disease: # Corn blister smut

Scientific name: *Ustilago zeae* (Beckm.)Unger
[Synonym: *Ustilago maydis* (Dc)Cda**]**

What it looks like: The above ground parts of corn get silvery grey swellings. These occur on the rapidly growing parts of the plant and can be on the stem, leaf, tassel and ear. These swellings occur at the place where the infection occurred as the fungus does not spread much within the plant.

The cause: The disease is caused by a fungus. It is a basidiomycete, which is the mushroom family.

The conditions it likes: This disease is more prevalent in warm and drier areas.

How the disease spreads: The fungal spores are highly resistant and can last in the soil for many years. They can germinate quickly and re-infect plants. The spores in the galls on the plant are blown by the wind. The fungus can live on dead plant material and manure in the soil.

The damage: Corncobs can be made completely inedible.

Other plants that get the disease: The disease is specific to corn.

Control: This is not easy.

1. Crop rotation is important. Corn cannot be re-sown in an infected garden for many years.
2. It is important to pull out or chop off infected plants before the galls burst and spread the spores. Infected plants should be burnt.
3. Seed treatment has been used but the chemicals used are not suitable for use in a village and difficult where villagers save their own seed.

References:

CMI Descriptions of Pathogenic Fungi No 79, 1965 and Map 93
Plant pathology note 1 Harvest 5(4) p 248

Disease: # Corn Leaf Blight

Scientific names:
Sexual: *Setosphaerica turcica* (Luttrell) Leon. & Sugg
[Synonym: *Trichometasphaeria turcica* (Pass.)Lutt.**]**
Asexual: *Exserohilum turcicum*
[Synonym: *Drechslera turcica* (Pass.) Subram et Jain]
[Synonym: *Helminthosporium turcicum* Pass.**]**

What it looks like: Large long grey to brown spots develop along corn leaves. These spots may increase in size and cover the whole leaf. The small spots are often soft and watery. In the centre of the older spots, spores develop giving the spots a green velvety appearance.

The cause: The disease is caused by a fungus

The conditions it likes: This disease gets worse where there is high humidity and low temperatures. In the lowlands it can occur in cooler wet seasons.

How the disease spreads: The spores can live for several months on crop remains left after the corn has been harvested. They get blown around in the wind. The disease also can attack wild sorghum grasses.

The damage: Plants that are infected by the disease early in their growth can be badly damaged with an important loss in yield.

Other plants that get the disease: Several sorghum family grasses

Control:

1. Getting rid of corn plants after the corn has been picked.
2. Crop rotation.
3. Use of resistant kinds of corn.
4. Treatment of seeds with fungicide chemical

References:

CMI Descriptions of Pathogenic Fungi No 304, 1971
De Leon, C., 1978, Maize diseases CIMMYT Info Bull No 11 p 33
Kranz, J., et al(eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 140

Disease: # Downy mildew of Corn

Scientific name: *Peronosclerospora sacchari* (T Miyake) Shir.& Hara
(Also Sorghum downy mildew *Peronosclerospora sorghi* (Weston and Uppal) Shaw.)

What it looks like: The corn leaves show regularly spaced yellow and light green bands. Leaves later turn brown and die.

The cause: The disease is caused by a fungus.

The conditions it likes: It likes an intermediate between wet and dry as a certain daylength is needed for the fungus to develop. It is not often found in wet places.

How the disease spreads: The disease spreads by spores from diseased leaves.

The damage: The maize plant is stunted.

Other plants that get the disease: Sugarcane and pitpit.

Control:

1. Get rid of diseased plants

References:

CMI Descriptions of Plant pathogenic fungi no. 453, 1975 and map 21

De Leon, C., 1978, Maize diseases A guide for field identification CIMMYT Info. Bull No 11 2nd ed. p 6

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 135

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 454

Disease: # Southern leaf blight of Corn

Scientific name: *Bipolaris maydis* (Nisik. & Miyake) Shoem
[**Synonym:** *Cochliobolus heterostrophus* (Drech) Drech.]
Asexual: *Drechslera maydis* (Nisik.) Subram. & Jain
The names of this group of fungi are at present being revised. Probably *Bipolaris zeae* Sivan is included here.

What it looks like: Several spots up to 2.5 cm long occur mostly on the leaves. They are pale brown with a dark edge. Sometimes they have rings and can be grey with fungal spores.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse with temperatures near 25° to 32°C.

How the disease spreads: It is assumed the fungus blows in the wind. It can also be spread on seed. The fungus can survive in moist soil for about 12 months.

The damage: It can reduce the harvest of cobs and this is worse if the fungus gets onto the cobs.

Other plants that get the disease: It can occur on sorghum and other grasses.

Control:

1. Some kinds of corn get the disease less.

References:

CMI Descriptions of Plant pathogenic Fungi No 301, 1971 & Distribution Map 346

Disease: # Grey leaf spot of sorghum and Corn

Scientific name: *Cercospora sorghi* Ell. & Ev.

What it looks like: Spots usually form on the lower leaves and spread upwards. They are about 1 cm long and 3-5 mm wide. Spots can join killing larger areas of leaf.

The cause: The disease is caused by a fungus.

The conditions it likes: Wet weather.

How the disease spreads: The fungal spores blow in the wind.

The damage: Normally not serious.

Other plants that get the disease: It mainly gets on sorghum and sorghum grasses but sometimes attacks corn.

Control: Usually not required.

References:

CMI Descriptions of Pathogenic Fungi No 419, 1974 and Map 338

Disease: **Leaf spot of corn**

Scientific name: *Mycosphaerella holci* Tehon
Asexual: *Phoma sorghina* (Sacc.) B, D, & K
[**Synonym:** *Phyllosticta sorghina* Sacc.]

What it looks like: Spots several centimetres in length develop on leaves. They have a reddish purple edge.

The cause: The disease is caused by a fungus.

The conditions it likes: It grows well between 25° and 30°C.

How the disease spreads: It can live on plant remains and weeds for up to 2 years. It can be spread with seed. It can blow in the wind and rain.

The damage:

Damage to seedlings can be severe.

Other plants that get the disease: It can row on rice, sugarcane and pitpit, corn, and some other grasses.

Control:

1. Clean seed should be used or seed treated.
2. Crop remains should be removed from old gardens.

References:

CMI Descriptions of Pathogenic Fungi No. 584, 1978

Disease: # Head smut corn & Sorghum

Scientific name: *Sphacelotheca reiliana* (Kuhn) Clint.

What it looks like: The flower becomes replaced by the fungus. With sorghum this means little grain is produced. Plant growth is not otherwise reduced.

The cause: The disease is caused by a fungus.

The conditions it likes: Soil temperatures of 21° to 28°C favour the disease

How the disease spreads: It can be spread on the seed but is mostly spread from the soil. Plants get infected when they are seedlings. This fungus can hybridise with covered smut of sorghum (*Sphacelotheca sorghi*). They can occur on wild grasses.

The damage:

With sorghum it can be serious.

Other plants that get the disease: It can occur on sorghum, corn and some other related grasses.

Control:

1. Crop rotation is important.
2. Wild grasses that could carry the disease must also be avoided in or near gardens.

References:

CMI Description of Plant Pathogenic Fungi No 73, 1965 and Distribution Map 69

Disease: # Tropical rust of Corn

Scientific name: *Puccinia polysora* Underw.

What it looks like: The lumps of rust coloured spores are lighter in colour and rounder than common rust. Leaves die early.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse with hot temperatures (27°C) and high humidity. It is mostly below about 1200 metres altitude.

How the disease spreads: It can spread for short distances in the air. It can spread with diseased plants.

The damage: Leaves turn yellow and die.

Other plants that get the disease:

Control:

1. Use of varieties that get the disease less.

References:

CMI Descriptions of Pathogenic Fungi No 4, 1964
De Leon, C., 1978, Maize Diseases CIMMYT p 16
Kranz, J., et al (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 164

Diseases of Onion family

Bunching onion (*A. fistulosum*)

Leaf spot	Fungus	*Alternaria porri*	114

Leek

Leaf blight	Fungus	*Alternaria porri*	114

Onion

Leaf tip withering	Fungus	*Alternaria porri*	114
Smudge	Fungus	*Colletotrichum circinans*	116
Soft rot	Bacterium and	*Erwinia carotovora* subsp. *carotovora* *Pseudomonas cepacia*	

Shallot

Leaf tip burn	Fungus	*Alternaria porri*	114
Leaf tip wither	Fungus	*Botryotinia fuckeliana*	115
Smudge	Fungus	*Colletotrichum circinans*	116

Disease: # Leaf blight of leek

(Also causes leaf spot onion and called purple blotch)

Scientific name: *Alternaria porri* (Ell.) Cif.

What it looks like: The leaves develop greyish spots. They get larger and darker. They can cause leaves to die.

The cause: The disease is caused by a fungus.

The conditions it likes: It spreads in wet windy weather.

How the disease spreads: It survives on old onion plant remains.

The damage: It is often not serious.

Other plants that get the disease: Also affects bunching onion, onion, and shallot.

Control:

1. Get rid of old onion plant remains.
2. It can be controlled with chemical fungicides.

References:

Persley, D.M. *et al* (eds), 1989, Vegetable Crops - a disease management guide Queensland DPI Information Series QI 88019 p 46

Disease: # Leaf tip wither of shallot

Scientific name: Asexual: *Botrytis cinerea* Pers. ex Fries
Sexual: *Botryotinia fuckeliana* (de Bary) Fuckel
[Synonym: Sex. *Sclerotinia fuckeliana* (de Bary) Whetz**]**

What it looks like: Brown water-soaked areas develop on tips and may turn grey on drying out.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse with low temperatures and high moisture. Temperatures about 25°C are optimum.

How the disease spreads: Spores (conidia) can be carried by wind or splashed by rain from old plant parts or diseased plants.

The damage:

Other plants that get the disease: The fungus affects a large number of plants. It causes grey mould of beans, soft rot of strawberries and vegetables.

Control:

1. Use wider spacing.
2. Try not to damage plants.
3. Remove old diseased plants.

References:

CMI Descriptions of Pathogenic Fungi No 431, 1974

Disease: # Smudge of onions

Scientific name: *Colletotrichum circinans* (Berk.) Vogl.

What it looks like: Small dark blotches develop on the bulb. There are often rings inside the spots.

The cause: The disease is caused by a fungus.

The conditions it likes: Warm wet weather favours development and spread of the fungus.

How the disease spreads: The disease can survive in the soil on onion remains.

The damage: It is mainly a problem of stored onions.

Other plants that get the disease: Onions and shallots.

Control:

1. Brown skinned types get much less disease.
2. Store onions under cool dry conditions.

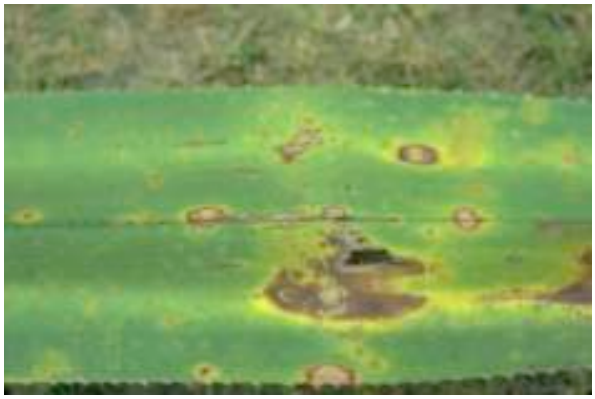
References:

Persley, D.M. *et al* (eds), 1989, Vegetable Crops - a disease management guide Queensland DPI Information Series QI 88019 p 46

Pandanus diseases - marita and karuka

Diseases of Pandanus

Disease	Cause	Scientific name	Page
Karuka			
Black leaf mould	Fungus	*Lembosia pandani*	119
Sooty mould	Fungus	*Meliola juttingii*	
Large leaf spot			
Leaf spot			
Yellow spot mosaic	Probably virus		
On seeds	Fungus	*Macrophoma pandani*	
On rotting flowers	Fungus	*Rhizopus stolonifer*	
Marita			
Leaf spot			
Fruit rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	118
Black leaf mould	Fungus	*Lembosia pandani*	119



Disease: **Bacterial rot of marita**

Scientific name: *Erwinia carotovora* subsp. *carotovora*

What it looks like: A bad smelling soft rot of the leaves and fruit occur. The diseased area of the leaf goes dark brown and soft. The marita fruit rots internally but little damage can be seen on the outside.

The cause: The disease is caused by a bacterium. It is a common bacterium that affects many plants.

The conditions it likes: Little information is available on the specific conditions required for infection of marita to occur. However the bacterium is widespread in both lowland and highland conditions. In other crops wounding is normally necessary for invasion of the bacterium, and this is likely in marita also.

How the disease spreads: It would have to spread by contact from infected plants.

The damage: Fruit go soft and squashy and are useless.

Other plants that get the disease: It also attacks the leaves of karuka. The same bacterium causes rots of potato, cabbage, lettuce, banana and some other vegetables.

Control: Control is not normally necessary.

References:

Tomlinson, D.L., 1988, A leaf and fruit disease of *Pandanus conoideus* caused by *Erwinia carotovora* subsp. *carotovora* in Papua New Guinea. Journal of Phytopathology 121(1), 19-25

Disease: **Black leaf mould of Karuka**
(Also on marita)

Scientific name: *Lembosia pandani* (Rost.) Theiss

What it looks like:

The cause:

The conditions it likes:

How the disease spreads:

The damage:

Other plants that get the disease: Marita and other pandanus.

Control:

References:

Diseases of the passionfruit family

Plant Disease	Cause	Scientific name	Page
Banana passionfruit			
Fruit spots	Fungus	*Colletotrichum sp.*	
Granadilla			
Stem death	Fungus	*Glomerella cingulata*	
Chlorotic spot	Virus	Chlorotic spot virus	122
Passionfruit			
Brown leaf spot	Fungus	*Alternaria passiflorae*	121
Seedling wilt	Fungus	*Phytophthora nicotianae*	123
Blight of flowers	Fungus	*Aspergillus sp.*	
Fruit rot	Fungus	*Fusarium sp.*	
Root knot	Nematode	*Meloidogyne javanica*	255

Disease: # Brown spot of Passionfruit

Scientific name: *Alternaria passiflorae* J.H.Simmonds

What it looks like: A round brown sunken spot appears on the side of the fruit. Spots also occur on the leaves. They are about 1 cm across. Spots can also occur on stems near where leaves join.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in wet warm weather.

How the disease spreads: The spores are spread by wind and rain. The disease can spread from the weed passionflower (*Passiflora foetida*).

The damage: It damages the skin of passionfruit.

Other plants that get the disease: The disease also infects granadilla.

Control:

1. Prune plants to avoid overcrowding.
2. Remove dead leaves and ripe fruit from the ground.
3. It can be controlled with a chemical fungicide (maneb).
4. Remove passionflower weed plants.

References:

CMI Descriptions of Pathogenic Fungi No 247, 1970 & Map 479
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 154
Vock, N.T., 1978, A Handbook of Plant diseases in colour Vol 1 Queensland DPI

Disease: **Chlorotic spot of passionfruit**
(Also on Granadilla)

Scientific name: Chlorotic spot virus

What it looks like:

The cause: The disease is caused by a virus.

The conditions it likes:

How the disease spreads:

The damage:

Other plants that get the disease: Granadilla, passionflower.

Control:

References:

Disease: # Phytophthora blight of passionfruit

(Also called seedling wilt)

Scientific name: *Phytophthora nicotianae* v.Breda de Haan var. *nicotianae*

What it looks like: The young growing tips turn black and die. Large watery looking spots occur on leaves. These become light brown in colour. Leaves fall. Large grey watery soft areas can occur on fruit. In wet weather white fungal threads cover the fruit. Fruit fall off. It may cause a collar rot in mature plants.

The cause: The disease is caused by a fungus.

The conditions it likes: It spreads in wet windy weather. The best temperature for the disease is about 30°C.

How the disease spreads: It initially splashes onto lower leaves from the soil.

The damage: Seedlings can die. Mature plants that are infected with collar rot wilt, turn yellow and lose their leaves. The bark just above the soil level may split, revealing a reddish brown rot moving up the plant from soil level.

Other plants that get the disease: It is a common fungus. It can grow on pineapple, strawberry, citrus, tomato and tobacco.

Control:

1. Prune vines to make them less crowded.
2. Grow grass under the vines.
3. Fungicides can be used.

References:

Graham, K.M., 1971, Plant Disease of Fiji, HMSO p 154
Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Diseases of pawpaw

Disease	Cause	Scientific name	Page
Butt rot	Fungus	*Athelia rolfsii*	
Leaf spot	Fungus	*Cercospora papayae*	
Shot hole leaf spot	Fungus	*Corynespora cassiicola*	129
Anthracnose/Leaf spot	Fungus	*Glomerella cingulata*	250
Powdery mildew	Fungus	*Oidium caricae*	127
Leaf spot	Fungus	*Phyllosticta sp.*	
Root rot	Fungus	*Phytophthora palmivora*	128
Leaf spot & fruit rot	Fungus	*Mycosphaerella caricae*	125
Fruit rot	Fungus	*Botrydiplodia theobromae*	
Fruit rot	Fungus	*Fusarium oxysporum*	
Stem rot	Bacterium	*Pseudomonas cepacia*	
Mosaic	Virus		126
Root knot	Nematode	*Meloidogyne incognita*	255
	and	*Meloidogyne javanica*	255

Disease: # Leaf spot & fruit rot of pawpaw

Scientific name: *Mycosphaerella caricae* H.Sydow & Sydow
Asexual: *Phoma caricae-papayae* (Tarr) Punith.

What it looks like: This fungus produces a black spot on mature fruit and brown and white spots on leaves. Leaf stalks and stems can also be affected.

The cause: The disease is caused by a fungus.

The conditions it likes: The fruit rot gets worse in rainy seasons. Although rain is not essential for the disease to spread it gets worse with rain showers or in high humidity.

How the disease spreads: The fungus blows in the wind.

The damage:

Leaf stalks may rot, young stems may rot at the end and plants can actually die back. Flowers may fall off and young fruits die. Fruit may continue to rot after harvest.

Other plants that get the disease: The disease only affects pawpaw.

Control:

1. Remove and burn infected material.
2. Fungicides can be used.
3. Fruit after harvest can be put in hot water at 33°C for 20 minutes to stop infected fruit rotting.

References:

CMI Descriptions of Pathogenic Fungi No 984, 1990

The fungus *Cercospora papayae* is also recorded from Papua New Guinea and probably does similar damage.

Disease: **Pawpaw mosaic**

Scientific name:

What it looks like: Young leaves turn yellow and do not grow properly. Often there are yellow patches around the edge of the leaf. Trees are stunted. Often they grow several side branches.

The cause: It is probably a virus

The conditions it likes:

How the disease spreads:

The damage:

Affected trees are of little use.

Other plants that get the disease:

Control:

References:

Vock, N.T., 1978, A Handbook of Plant Diseases in Colour Vol 1 Queensland DPI

Disease: # Powdery mildew pawpaw

Scientific name: *Oidium sp.*

What it looks like: Light yellow patches develop on the young leaves. These become soft and watersoaked and have a white powdery growth over them.

Round white patches can also develop on the fruit. Grey scarred areas are left after the white mould disappears.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease is more prevalent in warm dry conditions.

How the disease spreads: The disease spreads with the fungal spores blowing in the wind and rain.

The damage: It is mainly a disease of seedlings that are planted too close together.

Other plants that get the disease: Only pawpaw will be infected with this particular species of fungus.

Control:

1. Use wider spacing in nurseries.
2. Treat with a sulphur fungicide. (Sulphur dust can be used but can damage leaves when the temperature in above 24°C).

References:

Disease: # Root rot of pawpaw

Scientific name: *Phytophthora palmivora* (E Butler) E Butler
Often *Pythium sp*. fungi are also involved.

What it looks like: The older leaves turn yellow and collapse hanging limply around the trunk. The young leaves then die and the plant dies. Large roots show a soft wet decay and small roots are missing. Fruit can also be affected by this fungus.

The cause: The disease is caused by a fungus.

The conditions it likes: It occurs in warm areas with a high rainfall.

How the disease spreads: Spores can spread by wind and rain. It can survive in the soil.

The damage: Plants especially in wet areas die.

Other plants that get the disease: A large number of plants can be damaged eg pawpaw, coconut (bud rot), tomato, oil palm, rubber, cacao (black pod) etc.

Control:

1. Avoid wet areas.
2. Do not replant pawpaws into soil where the disease is known to occur.
3. Plant only disease free trees from a nursery that has clean soil.
4. Avoid damage to pawpaw trunks as this reduces trunk rot.

References:

CMI Descriptions of Pathogenic Fungi No 831, 1985
Holliday, 1980, Fungus Diseases of Tropical Crops CUP p 83

Disease: # Shothole of pawpaw

(Also called Brown spot.)

Scientific name: *Corynespora cassiicola* (Berk. & Curt.) Wei

What it looks like: Light brown round spots about 1 cm across develop on pawpaw leaves. The centre can sometimes fall out of the spots. Spots can also appear on petioles and fruit.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse with temperatures between 20°C and 27°C.

How the disease spreads: It can be carried on seed or can live on old diseased plant parts for up to 2 years. The spores can blow in the wind.

The damage: On pawpaw it is not serious.

Other plants that get the disease: The same fungus also gets on tomatoes, eggplant, watermelon, melon, banana, daka, castor oil plant, soya bean, cowpea and some flowering plants. It has been recorded causing a leaf spot on sweet potato.

Control: Not normally required for pawpaw.

References:

CMI Descriptions of Pathogenic Fungi No 303, 1971
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 152
Holliday, P., 1980, Fungal Diseases of Tropical Crops Cambridge p 114

Other leaf spots due to *Phyllosticta sp*. fungus probably also cause similar spots with a hole in the centre.

Peanut diseases

Disease	Cause	Scientific name	Page
Bacterial wilt peanut	Bacterium	*Pseudomonas solanacearum*	131
Collar rot	Fungus	*Aspergillus niger*	132
Leaf spot	Fungi	*Mycosphaerella arachidis*	133
	and	*Mycosphaerella berkeleyi*	133
Leaf mottle	Virus	Marginal leaf chlorosis virus	134
Mild mottle	Virus	Cowpea mild mottle virus	135
Rust	Fungus	*Puccinia arachidis*	136
Leaf spot and pod rot	Fungus	*Leptosphaerulina trifolii*	137
Stem rot	Fungus	*Athelia rolfsii*	138
	and	*Botryodiplodia theobromae*	252
Leaf spot	Fungus	*Colletotrichum sp.*	
Collar rot	Fungus	*Phomopsis sp.*	
Root rot	Fungus	*Pythium sp.*	
Blackening stems	Fungus	*Thanatephorus cucumeris*	253
Mosaic	Virus		

Disease: # Bacterial wilt of peanut

Scientific name: *Pseudomonas solanacearum* (E.F.Smith) E.F.Smith

What it looks like: Plants wilt and when the stems are cut there is a brown discolouration of the tissues.

The cause: The disease is caused by a bacterium.

The conditions it likes: Temperatures between 25° and 35°C suit the disease best.

How the disease spreads: The bacteria can spread in soil or by water running down hill from an infected area.

The damage:

It affects plants by blocking the conducting cells that allow water to pass up the plant. Plants wilt and die.

Other plants that get the disease: This bacterium affects many different plants including tomato, potato, eggplant and occasionally capsicum in PNG.

Control:

1. Avoid infected soils.
2. Don't plant crops that can be damaged downhill from infected crops.
3. For most crops resistant varieties have been developed.

References:

CMI Description of Plant pathogenic bacteria No 15, 1964

Plant pathology Note No.15 of Harvest 7(4) p180

Tomlinson, D.L., Mogistein, M., 1989, Occurrence of bacterial wilt of peanut (*Arachis hypogaea*) caused by *Pseudomonas solanacearum* and opportunistic infection of aibika (*Abelmoschus manihot*) in Papua New Guinea Plant Pathology 38(2), 287-289

Disease: # Collar rot of peanuts

(Also called Aspergillus crown rot peanuts)

Scientific name: *Aspergillus niger* v. Tiegham
(***Athelia rolfsii*** can also cause collar rot of peanuts)

What it looks like: If seeds are dug up they are covered with a sooty looking mass of black spores. The young seedlings can fall over and die due to the stem rotting off near the ground. The lower leaves of the plant become yellow. All stages from planted seeds to mature plants can be attacked.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus can live in dry soils and the disease likes high temperatures (30°C to 35°C).

How the disease spreads: The fungus lives in the soil and on rotting plant materials. Seeds can also be infected and often carry the disease. The fungus is common in soil. It gets most serious where peanuts are grown in the same area for several crops.

The damage: Plants can die.

Other plants that get the disease: Many other plants can be infected by this disease. It can be particularly troublesome as a storage disease on some crops.

Control:

1. Don't plant seed too deeply.
2. Use good quality undamaged seeds.
3. Chemical seed dressings can be used.
4. Crop rotation or moving garden sites is important.
5. Remove old plant rubbish (not only peanut plants).
6. Be careful not to damage growing plants.

References:

CMI Descriptions of Pathogenic Fungi No 94, 1966
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 161
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 40
Pest Control in Groundnuts PANS Manual No 2 p 31
Vock, N.T., 1978, A handbook of plant diseases in colour Vol 2 Queensland DPI

Disease: # Peanut leaf spot

(Also called early and late leaf spot of peanuts)

Scientific name: *Mycosphaerella arachidis* Deighton
Asexual: *Cercospora arachidicola* Hori
[Synonym: *Mycosphaerella arachidicola* W.A Jenkins**]**
and *Mycosphaerella berkeleyi* Jenkins
Asexual: *Cercosporidium personatum* (Berk & Curtis) Deighton
[Synonym: *Cercospora personata* (Berk & Curtis) Ell & Ev.**]**

What it looks like: Small brown pale areas develop on the older leaves of peanuts. These spots become dark brown (with *C. arachidicola*) and black (with *C. personatum*).

The cause: Two similar fungi are involved.

The conditions it likes: The disease is worse with temperatures between 20°C and 30°C and high humidity. Heavy rain helps the fungus spread. Poor soil fertility can increase the damage.

How the disease spreads: The disease can live on old plants and peanut rubbish.

The damage: Leaves can fall off early and less peanuts are then harvested.

Other plants that get the disease: This disease only affects peanuts.

Control:

1. Remove old peanut plants.
2. Plant peanuts in different areas each time.
3. Wider spacing
4. Chemical fungicides can be used.

References:

CMI Descriptions of Pathogenic Fungi Nos. 411, 412, 1974 and Maps 166, 152
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 164
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 271
Kranz, J., *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 127
Pest Control in groundnuts PANS Manual No 2

Disease: # Peanut marginal chlorosis

Scientific name: Peanut marginal leaf chlorosis virus

What it looks like: Two or three weeks after sowing, the leaves of diseased plants turn yellow on the edges. They also become wrinkled. The plants are smaller than normal.

The cause: The disease is spread by a virus.

The conditions it likes: This disease will occur wherever peanuts are grown although in PNG it appears to be uncommon.

How the disease spreads: The virus spreads in the seeds. No insects appear to be involved. The disease can be transmitted by grafting and could possibly be transmitted by plants rubbing together.

The damage: The plant produces less nuts than normal. (About half)

Other plants that get the disease: No other plants get this disease.

Control: No control is normally necessary.

1. Use seed from healthy plants.

References:

PANS Manual No 2, 1973, Pest Control in Groundnuts London p 78

Disease: # Peanut mild mottle

Scientific name: Cowpea mild mottle virus of peanuts

What it looks like: Small pale indistinct spots develop on the leaf surface. Veins on the leaf can go pale or clear. The leaves can turn yellow, go brown or bronze underneath or the leaves die. Leaves can also roll upwards.

The cause: This disease is caused by a virus called the cowpea mild mottle virus.

The conditions it likes: No information is available from within PNG on the conditions favourable to disease development.

How the disease spreads: This disease can be spread by being in the seed before they are planted or it can be spread between plants by a small sap sucking insect called the tobacco whitefly.

The damage: So far the disease is only of minor importance.

Other plants that get the disease: This virus disease can occur on many different bean family plants.

Control:

1. Pull out and burn diseased plants.
2. Other bean family plants should be checked and either removed if diseased or kept at a distance from peanut plants.
3. Do not use seed from infected plants.
4. Whitefly can be controlled by insecticides.

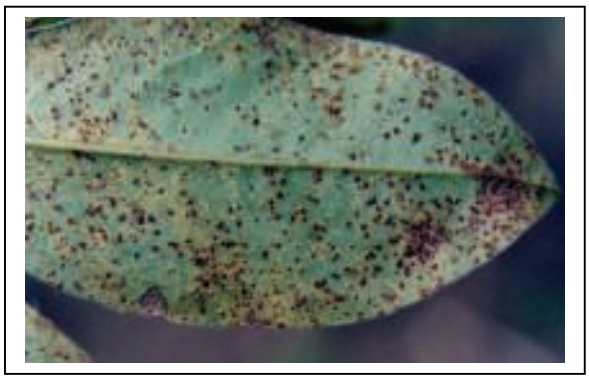
References:

Philemon, E.C., Harvest 12(4) p 15 or Plant Pathology Note No 32

Disease: **Peanut rust**

Scientific name: *Puccinia arachidis* Speg
[Synonyms: *Uredo arachidis* Lagerh.
and *Uromyces arachidis* P. Henn.**]**

What it looks like: Orange red lumps or pustules appear on the lower leaf surface and these feel rough to the touch. Older infected leaves turn yellow and eventually drop off.



The cause: It is caused by a fungus.

The conditions it likes: It gets worse in the wet season.

How the disease spreads: It is mostly spread by wind and rain.

The damage: Leaves and plants can die. It gets worse as plants get near maturity.

Other plants that get the disease: The disease only affects peanut.

Control:

1. Some varieties get less disease.

References:

CMI Descriptions of Pathogenic Fungi No 53, 1965 and Map 160
Pest Control in Groundnuts PANS Manual No 2 p 27

Disease: # Pepper spot & scorch of peanuts

Scientific name: *Leptosphaerulina trifolii* (Rostrup) Petrak

What it looks like: Very small spots (less than 1 mm) develop on the upper side of the leaf. Spots can join together and cause leaves to die. If the disease is near the edge of the leaf it can be brown with a yellow margin and is called scorch.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse with warm wet weather.

How the disease spreads: The disease is spread by wind.

The damage: Severely affected leaves can turn yellow and drop off.

Other plants that get the disease: A number of other plants get the disease although in these plants it is less severe than in peanut. In highlands PNG the white potato often gets the disease.

Control:

1. It can be controlled with fungicide chemicals.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 2 Queensland DPI

Disease: # Stem rot of peanuts

(Also called Sclerotium crown rot)

Scientific name: *Athelia rolfsii* (Curzi) Tu & Kimbrough
[Synonym: *Corticium rolfsii* (Sacc.) Curzi
and *Pellicularia rolfsii* (Curzi) West**]**
Asexual: *Sclerotium rolfsii* Sacc.

What it looks like: White fungal threads can be seen over brown diseased areas of the stem near ground level. Small hard round bodies (called sclerotia) are produced near the soil.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease spreads more rapidly under high humidity and wet soil. It can still grow with soil pH from 1.4-8.8. It can live for many years in the soil.

How the disease spreads: The fungus can live in the soil for several years. The fungus spreads in moist weather and can grown over the surface of the soil. It mainly spreads on plant remains but can also spread on seed and on tools.

The damage: Whole plants or single runners can die. Pegs carrying the peanuts may rot off so that the nuts stay in the ground.

Other plants that get the disease: Cabbage, beans, capsicum, giant taro, artichoke, lettuce, naranjilla, pawpaw, peanut, peas, pomelo, potato, rice, corn, sugarcane, sunflower, sweet potato, tomato, pepper and many other plants.

Control:

1. Improve drainage.
2. Grow the crop well by careful planting, good weeding, careful digging.
3. Use resistant varieties. Runner types of peanuts get less damage.
4. Use good crop rotations.
5. The disease gets worse where leaf spot has been bad.
6. Harvest as soon as the crop is ready.

References:

CMI Descriptions of Pathogenic Fungi No 410, 1974
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 110
Kranz, J., *et al* (eds) 1977, Diseases, Pests & Weeds of Tropical Crops p 148
Pest Control in Groundnuts PANS Manual No 2 p 39
Vock, N.T., (Ed), A Handbook of Plant Diseases in colour Vol 2 Queensland DPI

Potato diseases

Disease	Cause	Scientific name	Page
Common scab	Fungus	*Streptomyces scabies*	141
Dry rot & wilt	Fungus	*Fusarium oxysporium*	142
Late blight	Fungus	*Phytophthora infestans*	143
Powdery scab	Fungus	*Spongospora subterranea*	147
Target spot	Fungus	*Alternaria solani*	148
Collar rot & wilt	Fungus	*Athelia rolfsii*	
Storage rot	Fungus	*Fusarium solani*	
Leaf spot	Fungus	*Leptosphaerulina trifolii*	
Leaf spot	Fungus	*Phyllosticta sp.*	
Black scurf	Fungus	*Thanatephorus cucumeris*	
Wilt	Fungus	*Verticillium alboatrum*	149
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	140
Black leg	Bacterium	*Erwinia carotovora* subsp. *atroseptica*	
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	
Bacterial wilt	Bacterium	*Erwinia chrysanthemi*	
Leaf roll	Virus	Leaf roll virus	144
Interveinal mottling	Virus	Potato virus x	145
Mosaic & dying leaves	Virus	Potato virus y	146
Root knot	Nematode	*Meloidogyne javanica*	255

Disease: # Bacterial wilt of potatoes

Scientific name: *Pseudomonas solanacearum* (Smith)Smith

What it looks like: The leaves of the plant wilt, the whole plant collapses and the plant rots. If a tuber is cut and squeezed drops of milky liquid often form in a ring around the cut surface.

The cause: The disease is caused by a bacterium.

The conditions it likes: It tends to be a disease of warm countries. (25°-35°C).

How the disease spreads: It is spread with the tubers used for planting. It can be spread with soil. It can spread between plants touching together. The bacteria may survive in the soil and in roots of weeds for long periods.

The damage: It is a serious disease killing the plants and the crop. It stays in the ground preventing re-planting.

Other plants that get the disease: It can attack bananas, tomatoes, capsicums and a number of other plants. It has not been recorded on bananas in PNG.

Control:

1. Use healthy planting material.
2. Rotate gardens.
3. Space potato plants widely or mix them up with other plants.
4. Don't cut potato setts at planting.

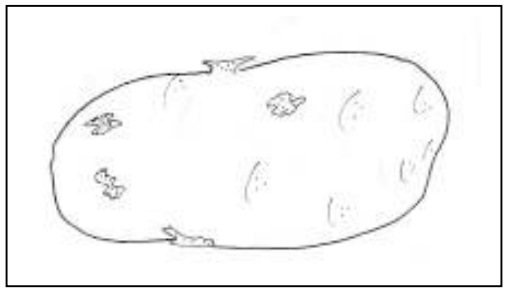
References:

CMI Descriptions of Pathogenic Fungi & Bacteria No 15, 1964 & Map 138
Tomlinson, D., Plant Pathology Note 15 Harvest 7(4) p 180.

Disease: # Common scab of Potato

Scientific name: *Streptomyces scabies* (Thaxt.) Waka. & Henr.

What it looks like: Small brown spots develop around a breathing pore on the tuber. These become a corky scab. This is coarse and rough. There is not a powdery mass of spores in the scab. (Unlike powdery scab.)



The cause: The disease is caused by a fungus.

The conditions it likes: It normally only damages tubers where the soil temperature is below 20°C (air 25°-30°C). It is worse in alkaline soils, low fertility soils and under dry soil conditions.

How the disease spreads: The fungus lives in the soil and on tubers. It spreads in soil water and in the air by wind. The fungus can live for many years in the soil.

The damage: Only the skin on the surface is damaged affecting the look of the potatoes.

Other plants that get the disease: Other Streptomyces species attack some other root crops.

Control: Not normally required.

1. Adequate rainfall while tubers are developing reduces the damage so watering would help.
2. Avoid planting diseased tubers.

References:

Graham, K.M., 1971, Plant Diseases of Fiji. HMSO. p 175.

Disease: # Dry rot & Fusarium wilt of potatoes

Scientific name: *Fusarium oxysporum* Schlecht.ex Fries

What it looks like: Stored potato tubers kept in poorly ventilated conditions become hard, shrink and have circles of wrinkles. The cut tissue inside is brown. Affected plants in the field turn yellow, wilt and die.

The cause: The disease is caused by a fungus.

The conditions it likes: High storage temperatures favour disease development. The disease gets worse in crops in warmer areas.

How the disease spreads: The fungus lives in the soil on dead plant tissue.

The damage: The conducting tissue of the plant is blocked so that it wilts and falls over.

Other plants that get the disease: A different strain of the same fungus attacks banana, tomato, sweet potato, peanut, oil palm, sorghum and maize.

Control:

1. Use resistant varieties.
2. Avoid damage to plants.
3. Don't plant infected tubers.
4. Store potatoes under cool well ventilated conditions.
5. Rotate potato crops with other crops.

References:

CMI Descriptions of Pathogenic Fungi No 211, 1970
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 164

Disease: # Late blight of potato

(Also called Irish blight)

Scientific name: *Phytophthora infestans* (Mont.) de Bary

What it looks like: Spots start to develop on the stems and leaves. They are not distinct round spots (like target spot) but irregular dark soft spots.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease spreads fastest when temperatures are 18° to 22°C and the humidity is high. It needs moisture on the leaves for several hours.

How the disease spreads: The disease mostly spreads by the spores blowing in the wind and rain on wet warm overcaste days.

The damage: Plants can collapse and tubers rot.

Other plants that get the disease:

Control:

1. Planting potatoes mixed with other crops in a garden is important.
2. Some varieties of potatoes get the disease less.
3. Crops can be sprayed but this must be done before the disease arrives.

References:

CMI Distribution Map 109

Disease: # Leaf roll of potatoes

Scientific name: Potato leaf roll virus

What it looks like: The edges of the leaves roll inwards especially those of older leaves. The leaves feel hard to touch. Young leaves can stick up and be pale. Tubers do not show disease signs.

The cause: The disease is caused by a virus.

The conditions it likes: The disease spreads more easily under conditions that allow large numbers of aphids. Aphids are less in windy places.

How the disease spreads: The disease can be in the potato tubers that are planted. Aphids can spread the disease between plants. The symptoms of the disease are less obvious when temperatures are cool and when plants are growing well.

The damage: Smaller tubers are produced.

Other plants that get the disease: No other plants get the disease.

Control:

1. Use potato tubers that do not have the disease.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 2 Queensland DPI

Disease: # Potato virus x

Scientific name: Potato virus x

What it looks like: Leaves become pale in patches and this is called a mosaic. The pale patches are not clear or distinct.
Under some conditions and with some varieties few signs show up in the leaves. But fewer potatoes are produced.

The cause: The disease is caused by a virus.

The conditions it likes: The disease spreads more rapidly under conditions that favour a build-up of aphids.

How the disease spreads: The disease is often carried in the tubers. It can be spread by contact through plants rubbing together. It can also spread where there is regular damage to plants through implements or tools and where plants are close together.

The damage: Yields gradually get less with each crop.

Other plants that get the disease: The disease only affects potato.

Control:

1. Use potato tubers that don't have the disease.

References:

Disease: **Potato virus y**

Scientific name: Potato virus y

What it looks like: The leave blades go small and twisted. When x and y occur together plants can be very stunted. Dead areas occur under leaves. Leaves become distorted and small

The cause: The disease is caused by a virus.

The conditions it likes: The disease spreads more rapidly under conditions that favour build-up of aphids.

How the disease spreads: The disease is carried by aphids.

The damage: The loss of yield can be very significant.

Other plants that get the disease: The disease only affects potato.

Control:

1. Avoid planting potato tubers that have the disease.
2. Plant potatoes in windy places where aphids are less common.
3. Use varieties that get less disease.

References:

Disease: # Powdery scab potato

Scientific name: *Spongospora subterranea* (Wallr.)Lagerh f.sp. *subterranea*

What it looks like: On the tubers wart-like growths develop. The edges of the scab break open and it is sunken. The tissue in the scabs is dry and powdery.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets less in acid soils. (It does not affect plants where the acidity is less than 4.5) It gets worse in cool weather with temperatures below 18°C. It gets worse in wet areas.

How the disease spreads: The fungus spreads with the tubers. It can live in the soil for many years.

The damage: It mainly only affects the appearance of the tubers.

Other plants that get the disease: No other plants get the disease.

Control:

1. Plant disease free potato tubers.
2. Plant varieties that get less disease.
3. Don't re-plant potatoes in soil known to be infected.
4. Fungicide dipping of seed for planting can be used.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 2 Queensland DPI

Disease: **Target spot of potato**
(Also called Early Blight of Potatoes)

Scientific name: *Alternaria solani* Sorauer

What it looks like: Dark round dead spots develop on potato leaves. Often these have rings inside them making them look like a target. Leaves fall off plants.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus can grow under a wide range of temperatures. The disease spreads between plants most easily when temperatures are between 20°C to 25°C and the air and leaves are damp.

How the disease spreads: The fungus can live on old plants for several years under cool conditions. The disease is spread by wind and rain.

The damage: The leaves can die and the whole plant may die early. A dark rot can damage the tubers.

Other plants that get the disease: Tomatoes and other plants in the tomato/potato family can get the disease. Sometimes cabbage family plants can also be damaged.

Control:

1. Keep areas clean from old potato plants.
2. Some kinds of potatoes are more resistant so get the disease less.
3. It can be stopped by using chemicals called fungicides. (They must be on the plants before the disease arrives.)

References:

CMI Descriptions of Pathogenic Fungi No 475 1975 & Map 89
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 173
Kranz, J., *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 186

Disease: # Verticillium wilt of potato

Scientific name: *Verticillium albo-atrum* Reinke & Berthold

What it looks like: The leaves go soft and hang down. The whole plant can wilt and die. Diseased stems are discoloured brown inside.
(A similar wilt can be caused either by bacteria or by Fusarium fungi.)

The cause: The disease is caused by a fungus.

The conditions it likes: It mostly occurs in cool or temperate places.

How the disease spreads: The fungus lives in the soil on dead plant material. It normally spreads on infected plants and as soil is dug or moved.

The damage: Plants wilt and die.

Other plants that get the disease: Plants in the potato family (Solanaceae) get the disease.

Control: Control is not necessary in PNG.

1. Crop rotations help control.
2. Resistant varieties can be used.

References:

CMI Descriptions of Pathogenic Fungi No 255, 1970

Diseases of the pumpkin family

Disease	Cause	Scientific name	Page
Bitter cucumber			
Leaf spot	Fungus	*Cercospora citrullina*	161
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Root knot	Nematode	*Meloidogyne incognita*	271
	and	*Meloidogyne javanica*	271
Bottle gourd			
Powdery mildew	Fungus	*Oidium sp.*	164
Anthracnose	Fungus	*Colletotrichum orbiculare*	162
Choko			
Leaf spot	Fungus	*Ascochyta sp.*	
Leaf blotch			
Soft rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Cucumber			
Leaf spot	Fungus	*Alternaria alternata*	
Leaf spot	Fungus	*Corynespora cassiicola*	
Fruit rot	Fungus	*Choanephora cucurbitarum*	267
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Leaf spot	Fungus	*Phyllosticta sp.*	
Damping off	Fungi	*Pythium butleri*	265
	and	*Pythium deliense*	
Fruit rot	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Root knot	Nematode	*Meloidogyne incognita*	271
Storage rot	Fungus	*Colletotrichum sp.*	
	and	*Fusarium sp.*	
	and	*Phoma exigua*	
	and	*Pythium sp.*	265
Melon (Rockmelon)			
Black rot	Fungus	*Mycosphaerella melonis*	
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Root knot	Nematode	*Meloidogyne incognita*	271
Pumpkin			
Storage rot	Fungus	*Colletotrichum orbiculare*	162
Sooty mould	Fungus	*Epicoccum sp.*	
Powdery mildew	Fungus	*Erysiphe cichoracearum*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
With storage rot	Fungus	*Rhizoctonia sp.*	266
Mosaic	Virus	Melon mosaic virus	163

Rockmelon (See Melon)

Snake gourd

Leaf spot	Fungus	*Colletotrichum orbiculare*	162
Leaf spot	Possibly bacterial		

Squash and marrow

With storage rot	Fungus	*Aspergillus sp.*	
Leaf spot	Fungus	*Cercospora sp.*	161
Storage rot	Fungus and	*Colletotrichum orbiculare* *Fusarium sp.*	164
Powdery mildew	Fungus	*Oidium sp.*	164
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160
Mould under leaf	Fungus	*Cercospora citrullina*	161
Possible virus			

Watermelon

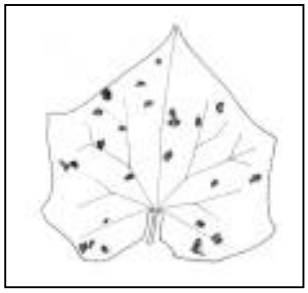
Leaf spot	Fungus	*Cercospora citrullina*	161
Leaf spot	Fungus and	*Colletotrichum orbiculare* *Leptosphaerulina trifolii*	162
Black rot	Fungus	*Mycosphaerella melonis*	
Powdery mildew	Fungus	*Oidium sp.*	164
Damping off	Fungus	*Pythium irregulare*	265
Mosaic	Probably virus		163
Root knot	Nematode	*Meloidogyne incognita*	271

Zucchini

Leaf spot	Fungus	*Alternaria cucumerina*	
Fruit rot	Fungus	*Choanephora sp.*	267
Powdery mildew	Fungus	*Erysiphe cichoracearum*	164
Storage rot	Fungus	*Fusarium sp.*	
Downy mildew	Fungus	*Pseudoperonospora cubensis*	160

Disease: # Downy mildew of Pumpkins

Scientific name: *Pseudoperonospora cubensis* (Berk. & Curt.) Rostov.



What it looks like: Cucumber and rockmelon have angular yellowish white spots on the leaves. Watermelon and pumpkin leaves become yellow between the veins. Leaves shrivel and die.

The cause: The disease is caused by a fungus. Different races of the fungus often occur and infect different members of the pumpkin family.

The conditions it likes: Wet weather and warm temperatures between 15°C and 21°C favour the disease. The disease stops below 5°C and above 30°C. High or low humidities do not suit disease spread. Also bright light helps kill the disease spores.

How the disease spreads: Small purple spores from the leaves are carried by wind to healthy wet leaves. These spores mostly develop at night.

The damage: Plants are stunted and can die. Fruits are small and poorly flavoured.

Other plants that get the disease: Pumpkin, cucumber, bitter cucumber, rockmelon, squash, watermelon, bottle gourd, smooth and angled loofah and *Tricosanthes*.

Control:

1. Rotate pumpkin family plants with other crops.
2. Some varieties get the disease less. Plant these where possible.
3. It can be controlled by chemical fungicides. (Mancozeb). Both sides of leaves must be sprayed.
4. Try to put new plants at a distance from old plants and get rid of old diseased plants.
5. Use wider spacing and avoid shady places.

References:

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 99

Kranz, J., *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 90

Disease: # Leaf spot of Pumpkin family

Scientific name: *Cercospora citrullina* Cooke

What it looks like: On watermelon and bitter cucumber, spots are round, pale with a dark edge and about 3 mm across. On cucumber and rockmelon spots are larger (6 mm) and angular. Greenish brown spores occur under the leaf.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease develops in warm wet weather. It gets worse where soil fertility is low.

How the disease spreads: Spores blow in the wind and can be splashed by rain. They can be carried on dirty tools. It can live on crop remains and weeds in the pumpkin family.

The damage: Not normally serious. Damage can be serious with some varieties in some seasons.

Other plants that get the disease: Watermelon, bitter cucumber, cucumber, rockmelon, wax gourd. It can also damage gourds, loofahs and chokos.

Control:

1. Rotate pumpkin family crops with other crops.
2. Improve soil fertility.
3. It can be controlled with chemical fungicides.
4. Remove weeds in the pumpkin family.

References:

CMI Descriptions of Pathogenic Fungi No 917, 1987
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 102

Disease: # Leaf spot/anthracnose of pumpkin family

Scientific name: *Colletotrichum orbiculare* (Berk. & Mont.) v Arx
[Synonym: *Colletotrichum lagenarium* (Pass.)Ell. & Halsted**]**

What it looks like: Spots can occur on leaves, vines and fruit. They are small and brown with a yellow ring around them. On leaves the spots become black and often develop on the veins. On vines they become long and sunken. On fruit, round spots can develop that are sunken in the centre but with a raised edge.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease is more severe in warm wet conditions.

How the disease spreads: The fungus can live on old pumpkin plants and survive on the seed. The spores can splash with the rain.

The damage:

Other plants that get the disease: Other pumpkin family plants. It is worse on watermelons.

Control: No control is normally required in PNG for this disease although a range of fungicides can be used for control if necessary. Your didiman will be able to advise you on this.

References: CMI Distribution map 313

Disease: # Mosaic of watermelon

Scientific name: (Presumably) Watermelon mosaic virus

What it looks like: Light and dark green patches appear on leaves.

The cause: The disease is caused by a virus.

The conditions it likes: The disease is more severe in warm dry conditions that favour build-up of aphids.

How the disease spreads: The virus is spread by aphids.

The damage: It can seriously affect the amount of fruit formed.

Other plants that get the disease: It can affect watermelon and other pumpkin family plants.

Control:

1. Get rid of old pumpkin plants.
2. Use varieties that get less disease.

References:

Persley, D.M., et al (eds), 1989, Vegetable Crops - a disease management guide Queensland DPI Information document QI 88019 p 33

Disease: # Powdery mildew of Pumpkins

Scientific name: **Asexual stage:** *Oidium sp*.
Sexual stage: *Erysiphe cichoracearum* D.C.
(Powdery mildew in pumpkin family plants can also be cause by*Sphaerotheca fuliginea*)

What it looks like: Large numbers of small spores on the leaf surface give the appearance of a powdery white coating on both sides of leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: It causes more serious damage during the cool dry season. A temperature between 20°C and 24°C and a dry soil favour the disease.

How the disease spreads: The spores are blown in the wind.

The damage: Leaves may turn yellow, dry out and drop off the plant. The plant can die.

Other plants that get the disease: Watermelon, sweet melon, cucumber, squash, pumpkin. (Oidium mildews also get on aibika and pawpaw.)

Control:

1. Use varieties that get less disease.
2. Sulphur fungicides can be used. (Chemicals need to be used sparingly because people eat the leaves of pumpkin family plants.)
3. Bury deeply all crop remains that are diseased.

References:

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 105

Rice diseases

Disease	Cause	Scientific name	Page
Brown sheath rot	Fungus	*Gaeumannomyces graminis*	166
Brown spot	Fungus	*Cochliobolus miyabeanus*	167
False smut	Fungus	*Ustilaginoidea virens*	168
Foot rot	Fungus	*Gibberella fujikuroi*	169
Glume blotch	Fungus	*Phaeoseptoria oryzae*	170
Leaf smut	Fungus	*Entyloma oryzae*	171
Leaf spot	Fungi	*Trichoniella padwickii*	172
	and	*Alternaria padwickii*	
Narrow brown leaf spot	Fungus	*Cercospora oryzae*	173
Rice blast	Fungus	*Pyricularia oryzae*	174
Seedling blight	Fungus	*Fusarium lateritium*	
Sheath blight	Fungus	*Thanatephorus sasakii*	175
Stem rot of rice	Fungus	*Magnaporthe salvinii*	176
White leaf streak	Fungus	*Mycovellosiella oryzae*	177
Rot at base of plant	Fungus	*Athelia rolfsii*	262
Leaf spot & on grains	Fungi	*Cochliobolus cynodontis*	
	and	*Cochliobolus geniculatus*	
	and	*Cochliobolus hawaiiensis*	
Leaf blotch	Fungus	*Metasphaeria oryzae-sativae*	
Root knot	Nematode	*Meloidogyne sp.*	271

(Also several fungi isolated off stored grain.)

Disease: **Brown sheath rot of rice**

Scientific name: *Gaeumannomyces graminis* (Sacc.) v Arx & Olivier
[Synonym: *Ophiobolus oryzinus* Sacc.**]**

What it looks like: Brown fungal threads can be found inside the sheath. They run around the stem, and cause the plants to fall over just above the ground.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease will occur wherever rice is grown.

How the disease spreads: It builds up on old rice straw.

The damage: Young plants can suddenly collapse and wilt. It can cause fairly bad damage.

Other plants that get the disease: The disease has not been recorded on other plants in PNG.

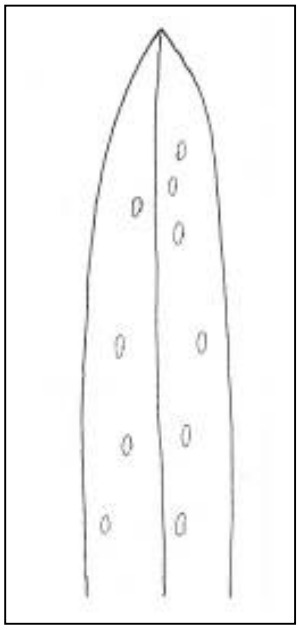
Control:

1. Burn old straw.
2. Rotate crops.

References:

Disease: # Brown spot of rice

Scientific name: *Cochliobolus miyabeanus* (Ito & Kuri) Drech.ex Dast
[Synonym: *Helminthosporium oryzae* Breda de Haan**]**
Asexual: *Bipolaris oryzae* (v B de Haan) Shoem
[Synonym: *Drechslera oryzae* (vB de Haan) Sub & Jain]



What it looks like: The disease gets on rice leaves causing oval shaped spots. These spots have a light brown centre, and dark brown edge.

The cause: The disease is caused by a fungus.

The conditions it likes: It spreads fastest when temperatures are about 25°C such as on the coast in Papua New Guinea. Shaded plants get more disease. Leaves that are damp get the disease more easily. Plants growing poorly get more damage. Cloud during the day and drizzly rain help the disease spread. Imbalanced plant nutrients help disease attack.

How the disease spreads: The disease can be carried in the seed. The disease can live on old rice stubble and plants. The spores can blow in the wind. It can develop as a serious seedling blight when it affects the grain. It is more serious in dryland rice.

The damage: On grains "eyespots" develop. These have brown edges with grey centres. Seeds may shrivel. Long brown spots develop under the leaf sheath and plants may collapse. Affected seed may rot in the ground. Seedlings may die before or after emergence and survivals are yellow and stunted.

Other plants that get the disease: It has been recorded on two other grasses.

Control:

1. Use fertile soil and get plants growing well.
2. Seed treatment is used in some countries.
3. Some resistant varieties occur.
4. Get rid of diseased plants.

References:

CMI Description of Pathogenic Fungi No 302, 1971 and Distribution Map 92

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 186

Kranz, J., *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 106

Pest Control in Rice PANS Manual No 3 p 51

Disease: # False smut of rice

Scientific name: *Ustilaginoidea virens* (Cke) Takahashi

What it looks like: Individual grains of rice develop yellow or green spore balls.

The cause: It is caused by a fungus.

The conditions it likes: The disease is more common and does more damage in cooler mountain places. It likes wet humid places. The temperature most suitable for growth and spread of the disease is about 27°C. Applying nitrogen to the crop can increase the amount of disease.

How the disease spreads: Most natural spread of the disease normally occurs just before flowering. Spores spread mostly in the middle of the night. The disease is not carried on seed. Hard resting spores (sclerotia) can develop and live between crops.

The damage: Normally a minor disease but it can at times become locally important.

Other plants that get the disease: The fungus also occurs on maize.

Control: Not normally necessary.

1. Some rice varieties get attacked less.
2. Chemicals can be used just before the grains are formed.

References:

CMI Descriptions of Pathogenic Fungi No 299, 1971 & Map 347
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 188
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 528
Ou, S.H., 1973, A Handbook of rice diseases in the tropics IRRI p 42-45
Pest Control in Rice PANS Manual No 3 p 70

Disease: # Foot rot of rice

(Also called Bakanae)

Scientific name: *Gibberella fujikuroi* (Sawada) Wollendw.
Asexual: *Fusarium moniliformis* Sheldon

What it looks like: Seedling plants are yellow, thin and long. In older plants, the plants are taller and leaves dry up and turn brown beginning with the oldest leaves. The leaf edges dry first. A white or pink mass of fungus threads occurs on the stem near the ground. (Roots are not affected)

The cause: The disease is caused by a fungus.

The conditions it likes: It is less common at low temperatures. The fungus grows best at temperatures of 27°C -30°C.

How the disease spreads: The disease is carried on seed. The seeds get the disease during flowering. The fungus occurs on many plants and can spread on seed, in the air or through the soil.

The damage: Losses can be high.

Other plants that get the disease: The fungus also damages corn, sugarcane and some other grasses.

Control:

1. Treatment of seed is used in some countries.
2. Some varieties are resistant.
3. Pre-germinating seeds for 3 days before sowing reduces the damage if the disease is already in the soil.

References:

CMI Descriptions of Pathogenic Fungi No 22, 1964 & Map 102
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 189
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 205
Ou, S.H., 1973, A Handbook of rice diseases in the tropics IRRI Philippines
Pest Control in Rice PANS Manual No 3 p 64

Disease: **Glume blotch of rice**

Scientific name: *Phaeoseptoria oryzae* Miyake

What it looks like: The spots on the leaves have an irregular edge. Often they start at the edge of the leaf. The spots are grey with a red-purple border. The spots can occur on leaves and glumes.

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: Presumably the spores blow in the wind and rain.

The damage: Normally not serious.

Other plants that get the disease: The fungus only attacks rice.

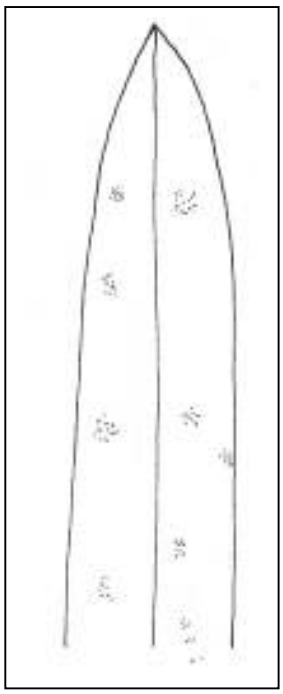
Control: Normally not required.

References:

CMI Descriptions of Plant Pathogenic Fungi No 664, 1980

Disease: # Leaf smut of Rice

Scientific name: *Entyloma oryzae* H. & P. Sydow



What it looks like: Small shiny black spots develop on the leaves. They do not rub off. When the disease is bad, leaves can turn yellow and become split.

The cause: It is caused by a fungus.

The conditions it likes: The disease increases if nitrogen fertiliser is applied late in the growth of the crop.

How the disease spreads: The fungus survives on old diseased leaves.

The damage: Tips of leaves may wither and die but the damage is not severe.

Other plants that get the disease: No other plants have been recorded with this disease in PNG.

Control: Not normally required.

1. Some varieties get less disease.

References:

CMI Descriptions of Pathogenic Fungi No 296, 1971 & Map 451
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 151
Pest Control in Rice PANS Manual No 3 p 67

Disease: **Leaf spot of rice**

Scientific name: *Trichoconiella padwickii*
Alternaria padwickii (Ganguly) Ellis

What it looks like:

The cause: The disease is caused by a fungus.

The conditions it likes: It is favoured by high rainfall and small fluctuations in temperature and humidity. The rice plant is most susceptible at the milky stage. Fungal incidence can continue after harvest but decreases on threshing and drying of the grain.

How the disease spreads: The disease is spread with the rice seed.

The damage: The disease can cause rice grains to be discoloured.

Other plants that get the disease:

Control:

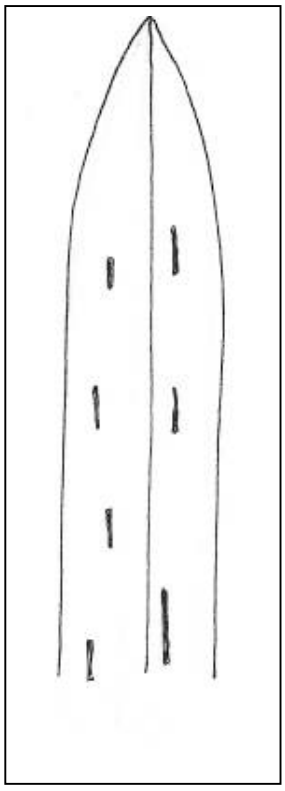
1. Mixing water extracts of ginger or garlic with the seeds can inhibit the fungus for seed to be replanted. (Seeds soak for 12 or 24 hours.)
2. Rice can be sprayed with fungicides when the flower emerges. (Iprodine).

References:

CMI Description of Pathogenic Fungi No 345, 1972 and Distribution Map 314

Disease: # Narrow brown leaf spot of rice

Scientific name: *Sphaerulina oryzina* Hara
Asexual: *Cercospora oryzae* Miyake



What it looks like: Small long spots develop on the leaves. They are up to 10 mm long and 1 mm wide. Often the colour is lighter brown near the edge.

The cause: It is caused by a fungus.

The conditions it likes: The fungus grows best at 25° to 28°C. Older leaves of rice are attacked.

How the disease spreads: The fungus attacks plants late in their growth.

The damage: The leaves die early and less food is produced.

Other plants that get the disease: No other plants have been recorded with this disease in PNG.

Control:

1. Use resistant varieties.

References:

CMI Descriptions of Pathogenic Fungi No 420, 1974 & Map 71
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 193
Ou, S.H., 1973, A handbook of rice diseases in the tropics IRRI
Pest Control in Rice PANS Manual No 3 p 65

Disease: # Rice blast

Scientific name: *Pyricularia oryzae*

What it looks like:

The cause:

The conditions it likes:

How the disease spreads:

The damage:

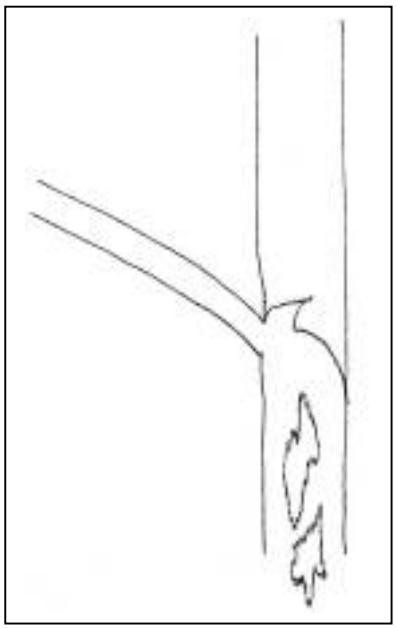
Other plants that get the disease:

Control:

References:

Disease: # Sheath blight of rice

Scientific name: *Thanatephorus sasakii* (Shirai) Tu & Kim.
Asexual: *Corticium sasakii* (Shirai) Matsumoto
[Synonym: *Pellicularia filamentosa* (Pat) Rogers;
Rhizoctonia solani;
and *Thanatephorus cucumeris;***]**



What it looks like: Large spots develop on the leaf sheath (the bottom of the leaf where it wraps around the stem). The spots are long, brown around the edge and light brown in the centre.

The cause: The disease is caused by a fungus. It is a common fungus and in rice has become worse with new varieties and intensive planting.

The conditions it likes: It likes high humidity. The disease gets worse when a lot of nitrogen fertiliser is used. Close planting and plants with lots of tillers makes the disease worse. The disease gets worse with temperatures 28° to 30° C.

How the disease spreads: The fungus can survive in the soil as small hard storage organs called sclerotia. It can also live on other weed plants. The small sclerotia spread in water.

The damage: Because the leaf sheath is damaged, leaves can fall off. Damage can be important in some conditions.

Other plants that get the disease: It is known to occur on the following plants: Peanut, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, lablab bean, tomato, mint, common bean, pepper, winged bean, potato, sorghum, cowpea, corn, ginger. (Also coffee, oil palm, eucalyptus, rubber, leucaena, siratro, tobacco, geranium, patchouli, stylo, teak & cacao.)

Control:

1. Wider spacing.
2. Get rid of old rice plants.
3. Don't use too much nitrogen fertiliser.
4. Some varieties get less disease.

References:

Kranz, J. *et al* (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 149
Ou, S.H., 1973, A handbook of rice diseases in the tropics IRRI p 26-29
Pest Control in Rice PANS Manual No 3 p 59

Disease: **Stem rot of rice**

Scientific name: *Magnaporthe salvinii* (Catt.) Krause & Webster
(Synonym: *Leptosphaeria salvinii* Catt.**)**
Asexual: *Nakataea sigmoidea*

What it looks like: The symptoms of the disease show up in the later stages of growth. Dead spots appear on the outside of the leaf sheath near the water line. Plants may fall over.

The cause: The disease is caused by a fungus.

The conditions it likes: It can survive high temperatures. High levels of nitrogen fertiliser increase the disease.

How the disease spreads: Hard resting stages of the fungus can float and attach onto new plants.

The damage: It is normally of minor importance.

Other plants that get the disease: No other plants have been recorded with the disease in PNG.

Control:

1. Some varieties get less disease.

References:

CMI Descriptions of Plant Pathogenic Fungi No 344, 1972 & Map 448

Disease: # White leaf streak of rice

Scientific name: *Mycovellosiella oryzae* (Deighton & Shaw) Deighton
[Synonym: *Ramularia oryzae* Deighton & Shaw**]**

What it looks like: The leaf spots are 2-3 mm long. In the centre the spot is white and it has a brown edge. The spot is visible on both sides of the leaves. The disease is similar to narrow brown leaf spot

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: Presumably spores blow in the wind.

The damage:

It is only a minor disease.

Other plants that get the disease:

Plants in the *Oryza* or rice group.

Control:

Not normally necessary.

References:

Deighton, F.C. *et al,* 1960, Trans. Br. Mycol Soc. 43:516
Holliday. P., 1980, Fungus Diseases of Tropical crops Cambridge p 426
IMI descriptions of Fungi and bacteria No 1037

Sugarcane diseases

Disease: # Brown spot of sugarcane

Scientific name: *Cercospora longipes* Butler

What it looks like: Brown spots form on the older leaves. They are long and oval in shape 13mm by 1mm. The spots are paler on the lower surface. There may be a pale yellow ring around the spots. They are similar to those of yellow spot. (*Mycovellosiella koepkei*).

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: Presumably by wind blown spores.

The damage: It can cause moderate damage to leaves causing them to die off.

Other plants that get the disease: The disease has only been recorded on sugarcane.

Control:

1. Some kinds of sugarcane get less damage.
2. Avoid taking plants that have the disease on the leaves, to new gardens.

References:

CMI Descriptions of Pathogenic Fungi No 418, 1974

Disease: # Brown stripe of sugarcane

Scientific name: *Bipolaris stenospila* (Drechsler) Shoem.
[**Synonyms:** *Drechslera stenospila* (Drechsler) Subraim
and *Helminthosporium stenospilum* Drechsler]

What it looks like: The spots are long and thin. (25mm or more long). This makes them form streaks but they do not have a shape like eyespot. (*Bipolaris sacchari*) When spots join large dead areas may form.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus grows best at 28° to 32°C. The disease gets more severe in dry weather, and when sugarcane is not growing well.

How the disease spreads: It is presumed that the spores blow in the wind.

The damage:

It can be serious with some varieties but many sugarcane varieties have resistance.

Other plants that get the disease:

Control:

1. Use varieties that get less disease.

References:

CMI Descriptions of Plant Pathogenic Fungi No.306, 1971 and map 483

Krishnamurthi, M., & Koike, H., 1982, Sugarcane collecting expedition: Papua New Guinea, 1977. Hawaiian Planters' Record 59(13) 273-313

Disease: # Downy mildew of sugarcane

(Also affects Coastal pitpit)

Scientific name: *Peronosclerospora sacchari* (Miy.) Shirai & Hara
[Synonym: *Sclerospora sacchari* Miy.**]**
Other species may also be involved.

What it looks like: Long light green stripes occur on the leaf. These may have white spots and leaves may strip into shreds. Older stripes may turn yellow. Fine white soft down can sometimes be seen. Young leaves get attacked first.

The cause: The disease is caused by a fungus.

The conditions it likes: It spreads when the temperature is about 25°C and there is a high relative humidity.

How the disease spreads: It can spread in infected planting material. The disease mostly attacks the plant through the young buds on the stem. The spores (conidia) spread mostly in the middle of the night. They can blow 400 m in the wind.

The damage: Growth is restricted. Plants infected early can die.

Other plants that get the disease: A number of grass plants can be attacked - sugarcane, sorghum, pitpit, *Setaria* and maize/corn.

Control:

1. Some varieties get less disease.
2. Use healthy planting material.
3. Crops in grassland may be more severely attacked.
4. Get rid of diseased plants including nearby crops.
5. Sets can be treated with hot water (52°C for 1 hour) or chemicals.

References:

CMI Descriptions of Pathogenic Fungi No. 453, 1975

Leu, L.S. & Egan, B.T., in Ricaud, C et al, 1989, Diseases of Sugarcane Elsevier p 107-117

Disease: # Eyespot of sugarcane

Scientific name: *Bipolaris sacchari* (Butler) Shoem
[Synonym: *Drechslera sacchari* (Butler) Subram. & Jain
and *Helminthosporium sacchari* Butler**]**

What it looks like: Several small red eyed spots develop on young leaves of sugarcane. These start about 1 mm x 1 mm across and grow to 3-6 mm x 5-12 mm across. They have a narrow yellow area around them. Large areas of leaf can die.

The cause: The disease is caused by a fungus.

The conditions it likes: It must have moisture on the leaves for the disease to get started. Dew is more important than heavy rain. It is commonest in cooler months. Plants get worse damage when they are growing very quickly. Temperatures need to be less than 25°C.

How the disease spreads: The fungus spreads by wind, and rain. It can be spread on machinery.

The damage: Badly infected sugarcane can produce a lot less food.

Other plants that get the disease: Elephant grass, lemon grass.

Control:

1. Some varieties are more resistant so get the disease less.
2. Don't use too much nitrogen fertiliser.

References:

CMI Descriptions of Pathogenic Fungi No 305, 1971 & Map 349

Comstock, J.C., & Steiner, G.W. in Ricaud, C. et al, 1989, Diseases of Sugarcane. Elsevier p 123-129

Frohlich, G. *et al*, 1970, Pests and Diseases of Tropical Crops Pergamon p 235 Plate 35

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 144

Disease: # Fiji disease of sugarcane

Scientific name: Fiji Disease Virus (FDV)

What it looks like: The sugarcane leaves become distorted and lumps and galls develop on the undersurface of the leaves. When leaves are growing quickly new leaves can be shorter and stiffer and look like a fan. The plant can be stunted.

The cause: The disease is cause by a virus.

The conditions it likes: The disease occurs from the coast to the highlands.

How the disease spreads: The disease is spread by a small sap sucking sugarcane leafhopper insects *Perkinsiella spp*. The disease can also be spread if planting material is taken from a plant that already has the disease. It cannot be spread on tools like bushknives. The adult leafhoppers move in large numbers on nights with no wind. They sometimes move towards lights. The number of insects varies depending on varieties of sugarcane available.

The damage: Plants can die. The disease can be serious if varieties of cane that favour the leafhopper and the disease are present.

Other plants that get the disease: Coastal or long pitpit can also get the disease.

Control:

1. Use healthy planting material.
2. Use resistant varieties.
3. Infected plants should be harvested early then the remainder of the plant destroyed.

References:

CMI Distribution Map 17
Egan, B.T., et al in Ricaud, C., et al, 1989, Diseases of Sugarcane Elsevier p 265-280
Frohlich, G. *et al*, 1970, Pests & Diseases of Tropical Crops Pergamon p 239, 240
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 112
Kula, G.R., Plant Pathology Note No 10 or Harvest 7(2) p 89.

Disease: # Leaf scorch sugarcane

Scientific name: *Stagonospora sacchari* Lo & Ling
Synonym: *Cercospora longipes* Butler?

What it looks like: Very small brown spots develop on the leaves. They gradually become long and develop a yellow ring around the edge. Finally spots can be 20 cm x 1 cm in size.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease spreads most rapidly when temperatures are between 20° and 25°C.

How the disease spreads: Wind blown rain and dew are essential for the fungus to spread.

The damage: Infected canes store less sugar.

Other plants that get the disease: Some wild grasses in the sugarcane family can get the disease.

Control:

1. Some varieties get less disease.

References:

CMI Descriptions of Pathogenic Fungi No. 418, 1974

Lo, T.T. & Leu, L.S., in Ricaud, C., *et al,* 1989, Diseases of Sugarcane Elsevier p 135-140

Disease: # Leaf spot or ring spot of sugarcane

Scientific name: *Leptosphaeria sacchari* v. Breda de Haan

What it looks like: Dark green spots with narrow yellow edges develop on leaves. These can become oval and irregular in shape and form dark reddish patches. The spots are more common on older leaves.

The cause: The disease is probably caused by a fungus but this fungus may start to grow after other fungi have damaged the leaf.

The conditions it likes:

How the disease spreads: The spores blow in the wind and are washed by rain. They can live for an extended time on old dead leaves.

The damage: Not normally serious but may reduce seedling growth in some varieties.

Other plants that get the disease:

Control: Not normally required.

References:

Abbott, E.V., in Hughes, C.G. et al (ed)., 1964, Sugarcane diseases of the world Vol 1 p 53-58

CMI Description of Pathogenic Fungi No 145, 1967 and Distribution Map No 330

Disease: # Orange rust of sugarcane

(Also affects Coastal pitpit)

Scientific name: *Puccinia kuehnii* (Krug.) Butler
[Synonyms: *Uromyces kuehnii* Kruger
and *Uredo kuehnii* Wakk. & Went.**]**

What it looks like: Small long yellow rust spots develop on both sides of leaves. These spots get longer and turn brown. Then an orange-brown rust pustule breaks out. The lumps occur in groups on the lower half of the leaf. (Another rust called common rust (*Puccinia melanocephala*) is spreading to most countries of the world, probably in the wind. It suits the highlands. 18°C.)

The cause: The disease is caused by a fungus.

The conditions it likes: It probably gets worse when temperatures are between 20° and 25°C and up to 30°C and humidity of 70-90%. Cloudiness and wind help spread the disease.

How the disease spreads: It is spread by wind and rain.

The damage: It is not normally serious but leaves may die early.

Other plants that get the disease: Sugarcane, coastal pitpit and wild *Saccharum* pitpit grasses.

Control:

1. Use varieties with high levels of resistance.
2. Other control is not normally required.

References:

CMI Descriptions of Pathogenic Fungi No 10 1964

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 117

Kranz, J. *et al*, (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 163

Ryan, C.C. & Egan, B.T. in Ricaud, C et al, 1989, Diseases of Sugarcane Elsevier p 189-202

Disease: # Pineapple disease of sugarcane

Scientific name: *Ceratocystis paradoxa* (Dade) Moreau
[Synonym: *Ceratostomella paradoxa* Dade**]**
Asexual: *Thielaviopsis paradoxa* (de Seynes) vHohn
[Synonym: *Thielaviopsis ethaceticus***]**

What it looks like: Sugarcane setts turn red then rot. They have a smell like pineapples.

The cause: The disease is caused by a fungus. The fungus normally occurs in the asexual or imperfect form. Small long spores and larger curved spores are produced in chains.

The conditions it likes: It likes warm conditions between 25° and 32°C such as on the coast in Papua New Guinea. When soils are cold and wet the sugarcane cuttings start to grow more slowly which gives the disease more time to attack the plants.

How the disease spreads: The fungus gets spread from the soil by rain and wind. It gets into damaged and cut stalks more easily. Wind blown spores can get into canes through rat damage etc.. The fungus can last in the soil for quite a long time.

The damage: Setts can rot completely and not grow.

Other plants that get the disease: The fungus also damages pineapples, coconuts, oil palm and bananas. Sometimes it damages betel nut palm and other palms, soursops, sweet potato, corn and other plants.

Control:

1. Use healthy planting material.
2. Grow in well drained but moist soil.
3. Get rid of diseased setts.
4. Cuttings can be soaked in chemicals.

References:

CMI Descriptions of Pathogenic Fungi No 143,1967 & Map 142
Frohlich, G.*et al*, 1970, Pests & Diseases of Tropical Crops Pergamon p 238
Holliday, P., 1980, Fungus Diseases of Tropical Crops Verlag Paul Parey p 102
Kranz, J.*et al*, (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Pergamon p 238
Wismer, C.A. & Bailey, R.A. in Ricaud, C., et al, 1989, Diseases of Sugarcane Elsevier p 145-151

Disease: # Pokkah Boeng of sugarcane

(It also affects Coastal pitpit)

Scientific name: *Gibberella fujikuroi* (Sawada) Ito apud Ito & Kimura
[**Synonym:** *Fusarium moniliforme* Shel.]

What it looks like: Young leaves go yellow near the base, leaves become wrinkled and red areas can occur. Stems can also be distorted.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in very wet weather especially when this follows a dry period. Cane between 3 to 7 months old and growing rapidly gets most disease.

How the disease spreads: It can spread from the soil or through cut stalks or in the air.

The damage: A fairly common but not very serious disease. Sets may not grow. When the disease gets bad, plants can die.

Other plants that get the disease: It occurs on many grass plants including maize, rice, sugarcane and pitpit. It causes pink ear rot of corn and foot rot of rice.

Control:

1. Some varieties have resistance.
2. Sets can be dipped in fungicide.
3. Avoid excessive amounts of nitrogen fertiliser.

References:

CMI Descriptions of Pathogenic Fungi No 22, 1964
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 205
Martin, J.P., et al in Ricaud et al, 1989, Diseases of Sugarcane Elsevier p 157-165

Disease: # Ramu scorch of sugarcane

Scientific name:

What it looks like: Large straw-coloured spots with red-brown edges occur on leaves. The spots have a yellow ring around them. In some varieties the spots joined to kill the leaves.

The cause: Unknown but several fungi have been implicated in causing the disease.

The conditions it likes: The disease is more severe in prolonged dry periods.

How the disease spreads: Wind blown spores are the most likely mode of spread for this disease.

The damage: It can be severe in susceptible varieties although some varieties appear to have resistance to the disease.

Other plants that get the disease: The disease has not been recorded on any other plants.

Control:

1. Use varieties that get less disease.

References:

Egan, B.T., New diseases appear in Papua New Guinea BSES Bulletin (1986) No 16, 8-10

Disease: # Ramu stunt of sugarcane

Scientific name: Suspected viroid

What it looks like: White to pale yellow-green stripes occur on leaves. The growth rate is reduced and roots develop poorly. Plants become severely stunted.

The cause: It is probably caused by a virus or mycoplasma.

The conditions it likes: The disease appears to be more serious in prolonged dry periods.

How the disease spreads: It spreads very rapidly.

The damage:

It causes serious loss in yield. Affected plants are severely stunted. Some varieties of sugarcane appear to have high resistance to the disease.

Other plants that get the disease: The disease has not been recorded on any other plants.

Control:

Plant resistant varieties.

References:

Egan, B.T. New Diseases appear in Papua New Guinea BSES Bulletin (1986) No 16, 8-10

Waller, J.M., Egan, B.T. & Eastwood,D., 1987, Ramu stunt, an important new sugarcane disease in Papua New Guinea Tropical Pest Management 33(4), 347-349

Disease: # Red rot of sugarcane

(Also affects Coastal pitpit)

Scientific name: *Glomerella tucumanensis* (Speg.) Arx & Muller
[Synonym: *Physalospora tucumanensis* Speg.**]**
Asexual: *Colletotrichum falcatum* Went.

What it looks like: Red areas with white flecks occur within the stems. Small red spots can occur on the leaf sheath especially near the midrib. The buds get damaged and a poor stand of cane is produced. Stalks need to be cut lengthwise to check red and white patches in the stalk.

The cause: The disease is caused by a fungus.

The conditions it likes: Damaged stems, including borers, allow the disease to get started. It gets worse in cooler areas.

How the disease spreads: The fungus can spread from the soil or old crop remains. Spores can be blown by wind. It can be spread in planting material. The fungus can only live for 6 months in the soil.

The damage: Plants grow less well and can die. Sugarcane is less sweet.

Other plants that get the disease: Saccharum and Sorghum grasses.

Control:

1. Don't plant diseased material.
2. Different varieties have different amounts of resistance.
3. The fungus in canes for planting can be killed with hot air treatment.
4. Get rid of diseased plants.
5. Rotate sugarcane crops

References:

CMI Descriptions of Pathogenic Fungi No 133, 1967 & Map 186

Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 115

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 230

Kranz, J., *et al*, (eds), 1977, Diseases, Pests & Weeds in Tropical Crops Verlag Paul Parey p 121

Singh, K. & Singh, R.P., in Ricaud, C. et al, 1989, Diseases of Sugarcane. Elsevier p 169-182

Disease: # Red stripe of sugarcane

Scientific name: *Pseudomonas rubrilineans* (Lee *et al*) Stapp
[**Synonym:** *Xanthomonas rubrilineans* (Lee et al) Starr & Burkholder]

What it looks like: It can cause leaf stripe and top rot. The leaf stripe has long narrow, uniform, dark-red stripes. They may start as watery-green stripes but become red. The disease is more common on young leaves.

The cause: The disease is caused by bacteria.

The conditions it likes: It gets worse with high humidity. It is worse in cool places.

How the disease spreads: It spreads with wind blown rain. The bacterium oozes onto the surface of leaf spots during moist warm weather. This can wash down plants or splash between plants. It is rarely transmitted by cane knives. It can lie in the soil for a month and on old dead plants for up to 7 months.

The damage: It can cause the top of plants to rot.

Other plants that get the disease: It can also occur on sorghum grasses and maize.

Control:

1. Use resistant varieties.
2. Change of planting dates can reduce top rot of seedlings in some areas.

References:

CMI Descriptions of Pathogenic bacteria No 127, 1967 and Distribution Map 39

Haywood, A.C. in Fahy, P.C. & Persley, G.J. (eds), 1983, Plant Bacterial Diseases A Diagnostic Guide Academic. p 124-127

Martin, J.P. & Wismer, C.A., in Ricaud, C et al, 1989, Diseases of Sugarcane. Elsevier p 81-91

Disease: # Rind disease of sugarcane

Scientific name: *Phaeocytostroma sacchari* (Ell. & Ev.) B Sutton
[Synonym: *Pleocyta sacchari* (Massee) Petrak & H.Sydow**]**

What it looks like: Leaves may turn yellow early due to the fungus on the leaf sheaths. Black spots like pimples (pustules) on the stalks can give off black, coiled, hair-like masses of spores under moist conditions.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse where there are low temperatures, high salinity, poor drainage, and mechanical damage to cane prior to planting.

How the disease spreads: The small fungal spores blow in the wind or rain.

The damage: It gets on seed cuttings and reduces their germination. It can seriously affect overmature cane causing the stalks to rot.

Other plants that get the disease: It occurs on plants in the sugarcane group.

Control:

1. Some varieties of sugarcane get worse damage.
2. Harvest the sugarcane when it is mature especially if it has suffered injury to the stalks.

References:

CMI Description of Pathogenic Fungi No 87, 1965 and Distribution Map 255

Disease: # Sugarcane mosaic

(Also called yellow stripe disease)

Scientific name: Sugarcane mosaic virus

What it looks like: A pattern of light green and dark green areas develop on the leaves. The pale areas can be most easily seen in young rapidly growing leaves. Sometimes these are just yellowish stripes but there can be large yellowish patches. The pale areas can also be on the leaf sheath and the cane stalk.

The cause: It is caused by a virus.

The conditions it likes: Any conditions that favour aphids can also favour disease development. Aphid populations normally increase in warm, dry calm weather.

How the disease spreads: It can be spread by aphids (eg corn leaf aphid *Rhopalosiphum maidis*) and sugarcane aphid *(Longuinguis sacchari).* It can also be spread mechanically with things like bush knives. It can spread from infected planting material.

The damage: The damage can be serious with kinds of sugarcane that get the disease easily. Sometimes plants can recover from the disease.

Other plants that get the disease: It also occurs in maize, sorghum and on many other grasses.

Control:

1. Use disease free planting material.
2. Some kinds of sugarcane get the disease less.

References:

CMI Distribution Map 330

Koike, H. & Gillaspie, A.G., in Ricaud, C et al, 1989, Diseases of Sugarcane Elsevier p 301-314

Disease: # Tar spot of sugarcane

(Also affects Coastal pitpit)

Scientific name: *Phyllachora sacchari* P. Henn.

What it looks like: Black tar like spots occur on the leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease appears to be more common in warm wet conditions.

How the disease spreads: Probably by wind and rain spreading spores from infected crop debris.

The damage: Leaves can dry up in serious cases. It is not normally serious.

Other plants that get the disease: Sugarcane, coastal pitpit, sorghum, and other *Sorghum* and *Saccharum* grasses.

Control: None normally required.

References:

CMI Descriptions of Pathogenic Fungi No 588 1978
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 330

Disease: # Veneer blotch of sugarcane

Also affects Coastal pitpit

Scientific name: *Deightoniella papuana* D. Shaw

What it looks like: The disease causes a distinct pattern on the upper surface of the leaves. It begins as a small oval leaf spot, light green with a red border. New long spots develop on either side of the original spot forming a long patterned leaf spot.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease is more common in warm humid conditions.

How the disease spreads: This disease probably spreads through wind-blown spores.

The damage: Little damage is caused although spots can be very distinct.

Other plants that get the disease: Sugarcane, long pitpit and other sugarcane type grasses get the disease.

Control: No control is necessary.

References:

Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 1124
Shaw, D.E., 1959, PNG Ag. J. 11(1956): 77

Disease: # Yellow spot of sugarcane

(Also affects Coastal pitpit)

Scientific name: *Mycovellosiella koepkei* (Kruger) Deighton
[Synonym: *Cercospora koepkei* Kruger**]**

What it looks like: On the young leaves of sugarcane and coastal pitpit small yellow pinpoint spots appear. These spots later join and become irregular in shape.

The cause: It is caused by a fungus. Different races of the fungus occur which means vertical resistance can break down.

The conditions it likes: The disease gets worse during wet, humid weather and high temperatures (28°C). Humidities over 80% are possibly necessary.

How the disease spreads: The spores (conidia) are washed off leaves. Although it does not spread on sets where pieces of the stalk are used it probably can spread on tops as used in Papua New Guinea.

The damage: The leaves of sugarcane and pitpit die early.

Other plants that get the disease: The disease gets on sugarcane and coastal pitpit.

Control:

1. Some varieties get less of the disease (Traditional varieties are less damaged than hybrids.)

References:

CMI Descriptions of Pathogenic Fungi No 417, 1974 & Map 341
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 118
Holliday, P, 1980, Fungus Diseases of Tropical Crops Cambridge p 71
Martin, J.P. *et al*, 1961, Sugarcane Diseases of the World Vol 1 Elsevier p 357ff
Ricaud, C. & Autrey, L.J.C. in Ricaud, C et al, 1989, Diseases of Sugarcane Elsevier p 231-241

Diseases of pitpits

Disease	Cause	Scientific name	Page
Coastal pitpit			
Leaf spot	Fungus	*Beniowskia sphaeroides*	
Leaf spot	Fungus	*Cercospora longipes*	179
Leaf blight	Fungus	*Colletotrichum falcatum*	
Leaf spot	Fungus	*Cytoplea sp.*	
Leaf spot	Fungus	*Diplodia sp.*	
Veneer blotch	Fungus	*Deightoniella papuana*	196
Leaf spot	Fungus	*Bipolaris sacchari*	182
Pokkah boeng	Fungus	*Gibberella fujikuroi*	188
Red rot	Fungus	*Glomerella tucumanensis*	191
Yellow spot	Fungus	*Mycovellosiella koepkei*	197
Tar spot	Fungus	*Phyllachora sacchari*	195
Downy mildew	Fungus	*Peronosclerospora sp.*	181
Rust	Fungus	*Puccinia kuehnii*	186
Fiji disease	Virus		183
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For details of Coastal pitpit diseases see Sugarcane.

Highlands pitpit			
Tar spot	Fungus	*Phyllachora minutissima*	201
Rust	Fungi	*Uredo palmifoliae*	200
	and	*Uromyces setariae-italicae*	200
Leaf spot	Fungus	*Bipolaris panici-miliacei*	199

Disease: # Leaf spot of highland pitpit

Scientific name: *Bipolaris panici-miliacei* (Nisik.) Shoem
[**Synonym:** *Drechslera panici-miliacei* (Nisik.) Subram. & Jain]

What it looks like: A dead brown elongated spot develops on the leaves. The spot tends to be grey in the centre, dark brown around the edge and with a narrow yellow margin around the spot.

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: Fungal spores blow in the wind.

The damage:

Some of the leaf tissue is killed but this disease does not seem to seriously damage the leaf.

Other plants that get the disease:

Control:

Probably not necessary.

References:

Disease: **Rusts of highland pitpit**

Scientific name: *Uredo palmifoliae* Cummins
And *Uromyces setariae-italicae* Yosh
[Synonym: *Uromyces leptodermus* H.Sydow & Sydow**]**

What it looks like:

The cause: The disease is caused by two different fungi.

The conditions it likes:

How the disease spreads: Presumably the fungi blow in the wind.

The damage:

It does not appear to be serious.

Other plants that get the disease:

Control:

References:

Disease: # Tar spot of highland pitpit

Scientific name: *Phyllachora minutissima* (Welv. & Currey)

What it looks like: Small black raised spots develop on the leaf. They look like small specks of tar. They are firmly attached to the leaf. (Not like a sooty mould).

The cause: The disease is caused by a fungus

The conditions it likes:

How the disease spreads:

The damage: It is moderately common on pitpit in the highlands but does not appear to do serious damage.

Other plants that get the disease:

Control:

Probably not necessary

References:

Sweet potato diseases

Disease	Cause	Scientific name	Page
Charcoal rot	Fungus	*Macrophomina phaseolina*	194
Fusarium wilt	Fungus	*Fusarium oxysporum*	195
Leaf blight	Fungus	*Phomopsis ipomoea-batatas*	197
Leaf spot	Fungus	*Pseudocercospora timorensis*	196
Leaf spots	Fungus	*Ascochyta convolvuli*	207
	and	*Cercospora bataticola*	207
	and	*Didymella sp.*	
	and	*Phoma sorghina*	
Scab	Fungus	*Elsinoe batatas*	208
Black rot	Fungus	*Ceratocystis fimbriata*	209
Soft rot	Fungus	*Rhizopus stolonifer*	210
Little leaf & vein clearing	MLO	Mycoplasma like organism	211
Collar rot	Fungus	*Athelia rolfsii*	262
Scurf	Fungus	*Moniliochaetes infuscans*	
Tuber rot	Fungus	*Botrydiplodia theobromae*	265
	Bacterium	*Erwinia sp.*	262
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Storage rot	Fungus	*Aspergillus sp.*	
	and	*Choanephora sp.*	
	and	*Mucor sp.*	
Blue mould rot	Fungus	*Penicillium sp.*	
Leaf curling	Potyvirus		
Root knot	Nematode	*Meloidogyne sp.*	255

Disease: # Charcoal rot of sweet potato

Scientific name: *Macrophomina phaseolina* (Tassi) Goid.
[**Synonyms:** *Macrophomina phaseoli* (Maubl.) Ashby
and *Sclerotium bataticola* Taub.
and *Rhizoctonia bataticola* (Taub.) Briton-Jones.]

What it looks like: A dark rot develops on the lower stem. It can attack young stems or aging stems but not stems growing well.

The cause: The disease is caused by a fungus. The fungus lives on roots in the soil.

The conditions it likes: It can only attack plants not growing well. It gets worst when temperatures are 35° to 39°C.

How the disease spreads: It spreads through plant remains in the soil. It can be spread with the seed of some crops. It has storage stages which allow it to stay for long periods on seed or on plant remains.

The damage: It does not usually cause major damage on sweet potato in PNG.

Other plants that get the disease: It can attack many plants including rosella, corn, beans, taro, peanut etc.

Control:

1. Improve the growing conditions.
2. Intercrop where possible.
3. Improve the soil fertility
4. Crop rotations are important.

References:

CMI Descriptions of Pathogenic Fungi and bacteria No 275 1970

Disease: # Fusarium wilt of sweet potato

Scientific name: *Fusarium oxysporum* Schlecht ex Fries

What it looks like: The tuber stops growing and rots because the vine connection to the tuber rots off. When the vine or tuber is cut open the conducting tissue is blackened in a ring around the vine or tuber.

The cause: The disease is caused by a fungus. Damage to tubers makes it easier for the fungus to get inside and cause infection. Very small worms called nematodes may damage the roots and tubers of sweet potato and make the disease worse.

The conditions it likes: It occurs in cold places.

How the disease spreads: It spreads in soil, water and planting material. The fungus can live for a long time on rotting plant material in the soil.

The damage: It can be very serious and stop tuber growth.

Other plants that get the disease: Several plants can get attacked by this strain of the fungus.

Control:

1. Replant at a new garden site.
2. Use disease free planting material.
3. Rotating crops is little help as several different plants can get the disease.
4. Some varieties get the disease less.
5. Dipping planting material in chemicals helps.

References:

CMI Descriptions of Pathogenic Fungi No 212, 1970
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 164

Disease: # Leaf spot of sweet potato

Scientific name: *Pseudocercospora timorensis* (Cooke) Deighton
[Synonyms: *Cercospora timorensis* Cooke
and *Cercospora batatae* A.W.Zimmerm.**]**

What it looks like: Small angular brown spots (6 mm across) develop mostly on old leaves. They develop first on the leaf borders and tips and spread over the leaf surface.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse with wet weather. It also gets worse with low soil fertility. It is worse in warm humid conditions.

How the disease spreads: The spores (conidia) are spread by wind and rain.

The damage: Leaves can fall off early. Damage is usually not severe.

Other plants that get the disease: It can occur on some other *Ipomoea* plants.

Control: Not normally required.

1. Use varieties that get less disease.
2. Improve the growing conditions - well drained and aerated soil.
3. It can be stopped with chemical fungicides (zineb, maneb, captan etc).
4. Allow more than 2 years before growing sweet potato in the same garden site.

References:

CMI Descriptions of Pathogenic Fungi No 918 1987
Pest Control in Tropical Root Crops PANS Manual No 4 p 57

Disease: # Leaf blight of sweet potato

Scientific name: *Phomopsis ipomoeae-batatas* Punith.
Synonym: *Phyllosticta batatas* (Thumen) Cooke

What it looks like: Distinct small spots develop on old leaves. They have a purplish brown edge. The spots grow larger (5-10 mm) and become dry and pale brown with a darker edge. They are more obvious on the top leaf surface.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease is usually more severe in cooler weather with prolonged wet weather.

How the disease spreads: It spreads from old leaves by water splash and by leaves touching.

The damage: It tends to damage old leaves towards the end of the sweet potato growth. It is probably not therefore serious except in some local situations in the highlands.

Other plants that get the disease: Only sweet potato is affected by this particular fungus.

Control: Probably not necessary.

1. Good clean gardens and removing old plant remains probably helps.

References:

CMI Description of Pathogenic Fungi No. 739 1982

Disease: # Leaf spots of sweet potato

Scientific names: *Ascochyta convolvuli* Fautrey
Cercospora bataticola Ciferri & Brunner
[Synonym: *Phaeoisariopsis bataticola*]
Didymella sp.
Phoma sorghina (Probably in error)
Ramularia sp.

What it looks like: Brown spotting occurs on sweet potato leaves and stems. The size and shape differs with different fungi causing the leaf spotting.

The cause: These diseases are caused by fungi.

The conditions it likes: Fungal leaf spots are normally more serious in wet weather.

How the disease spreads: They normally have spores which blow in the wind.

The damage: They do not seem to cause serious problems at present in Papua New Guinea

Other plants that get the disease: A leaf spot also gets on kangkong (*Ipomoea aquatica*) and on Hangaar (*Ipomoea tuba*).

Control: No control is normally necessary.

References:
Phoma sorghina CMI Descriptions of Pathogenic Fungi and bacteria No 825, 1984

Disease: # Scab of sweet potato

Scientific name: *Elsinoe batatas* Jenkins & Viegas

What it looks like: Scabby lesions and spots occur on the veins and vines particularly under the leaf. The leaves are twisted and distorted.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in cool wet weather (13°-26°C).

How the disease spreads: Spores from the scabs spread with rain.

The damage: Leaves can be reduced and growing tips of the vines killed. The yield is reduced.

Other plants that get the disease: This disease only occurs on sweet potato.

Control:

1. Some varieties get less disease.
2. Use clean planting material.
3. Chemical fungicides can be used.

References:

CMI Distribution Maps of Plant diseases Map 447
Goodbody, S., Plant pathology Note No 17 Harvest 8(2) p 99
Pest Control in Tropical Root Crops PANS Manual No 4 p 58

Disease: # Sweet potato black rot

Scientific name: *Ceratocystis fimbriata* Ell. & Halst.
[Synonym: *Ceratostomella fimbriata* (Ell. & Halst) Elliott]

What it looks like: Small slightly sunken black spots develop on underground parts. They may eventually cover almost the whole tuber. Aerial parts of the plant may be affected as well. Fungal spores are often produced in the centre of the spots.

The cause: The disease is caused by a fungus. The fungus produces both sexual and asexual spores.

The conditions it likes: The disease is worse when soil is wet for long periods and when sweet potato tubers are damaged. It is common when sweet potato tubers are left for long periods in the ground before digging up.

How the disease spreads: The fungus lives in the soil between sweet potato crops. It is spread by water, wind, animals, machinery etc. It can spread on diseased planting material. The fungus can develop rapidly on tubers during storage.

The damage: A dry black rot covers damaged parts of the tuber. Bristle-like black projections may occur in large numbers. These carry the spores which spread the disease.

Other plants that get the disease: The fungus also occurs on coffee, cacao, mango, coconut, rubber, tobacco, and *Crotalaria*.

Control:

1. Only take clean planting material into a garden. Take only tips, not tubers.
2. Rotate crops as the fungus only survives in the soil for 2 years.
3. Some resistance is available but the resistance levels vary between tubers and stems.
4. Do not manure beds with dung from animals that have eaten black rot infected tubers.
5. If tubers were needed for planting they can be treated with hot air or fungicide.

References:

CMI descriptions of Pathogenic Fungi No 141 1967

Holliday, P., 1980, Fungus Diseases of Tropical crops Cambridge p 57

Kranz, J. *et al,* (eds), 1977, Diseases, Pests & Weeds of Tropical Crops Verlag Paul Parey p 100

Disease: **Sweet potato soft rot**

Scientific name: *Rhizopus stolonifer* (Fr.) Lind.
[Synonyms: *Rhizopus nigricans* Ehrwnb.
and *Mucor niger* Ged**]**

What it looks like: A soft watery brown rot of tubers.

The cause: The disease is caused by a fungus.

The conditions it likes: It needs a wound to get started. It gets worst at cool temperatures and is controlled above 37°C or below 10°C.

How the disease spreads: The fungus is very common in soil, in the air and around food. It can also be spread by fruit flies.

The damage: Tubers become soft then rot completely.

Other plants that get the disease: Strawberries, peaches, sweet potato. It also causes soft fruit rot of breadfruit.

Control:

1. Careful handling of tubers at harvest.
2. Vigorously growing plants rarely get diseased but the disease can get started when growth stops.

References:

CMI Descriptions of Pathogenic Fungi No 524 1977

Disease: # Witches' Broom of Sweet potato

(Also called little leaf mycoplasma and sweet potato little leaf)

Scientific name:

What it looks like: Leaves become small and pale yellow. The distance between leaves along the stalk become much reduced.

The cause: The disease is caused by a mycoplasma-like-organism (MLO). This is a very small bacterium without a protective cell wall. It can only grow in the nutrient conducting tissues of the plant. Antibiotics can reverse the symptoms produced by MLOs but do not provide a cure for the disease.

The conditions it likes: It gets worse in the seasonally dry areas. This is probably because the insect that spreads it becomes more common in dry areas.

How the disease spreads: The disease is spread by a leafhopper insect - the sweet potato black spotted leafhopper *Orosius lotophagorum ryukyuensis*.

The damage: Yields may be very severely reduced in the dry season in parts of lowland PNG.

Other plants that get the disease: Some of the self-sown plants in the sweet potato family can also get the disease.

Control:

1. Pull out and destroy infected plants.
2. There do not appear to be any resistant kinds of sweet potato.

References:

Jackson, G.V.H., & Zettler, F.W., 1983, Sweet potato witches' broom and legume little-leaf diseases in the Solomon Islands Plant Disease 67:1141-1144

Pearson, M.N., Plant Pathology Note No 8 Harvest 7(1) 1981, p 50

Van Velsen, R.J., 1967,"Little leaf" a virus disease of *Ipomoea batatas* in Papua and New Guinea. Papua New Guinea Agric. J. 18:126-128

Taro diseases

Taro family

Disease	Cause	Scientific name	Page
Chinese taro			
Root rot	Fungi	*Phytophthora citricola*	220
		Phytophthora nicotianae	
		Pythium arrhenomanes	
		Pythium vexans	
	and	*Rhizoctonia solani*	
	and ?	*Aphelenchoides sp.*	
	and ?	*Bursaphalenchus sp.*	
Leaf spot	Fungus	*Glomerella cingulata*	261
Leaf wrinkle	Virus	Bobone	204
Leaf speckle	Virus	Dasheen mosaic	209
Elephant foot yam			
Leaf spot	Fungus	*Pseudocercospora protensa*	
Rough blotched leaves	Virus		
Giant taro			
Leaf spot	Fungus	*Mycosphaerella alocasiae*	
Rust	Fungus	*Uredo alocasiae*	
Collar rot	Fungus	*Athelia rolfsii*	262
Yellow spot	Alga	*Phyllosiphon sp.*	
Swamp taro			
Algal leaf spot	Alga	*Cephaleuros virescens*	274
Taro			
Blossom blight	Fungus	*Choanephora cucurbitarum*	267
Brown leaf spot	Fungus	*Cladosporium colocasiae*	216
Leaf spot	Fungus	*Neojohnstonia colocasiae*	218
Shot hole	Fungus	*Phyllosticta sp.*	221
Blight	Fungus	*Phytophthora colocasiae*	222
Leaf blight	Fungus	*Thanatephorus cucumeris*	217
Root rot	Fungus	*Pythium spp.*	220
Mosaic	Virus	Dasheen mosaic virus	219
Dwarfed plants	Viruses	Alomae & Bobone viruses	214
Root knot	Nematode	*Meloidogyne sp.*	271
Bacterial leaf blight	Bacterium	*Xanthomonas campestris*	215

Disease: # Alomae/Bobone of taro

Scientific name:

What it looks like: With alomae the leaves at first have a fine feathery pattern. The leaves are wrinkled and thicker than normal. Dead patches develop along the leaf stalk and plants can die. With bobone leaves are stunted and twisted but remain dark green. Alomae occurs on plants with few suckers and bobone on plants with several suckers.

The cause: Two different viruses get into taro plants causing these diseases. These diseases look similar. Sometimes only one or the other virus attacks. There are also other virus diseases of taro. When the two viruses occur together the disease gets bad.

The conditions it likes:

How the disease spreads: These two viruses cannot be spread by contact or plants rubbing together. (Nor can they blow in the wind or wash in rain.) The diseases have to be spread by insects. The taro leafhopper (*Tarophagus proserpina*) is the main insect that spreads the disease.

The damage: Plants die with alomae but often recover with bobone. Taro varieties with few side suckers get alomae worse.

Other plants that get the disease: The disease only occurs on taro.

Control:

1. Wider spacing of gardens helps avoid the taro leafhopper.
2. With Alomae, diseased plants must be pulled out and destroyed.

References:

Gollifer, D.E. & Brown, J.F., 1972, Virus diseases of *Colocasia esculenta* in the British Solomon Islands. Plant Disease Reporter 56(7): 597-599

Gollifer, D.E., & Jackson, G.V.H., 1978, Incidence and effects on yield of virus diseases of taro in the Solomon Islands Ann. Appl. Biol. 88:131-135

Pearson, M.N., Plant Pathology Note No 13 Harvest 7(3) p 136

Disease: # Bacterial leaf spot taro

Scientific name: *Xanthomonas campestris*

What it looks like: Either leaves turn brown at the edges and the browning moves towards the centre of the leaf causing collapse of the leaf or under natural conditions small brown spots may occur over the entire surface of the leaf.

The cause: The disease is caused by a bacterium.

The conditions it likes: The condition seems to be limited to warmer areas with long periods of wet rainy weather.

How the disease spreads: The disease appears to only be able to get started on damaged leaves. It may splash from other infected leaves nearby and may blow in the wind.

The damage: It attacks leaves more readily which have already had some damage.

Other plants that get the disease: It can also attack Chinese taro but less severely than taro.

Control: Probably not necessary in PNG.

1. Wider spacing or intercropping would reduce the disease.
2. Avoid any unnecessary damage to leaves.

References:

Tomlinson, D.L., 1987, A bacterial leaf disease of taro (*Colocasia esculenta*) caused by *Xanthomonas campestris* in PNG. Tropical Pest Management (UK) 33(4): 353-355

Disease: # Brown leaf spot of taro

(Also called Ghost spot)

Scientific name: *Cladosporium colocasiae* Sawada (Bugnicort)

What it looks like: Reddish brown spots 5-10 mm across occur on taro leaves. The spots have an unclear edge. The spots occur on both sides of the leaves. The disease is more common on old leaves. It can cause leaves to become twisted and dead.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in damp and humid conditions.

How the disease spreads: The spores blow in the wind.

The damage: The disease is not serious.

Other plants that get the disease: None.

Control: Not normally necessary.

References:

Bugnicort, F., 1958, Rev Mycol 23:233 (38:176).
CMI Descriptions of Pathogenic Fungi No 956, 1988
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 107
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 77
Pest Control in Tropical Root Crops PANS Manual No4 p 180

Disease: **A leaf blight of taro**
(Not Taro blight)

Scientific name: *Thanatephorus cucumeris* (Frank) Donk
Asexual: *Rhizoctonia solani* Kuhn.

What it looks like: This fungus attacks parts of plants near the ground. Often grey threads of fungus can be seen over the base of plants. It occurs on stems, petioles and leaves near the ground.

The cause: This disease is caused by a fungus. It is a very common fungus and affects many different plants. The fungus occurs in the soil.

The conditions it likes: It attacks young plant parts often after wounding has already occurred. It can occur with a wide range of temperatures. It gets worse with high humidity, and when there is rain or moisture.

How the disease spreads: It spreads by fungal threads growing upwards from the soil. The fungus can produce storage organs that help it survive in soil.

The damage: It can cause damage in crowded, wet places by rotting plant parts.

Other plants that get the disease: It is known to occur on the following plants: Peanut, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, lablab bean, tomato, mint, common bean, pepper, winged bean, potato, sorghum, cowpea, corn, ginger. (Also non-food crops like coffee, oil palm, eucalyptus, rubber, leucaena, siratro, tobacco, geranium, patchouli, stylo, teak & cacao.)

Control:

1. Use wider spacing.
2. Improve soil drainage or avoid very wet areas.
3. Planting so that leaves dry quickly reduces the damage.

References:

CMI Descriptions of pathogenic Fungi No 406, 1974

Disease: # Leaf spot of taro

Scientific name: *Neojohnstonia colocasiae* (Ellis) Sutton
[**Synonym:** *Johnstonia colocasiae* Ellis]

What it looks like: It causes orange or brown spots on upper surfaces of the leaves. On the lower leaf surface spots are pale yellow covered with a back velvety layer. The spots can be round or irregular. They can be up to 1.5 cm across.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease only occurs in coastal areas in the wet season.

How the disease spreads: Presumably is spreads by spores blown in the wind.

The damage: No information exists on the yield losses due to this disease although leaf damage can be very noticeable.

Other plants that get the disease: No other plants get the disease.

Control: No control is necessary in PNG

References:

Sutton, B.C., 1983, Trans. Br. mycol. Soc. 81(2): 407

Leaf spots can be seen on Elephant foot yam caused by a fungus *Pseudocercospora protensa* (Sydow) Deighton [Syn. *Cercospora protensa* Sydow] **and on Giant taro by a fungus** *Mycosphaerella alocasiae* H.Sydow & Sydow. Both of these are the type of fungi that produce round dead spots with a yellow ring around them. They are common but do not seem to cause serious problems.

Disease: **Mosaic of taro**

Scientific name: Dasheen mosaic of taro

What it looks like: The leaves develop irregular pale and dark green patterns over the leaves. The leaves are not particularly wrinkled. Often the leaves have a feathery pattern of colours.

The cause: This disease is caused by a virus. The type of virus is called a potyvirus.

The conditions it likes:

How the disease spreads: The disease is spread by a small aphid called the melon aphid (*Aphis gossypii*). Suckers from infected plants would also have the disease.

The damage:

The disease is commonly seen in almost all plants in the taro family including ornamental plants. It does not seem to seriously affect taro production, although investigations have been made in PNG on yield losses due to this disease.

Other plants that get the disease: The virus also gets into Chinese taro and most other plants in the taro family.

Control: Not necessary in PNG at present.

1. It is possible to control this virus by techniques of seed production or by using a method called tissue culture in laboratories. This gives clean planting material.

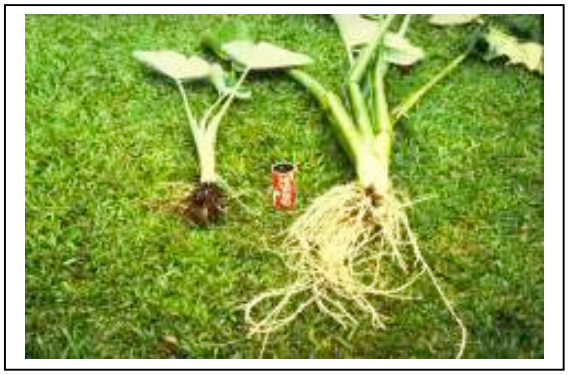
References:

Pearson, M.N., Plant Pathology Note No 13. Harvest 7(3) p 136
Shaw, D.E., et al, 1979, PNG Ag J. 30(4) 71-97

Disease: # Root rot of taro and Chinese taro

(Also root and corm rot of taro)

Scientific names: *Phytophthora citricola*
and *Phytophthora nicotianae*
and *Pythium arrhenomanes*
and *Pythium vexans*



What it looks like: Plants rot near the ground level and roots rot in the ground.

The cause: It is caused by fungi.

The conditions it likes: Thes diseases in the field get worse with poor growing conditions where soil fertility, crowding and damp conditions restrict the healthy growth of the taro. All the fungi causing these corm and root rots require water soaked soil for their growth.

How the disease spreads: The fungi are common in the soil and also blow in the wind. They can be spread on planting material**.**

The damage: These fungi (as well as *Botryodiplodia theobromae* and *Fusarium solani* and *Athelia rolfsii*) are all common soil living fungi. They are known to cause rots of Chinese taro and taro tru both in the field under poor growing conditions and of tubers after harvest. This rot occurs with plants growing in wet conditions in the field but is not one of the main rots of taro in storage. Other fungi and bacteria are involved there.

Other plants that get the disease: The fungi can attack many plants. A similar rot affects Chinese taro.

Control:

1. Healthy planting material should be used.
2. Taro fields should not have stagnant water. They should either have drainage or carefully controlled irrigation.
3. Diseased plants should be removed.
4. Crop rotation should be practiced.
5. Resistant varieties of taro should be planted.

References:

SPC (South Pacific Commission) Advisory leaflet No 20 1985
For *Phytophthora citricola* see CMI Description Pathogenic Fungi No 114

Disease: **Shot hole of taro**

Scientific name: *Phyllosticta colocasiae*

What it looks like: Spots from 0.5 cm to 2.5 cm across can develop on leaves. They are oval or irregular. The young spots are a dull yellow colour then they turn brown with a pale ring around them. Often the centre of the leaf spot drops out leaving a hole. The spots can be seen on both surfaces of the leaf. Unlike taro blight spots there is not a whitish growth of spores in the spot in the early morning before leaves dry.

The cause: The disease is caused by a fungus. This fungus produces small black fruiting bodies that can often be seen in the spots.

The conditions it likes: The disease gets worse with cloudy, rainy weather and cool winds. The disease gets less with hot dry days and dry cool nights.

How the disease spreads: The spores of the fungus splash between taro plants in the rain and wind.

The damage: It does not cause great loss of leaf and is probably not a serious disease.

Other plants that get the disease: No other plants get the disease.

Control: Not necessary in PNG.

1. Removing and burning infected leaves, helps stop the spread of the disease.
2. It could be stopped by using fungicides, but this is probably not worthwhile.

References:

Disease: **Taro blight**

Scientific name: *Phytophthora colocasiae* Racib

What it looks like: Small spots on the leaves gradually increase in size. They are purplish brown in colour and drops of liquid can often be seen around the edge of the spots. Often there is a line of spots down a leaf where the disease has run down. The edges of the leaf die.

The cause: The disease is caused by a fungus.

The conditions it likes: It likes warm humid places. The disease gets worse when day temperatures are about 25°-28°C and night temperatures are 20°-22°C and the air and leaves are damp. These conditions occur in wetter places in Papua New Guinea up to about 800 metres altitude.

How the disease spreads: The fungus spreads with wind and rain.

The damage: It can kill off the taro leaves and kill the taro. Plants in many places in PNG have been killed completely making taro growing impossible.

Other plants that get the disease: No other plants get the disease.

Control:

1. Wider spacing and intercropping helps reduce the disease.
2. Cutting off badly infected leaves helps a little.
3. Avoiding planting during the wetter months helps.
4. Chemicals called fungicides can be used.
5. Taro varieties that get less damage are being produced.

References:

Clarkson, D., Plant Pathology Note No 9 or Harvest 7(2) p 87

CMI Distribution Maps of Plant Diseases No 466.

Cox, P.G.& Kasimani, C., 1988, Control of taro leaf blight using metalaxyl Tropical pest management 34(1):81-84

Holliday, P., 1980, Fungus Diseases of Tropical Crops. Cambridge.

Pest Control in Tropical Root Crops PANS Manual No 4 p 177

Trujillo, E.E., Diseases of *Colocasia* in the Pacific. 1st Int. Symp. Root Crops. IV - 13

Tomato and capsicum diseases

Diseases of the tomato family (Solanaceae)
(Potato are covered separately)

Disease	Cause	Scientific name	Page
Blackberried nightshade			
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	263
Cape gooseberry			
Leaf spot	Fungus	*Cercospora physalidis*	
Capsicum			
Leaf spot	Fungus	*Alternaria sp.*	224
Collar rot	Fungus	*Athelia rolfsii*	264
Fruit rot	Fungus	*Glomerella cingulata*	225
Fruit rot	Fungus	*Curvularia sp.*	
Leaf blotch	Fungus	*Thanatephorus cucumeris*	266
Wilt	Fungus	*Fusarium solani*	
Root rot	Fungus	*Pythium sp.*	266
	and	*Fusarium sp.*	
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Storage rot	Bacterium	*Erwinia carotovora*	263
Bacterial leaf spot	Bacterium	*Xanthomonas campestris* pv. *vesicatoria*	
Leaf distortion	Virus	Possibly potato virus y	
Root knot	Nematode	*Meloidogyne incognita*	271
Chilli			
Fruit rot	Fungus	*Glomerella cingulata*	225
Leaf & fruit blotch	Fungus	*Thanatephorus cucumeris*	266
Root knot	Nematode	*Meloidogyne incognita*	271
Eggplant			
Leaf spot	Fungus	*Colletotrichum sp.*	225
Collar & stem rot	Fungus	*Pythium butleri*	265
Root rot	Fungus	*Fusarium oxysporum*	
Storage rot	Fungus	*Alternaria sp.*	
	and	*Botrydiplodia theobromae*	265
	and	*Curvularia lunata*	
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Root knot	Nematode	*Meloidogyne sp.*	271
Naranjilla			
Collar rot	Fungus	*Athelia rolfsii*	264

Tomato

Target spot	Fungus	*Alternaria solani*	233
Fruit rot	Fungus	*Athelia rolfsii*	264
	and	*Phytophthora nicotianae*	229
Collar rot	Fungus	*Athelia rolfsii*	264
	and	*Pythium butleri*	
	and	*Thanatephorus cucumeris*	266
Anthracnose	Fungus	*Colletotrichum sp.*	216
Leaf spot	Fungus	*Curvularia sp.*	
Leaf spot	Fungus	*Corynespora cassiicola*	
	and	*Phoma destructive*	
	and	*Septoria lycopersici*	231
Fruit spot	Fungus	*Didymella lycopersici*	230
Brown mould	Fungus	*Fulvia fulvum*	228
Wilt and collar rot	Fungus	*Fusarium equiseti*	
	and	*Fusarium oxysporum*	
Leaf spot	Fungus	*Helminthosporium sp.*	
Brown leaf mould	Fungus	*Pseudocercospora fuligena*	227
Small leaf spot	Fungus	*Stemphylium lycopersici*	
Bacterial wilt	Bacterium	*Pseudomonas solanacearum*	226
Bacterial leaf spot	Bacterium	*Xanthomonas campestris* pv. *vesicatoria*	
Soft rot fruit	Bacterium	*Erwinia carotovora* subsp. *carotovora*	262
Mosaic	Virus	Tobacco mosaic virus	232
Spotted wilt	Virus		234
Root knot	Nematode	*Meloidogyne arenaria*	271
		Meloidogyne incognita	271
		Meloidogyne javanica	271

Tree tomato

Leaf spot	Fungus	*Ascochyta sp.*	
Spots (Anthracnose)	Fungus	*Glomerella cingulata*	261
Root rot	Fungus	*Phytophthora palmivora*	
	and	*Pythium sp.*	266
Root knot	Nematode	*Meloidogyne sp.*	271

Disease: # Anthracnose of capsicum

Scientific name: *Colletotrichum capsici* (Syd.) Butler & Bisby
(Often another fungus *Curvularia lunata* was also associated with this fruit rot.)

What it looks like: Tips and young plant parts turn brown and die back.

The cause: The disease is caused by a fungus.

The conditions it likes: It needs moist air and high humidity. Serious outbreaks mostly occur after rain. It can grow with temperatures from 10°C to 37°C with 32°C as the best temperature for disease spread.

How the disease spreads: It is carried in the seed and continues on rotting fruit and other plant remains. It can spread with wind and rain.

The damage: The fungus can cause plants to die back, stems to break, spots on leaves, young seedlings to die, and rot of fruit both as young fruit and as ripe fruit.

Other plants that get the disease: It gets on capsicum, chillie, eggplant, tomato and a number of other plants.

Control:

1. Normally the longer more biting kinds of capsicums get less disease than the rounder sweeter kinds.
2. Removing crop remains after harvest is important and also keeping gardens free from weeds that might host the disease.
3. Fungicides can be used.

References:

CMI Descriptions of Pathogenic Fungi and Bacteria No 317 1971

Pearson, M.N.; Bull, P.B.; Speke, H., 1984, Anthracnose of *Capsicum* in Papua New Guinea; varietal reaction and associated fungi Tropical Pest Management 30(3)230-233

Disease: # Bacterial wilt of tomato

(Also bacterial wilt capsicums; eggplant; blackberried nightshade;)

Scientific name: *Pseudomonas solanacearum* (E.F.Smith) E.F.Smith

What it looks like: The branches and leaves wilt and hang down. If the disease has developed slowly the plant may put lots of extra roots on the stem just above the ground. When the stem is cut across the conducting tissue just under the bark is brown and the cut end gives off a milky sap in water.

The cause: The disease is caused by a bacterium.

The conditions it likes: Temperatures between 25° and 35°C favour the disease.

How the disease spreads: The disease causing bacteria live in the soil and are active during hot wet weather. They can survive between seasons on old tomato plants and on some weeds. During rain the disease washes down hill. It can also spread by contact of roots.

The damage: Plants can be stunted, leaves curl downwards and plants wilt.

Other plants that get the disease: Potatoes are also attacked by this bacterium. It causes wilt of capsicums, eggplant, blackberried nightshade and tomato.

Control:

1. Avoid planting areas where this disease is known to be in the soil.
2. Do not apply excess amounts of animal manure or nitrogen fertiliser.
3. Do not grow susceptible plants on the same ground more than once every two years.

References:

CMI Descriptions of Pathogenic Fungi & Bacteria No 15, 1964
Tomlinson, D., Plant Pathology Note 15 Harvest 7(4) p 180

Disease: # Brown leaf mould of tomato

(Also called brown leaf spot)

Scientific name: *Pseudocercospora fuligena* (Roldan)Deighton

[Synonym: *Cercospora fuligena* Roldan**]**

What it looks like: Dark brown spots develop on the leaves. They are usually angular and vary in size. The spores that develop give a felt-like appearance to the spots. Sometimes the spots are indistinct and pale yellow.

The cause: The disease is caused by a fungus.

The conditions it likes: It is more common in the lowlands. The fungus grows fastest at about 26° to 28°C.

How the disease spreads: Presumably the fungus blows in the wind.

The damage:

Leaves can die but often the damage is not very serious.

Other plants that get the disease:

Control:

1. It can be controlled with chemical fungicides.

References:

CMI Descriptions of Pathogenic Fungi No 465, 1975 and Distribution Map 382
Plant pathology note 16 Harvest 8(1) p 39

Disease: # Brown mould of tomato

Scientific name: *Fulvia fulvum* (Cooke) Cif
[Synonym: *Cladosporium fulvum* Cooke**]**

What it looks like: Irregular spots develop on leaves. The spots are yellow green on the topside of the leaf and greenish purple underneath.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in the cool season (21°-25°C) when there is high humidity (95%).

How the disease spreads: The disease spores spread easily by wind and rain. The fungus can live on old tomato plants. It can also live on tomato seed.

The damage: Leaves fall off early and therefore fruit does not ripen properly.

Other plants that get the disease: The disease only occurs on tomato.

Control:

1. Old tomato plants should be removed.
2. A chemical fungicide can be used.

References:

CMI Descriptions of Pathogenic Fungi No 487, 1976 & Distribution Map No 77
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 223

Disease: # Buckeye rot of tomato

(Also called fruit rot of tomato)

Scientific name: *Phytophthora nicotianae* var. *nicotianae*

What it looks like: On the fruit a green to brown firm rot develops. It has an indistinct watersoaked edge to the spots and often there are rings inside the spot. The remainder of the fruit remains firm.

The cause: The disease is caused by a fungus. It is a common fungus that occurs in the soil.

The conditions it likes: The disease normally gets worse in warm places. Temperatures about 30°C or above, favour the disease. It gets worse in low-lying poorly drained areas.

How the disease spreads: The fungus lives in the soil and can remain in the soil for several years. The spores can blow in the wind. The disease mostly gets on fruit near the ground.

The damage:

Fruit rot. The rot continues in the fruit if the fruit are stored.

Other plants that get the disease: It affects tobacco, amaranthus, tomatoes, castor bean, eggplant, and can also get on damaged carrots and sweet potato.

Control:

1. Avoid wet low lying ground.
2. Keep tomatoes staked up or with fruit off the ground.
3. Avoid areas that are known to be contaminated by the disease.

References:

CMI Descriptions of Pathogenic Fungi No 34 1964

Disease: # Fruit spot of tomato

Scientific name: *Didymella lycopersici* Klebahn

What it looks like: Spots develop on the stems of tomato plants. It can cause rots of the stems and spots on the fruit.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse with high humidity (> 90%). It also develops more quickly with low soil and air temperatures and low light intensities.

How the disease spreads: The disease gets started more easily when plants have been damaged. Spores can live in water for over 3 months. The disease can spread on tools if processes like pruning are carried out.

The damage:

Other plants that get the disease: The disease only occurs on tomato.

Control:

1. The disease can be controlled with fungicide sprays.

References:

CMI Description of Pathogenic Fungi No 272, 1970 & Distribution Maps No 324

Disease: # Leaf spot of tomato

Scientific name: *Septoria lycopersici* Speg

What it looks like: Spots on the leaves are soft, damp and brown. They can be 2 mm across. They are light coloured in the centre.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse when there is dew on the leaves or high humidity for 48 hours and the temperature is near 25°C.

How the disease spreads: The spores are spread by rain and wind. The disease can be spread by people. The disease can live on old plants or wild plants in the tomato family.

The damage: Leaves fall off early.

Other plants that get the disease: Tomato, blackberried nightshade, eggplant.

Control:

1. Get rid of diseased plants.
2. Rotate crops.
3. Get rid of weeds in the tomato family.
4. It can be controlled with chemical fungicides. (Zineb)

References:

CMI Descriptions of Pathogenic Fungi No 89, 1966

Disease: **Mosaic of tomatoes**

Scientific name: Tobacco mosaic virus

What it looks like: Leaves are crinkled with pale and dark green patterns.

The cause: The virus could be tobacco mosaic virus but several other viruses also affect tomato.

The conditions it likes: No studies have been carried out on this disease in PNG.

How the disease spreads:

The damage:

Other plants that get the disease:

Control:

References:

Disease: # Target spot of tomatoes

(Also called Early Blight.)

Scientific name: *Alternaria solani* Sorauer

What it looks like: Small dark round spots on the leaves get bigger and have rings inside them. Round sunken spots with rings can also occur on stems.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease probably gets worse at temperatures of about 20°-25°C. It needs moist air.

How the disease spreads: The disease can be transmitted on seed, by wind and rain splash.

The damage: Leaves can fall off early and reduce yield.

Other plants that get the disease: Potato and tomato.

Control:

1. Get rid of old diseased plants and fruit.
2. Some varieties get less disease.
3. Seed can be treated with chemicals.
4. The disease can be stopped with chemical fungicides.

References:

CMI Descriptions of Pathogenic Fungi No 475, 1975 & Map 89
Plant pathology note No 16 Harvest 8(1) p 39

Disease: **Tomato spotted wilt**

Scientific name: Tomato spotted wilt virus

What it looks like:

The cause:

The conditions it likes:

How the disease spreads:

The damage:

Other plants that get the disease: It can cause spotted wilt of lettuce.

Control:

References:

CMI Distribution Map 8

Yam diseases

Disease	Cause	Scientific name	Page
Five leaflet yam			
Leaf spot			
Rust	Fungus	*Uredo dioscoreae-sativae*	239
Greater yam			
Anthracnose	Fungus	*Glomerella cingulata*	237
Leaf spot	Fungus	*Phyllosticta dioscoreae*	238
Rust	Fungi	*Goplana dioscoreae*	240
	and	*Goplana australis*	240
	and	*Uredo dioscoreae-sativae*	239
Silvering	Fungus	*Botrodiplodia theobromae*	241
Mosaic	Possibly virus		
Root knot	Nematode	*Meloidogyne sp.*	271
Lesser yam			
Leaf spot	Fungus	*Cylindrosporium dioscoreae*	
Leaf spot	Fungus	*Guignardia dioscoreae*	238
Leaf spot	Bacterium	*Xanthomonas sp.*	242
Mosaic	Perhaps virus		
Root knot	Nematode	*Meloidogyne incognita*	271
Potato yam			
Leaf mould	Fungus	*Pseudocercospora ubi*	242
Rust	Fungus	*Uredo dioscoreae-sativae*	239
Also general or non-specific on "yams"			
Leaf spot	Fungus	*Curvularia sp.*	243
Dry rot	Fungus	*Fusarium sp.*	
Collar rot	Fungus	*Fusarium oxysporum*	
	and	*Penicillium funiculosum*	
	and	*Penicillium javanicum*	
With tuber rot	Fungus	*Scutelina badio-berbis*	
Leaf spot	Fungus	*Mycosphaerella contraria*	243
Leaf spot	Fungus	*Mycosphaerella papuana*	243
Necrosis of tubers	Nematode	*Pratylenchus sp.*	
Silvering of yam leaves	Fungus	Possibly *Botryodiplodia theobromae*	241

Disease: # Anthracnose of yams

(Also called dieback)

Scientific name: *Glomerella cingulata* (Stonem) Spauld et Schrenk.
[Synonyms: *Gloeosporium pestis* Massee
and *Colletotrichum gloeosporioides* Penz**]**

What it looks like: Often the disease starts as small brown spots on the older leaves. The spots get larger, turn black and the leaves die. Fruiting bodies give the appearance of dark rings in the spots.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in hot wet humid places. It spreads most rapidly when there are heavy rains.

How the disease spreads: The small spores can remain on old leaves of yams and spread by rain.

The damage: Some kinds of yams get worse damage than others. Greater yam can get fairly bad damage. Potato yam can get the leaves blackened. Lesser yam is not seriously damaged. Some varieties of yams get more damage than others.

Other plants that get the disease: Many other plants may be affected by this fungus.

Control:

1. Get rid of old yam leaves and rubbish.
2. Choose kinds of yams that get less damage.
3. Having yams well staked up so that the leaves can dry.
4. It can be controlled with chemical fungicides. (Zineb).
5. There is considerable difference between varieties of greater yam as to how badly they are affected by this disease. Varieties with high tolerance had high levels of the nutrient potassium.

References:

CMI Descriptions of Pathogenic Fungi No 315, 1971
PANS Manual No 4 Pest Control in Tropical Root Crops p 147

Disease: **Leaf spot of lesser yam**

(Other fungi can also cause leaf spots)

Scientific name: *Phyllosticta dioscoreae* Cooke
[Syn ? *Guignardia dioscoreae* Pande]

What it looks like: Small brown spots occur on leaves especially lower leaves. The centres of the spots sink and turn grey while the edges are dark brown. Holes can form in the centre of the spots.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in the wet season.

How the disease spreads: It is spread by spores (pycnidia) during wind and rain.

The damage: Damage by this fungus is also often associated with attack by other fungi.

Other plants that get the disease: This disease only affects yams.

Control: Not normally necessary in PNG.

References:

Pest Control in Tropical Root Crops PANS Manual No4 p 153

Disease: # Rust of lesser, potato & five leaflet yam

(See also yam rust *Goplana dioscoreae)*

Scientific name: *Uredo dioscoreae-sativae* H & P Sydow
[**Synonym:** *Uredo dioscoreae-pentaphylla* Petch]

What it looks like: It causes leaf spots and leaf blights.

The cause: The disease is caused by a fungus.

The conditions it likes:

How the disease spreads: The disease spreads by wind-blown spores.

The damage:

Other plants that get the disease: This rust has been recorded on lesser yam, potato yam and five-leaflet yam.

Control: Not normally necessary in PNG.

References:

Ono, Y., 1982, Rusts of Yams in Southeast Asia and South Pacific Trans. Br. Mycol. Soc. 79(3) 423-429

Disease: # Yam rust

Scientific name: *Goplana dioscoreae* Cummins
And *Goplana australis* Ono & Hennen
Asexual: *Uredo hiulca* Cummins

What it looks like: Small pin-head sized bright yellow orange lumps form on the leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse under humid conditions.

How the disease spreads: The spores are spread by wind and on new leaves they grow through the leaf pores.

The damage:

Other plants that get the disease: The disease only occurs on yams.

Control: Not normally necessary in PNG.

1. Use varieties that get less disease.

References:

Ono, Y., 1982, Rusts of yams in South East Asia and South Pacific Trans. Br. Mycol. Soc. 79(3): 423-429

Disease: # Silvering of Yam leaves

Scientific name: Probably *Botryodiplodia theobromae* Pat.

What it looks like: Leaves especially of the greater yam (*D. alata*) develop a silvery colour and appear to start drying off early.

The cause: The cause is most probably a fungus (*Botryodiplodia theobromae*) that occurs commonly on cacao, coconuts and other crops.

The conditions it likes: The fungus grows best at relatively high temperatures of about 30°C. It tends to only attack plants as a secondary organism after they have been damaged or are not growing well due to some other cause such as nematodes.

How the disease spreads: The fungus is very common in the tropics and it spreads by spores in the wind and rain as well as on seeds and planting material and can be spread by insects.

The damage: It probably causes yams that are not growing well to die off more quickly. It can also cause rotting of yam tubers in storage.

Other plants that get the disease: This fungus has been recorded on over 500 different types of plants so it is a common secondary disease.
(See also page 252)

Control:

1. Rotating yam gardens so that they avoid nematode damage and so keep growing well is important.
2. Some crops such as peanuts and maize can cause the fungus to be more common, so putting yams first in rotations would probably help.
3. Avoid damage to plants and to tubers that are to be stored as the fungus normally starts in damaged places on plants.

References:

CMI Descriptions of Pathogenic Fungi No 519, 1976
Pest Control in Tropical Root Crops PANS Manual No 4 p 154
Holliday, P., 1980, Fungal Diseases of Tropical Crops Cambridge p 42
Kranz, J., *et al,* 1977, Diseases, Pests & Weeds in Tropical Crops p 188

Disease: # Yam leaf moulds

Scientific name: *Dactylaria dioscoreae* Ellis
Also *Pseudocercospora ubicola* (W.Y.Yen) Deighton
And *Pseudocercospora ubi* (Racib.) Deighton
Also *Xanthomonas sp.*

What it looks like:

The cause:

The conditions it likes:

How the disease spreads:

The damage:

Other plants that get the disease:

Control:

References:

Yen, Review mycology 30(3) 200-203, 1965

Disease: **Yam leaf spots**

Scientific names: *Mycosphaerella contraria*
Mycosphaerella papuana
Leptosphaeria coniothyrium (Fuckel) Sacc.
and *Corticium sp*
and *Curvularia sp*.

What it looks like: Brown spots occur on leaves and stems.

The cause: The diseases are caused by fungi.

The conditions it likes: No information is available but it is probably warm humid conditions.

How the disease spreads: The disease spreads by wind-blown spores and rain splash.

The damage:

Other plants that get the disease:

Control: No control is normally necessary.

References:

Diseases of other crops

Disease: # Leaf spot of carrot

(Also called leaf blight)

Scientific name: *Alternaria dauci* (Kuhn) Groves & Skolko

What it looks like: Small dark spots with a yellow margin develop on carrot leaves. Older leaves are attacked first. The spots occur on the veins and leaf stalk. The leaves turn yellow, then brown and black. The leaflets shrivel at the edges.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse where there is frequent rain and temperatures of about 27°C. The leaf surface needs to be wet.

How the disease spreads: The fungus can be spread on the seed, from the remains of old carrots, or from diseased plants. Spores blow during the day.

The damage: The leaves can die and the size of the carrots is less. It can also cause young seedlings to die off.

Other plants that get the disease: Celery, parsnip, and parsley.

Control:

1. Plant carrots in well-drained soil.
2. Rotate carrot crops over 3 years.
3. Dust seed with a chemical called captan.
4. It can be controlled with fungicides eg mancozeb, zineb etc.

References:

CMI Descriptions of Pathogenic Fungi No 951, 1988 & Map 352
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 39

Disease: # Septoria spot of celery

Scientific name: *Septoria apiicola* Speg.

What it looks like: Small yellow spots develop on the leaves and stalks. They get larger and turn brown. Small black spots occur on these spots.

The cause: The disease is caused by a fungus.

The conditions it likes: It spreads during wet windy weather. It gets worse in cool weather.

How the disease spreads: The disease can be on the seed. In gardens it can stay on old celery plant materials in the soil. Spores can blow in the wind.

The damage: Affected plants are more likely to rot after harvesting.

Other plants that get the disease: This disease only occurs on celery.

Control:

1. Use clean seed.
2. Get rid of old celery crops or move garden sites.
3. Chemical fungicide sprays can be used.eg chlorothalonil.
4. Seed can be treated (In hot water at 50°C for 30 mins.).

References:

CMI Descriptions of pathogenic fungi No 88, 1966
Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: **Rust of Fig trees**

Scientific name: *Cerotelium fici* (Butl.) Arth.
[Synonym: *Uredo fici***]**
(*Uredo ficina* Juel is a very similar fungus on *Ficus*.**)**

What it looks like: Rust coloured spots develop between the veins.

The cause: The disease is caused by a fungus.

The conditions it likes: No information is available at present on the conditions favourable to disease development in Papua New Guinea.

How the disease spreads: The rust probably spreads from old diseased leaves.

The damage: The leaves can fall off trees.

Other plants that get the disease: Fig and other *Ficus spp.,* Mulberry, and Polynesian mulberry or Tapa plant.

Control: No control is necessary in PNG at present.

1. Sulphur fungicides can be used.

References:

CMI Descriptions of Pathogenic Fungi No 281, 1971 & Map 399

Disease: # Heart rot of galip

Scientific name: *Phellinus noxius* (Corner) G.H.Cunn.
[Synonym: *Fomes noxius* Corner**]**

What it looks like: A crust of brown fungal threads and dirt (2-3 cm thick) forms around the roots. The shelf like fruiting body has rings of ridges and is purple brown on top and darker underneath.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus may only attack after plants are weakened.

How the disease spreads: Fungal spores blow in the wind.

The damage: Young trees can quickly be killed.

Other plants that get the disease: Albizia, Cassia, Coconuts, Rubber, Leucaena, Cacao, Panama Berry, avocado, citrus, rambutan and probably many other trees. It causes upper stem rot of oil palm.

Control:

1. If the disease is detected early the damaged area can be cut out and sealed off with oil palm trees.

References:

CMI Description of Plant pathogenic Fungi No 195, 1968
Kranz, J., 1977, Diseases, Pests and Weeds of Tropical Crops p 162

Disease: # Downy mildew grapes

Scientific name: *Plasmopara viticola* (Berk. & M.A.Curtis) Berl. & de Toni

What it looks like: Pale yellow to clear spots develop on young leaves. These become large dead areas. In wet weather there is a fine downy growth under the leaves.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in moist weather.

How the disease spreads: The spores spread by wind and water to new leaves.

The damage: Large dead areas occur on the leaves causing the leaves to fall off. Fruit stalks can also wither and fall off.

Not important in PNG because grapes are rarely grown.

Other plants that get the disease: This disease only occurs on grapes.

Control: No control is normally necessary in Papua New Guinea at present.

1. Spray with fungicide chemicals.
2. Remove old leaves and any parts of vines that are cut off.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: # Powdery mildew grapes

Scientific name: *Uncinula necator* (Schwein.) Burr.
[Synonym: *Oidium tuckeri* Berk.]

What it looks like: Indistinct white patches start on the leaf and spread to cover the leaf. They have a fine grey dusty coating. Canes and fruit can become rough.

The cause: The disease is caused by a fungus.

The conditions it likes: It can spread in dry air. It is favoured by cooler temperatures.

How the disease spreads: The spores can blow long distances by wind.

The damage: The fruit develop distortions and cracking. It is not a major problem in PNG because grapes are rarely grown.

Other plants that get the disease: This disease only occurs on grapes.

Control:

1. Fungicide chemicals can be used.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: # Collar rot of lettuce

Scientific name: *Athelia rolfsii* (Curzi) Tu & Kimbrough
[**Synonyms:** *Corticium rolfsii* (Sacc.) Curzi
and *Pellicularia rolfsii* (Curzi) West.]
Asexual: *Sclerotium rolfsii* Sacc.

What it looks like: Young plants rot off near ground level, fall over and die. Small hard, brown pellet-like fungal structures can often be seen on the soil surface immediately next to the infected stem.

The cause: The disease is caused by a fungus.

The conditions it likes: The fungus is widespread in warm places. It causes most damage in wet sandy soils.

How the disease spreads: The fungus can live in the soil.

The damage: The fungus causes a collar rot.

Other plants that get the disease: Beans, cabbage, peanut, corn, peas, pepper, sweet potato, sugarcane, tomato, and others.

Control:

1. Plants need to be in well-drained soil.
2. Plants need to be rotated or garden sites changed.

References:

CMI Descriptions of Pathogenic Fungi No 410, 1974
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 110
Kranz, J., 1977, Diseases, Pests and Weeds of Tropical Crops p 148

Disease: # Leaf spot of Lettuce

(Also called Septoria leaf spot)

Scientific name: *Septoria lactucae* Pass.

What it looks like: Several small irregular spots develop on the outer leaves of lettuce. These get larger, become brown with a pale ring and the centre falls out.

The cause: The disease is caused by a fungus.

The conditions it likes: Cool wet conditions favour the disease.

How the disease spreads: The disease is spread in infected seed. It can also spread from old lettuce plants and plant remains in the soil. It is spread by wind.

The damage: It can be severe.

Other plants that get the disease: This fungus only attacks lettuce.

Control:

1. Use clean seed or treat seed in hot water at 48°C for 30 minutes.
2. Remove old lettuce crops.
3. Fungicide sprays can be used.

References:

CMI Descriptions of Pathogenic Fungi No335, 1972 & Map 485
Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: # Anthracnose of mango

Scientific name: *Glomerella cingulata* (Stonem.) Spauld & Schrenck
[Synonym: *Glomerella mangifera* Penz.]
Asexual: *Colletotrichum gloeosporoides* Penz.

What it looks like: Small black spots occur on the leaves. These form larger dark dry areas then join together. Small black irregular spots also form on the flowers and cause the flowers to turn black and fall. Small black specks can also occur on the fruit. In the centre of these spots pink spores can develop. The surface of the fruit can become stained. The spots can be sunken. If young fruit are infected they drop off.

The cause: The disease is cause by a fungus. It is a very common fungus.

The conditions it likes: It gets worse with high humidity and a temperature of about 25°C.

How the disease spreads: The spores of the fungus develop on dead twigs and leaves on the ground for many months and spread by water and rain.

The damage: In wet areas or wet seasons the disease can be serious causing few fruit to form. It stops fruit production in most wet areas of Papua New Guinea. Harvested fruit with the disease quickly blacken and rot.

Other plants that get the disease: The fungus occurs on many different plants.

Control:

1. Some varieties of mangoes get the disease less.
2. Remove dead twigs and branches before flowering.
3. The disease can be controlled with fungicide chemicals.
4. Mangoes are better suited to areas with a dry season during flowering.

References:

Frohlich, G & Rodewald, W, 1970, Pests & Disease of Tropical Crops Pergamom p 69
Vock, N.T., 1978, A Handbook of plant disease in colour Vol 1 Queensland DPI

Disease: **Peach leaf curl**

Scientific name: *Taphrina deformans* (Berk.) Tul.

What it looks like: Leaves are thickened and twisted. They develop large blisters and these can be pink coloured. On fruit there can be red marks and the surface cracks.

The cause: It is caused by a fungus.

The conditions it likes: It gets worse in cool wet weather.

How the disease spreads: The fungus lives on trees and fallen leaves. The spores blow in the wind.

The damage: The leaves can be severely twisted and fall of and the fruit can be distorted.
It is not common in Papua New Guinea because peaches are rarely grown.

Other plants that get the disease: It affects peaches, nectarines and occasionally apricots.

Control:

1. It can be controlled with fungicide sprays.

References:

Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: **Peach rust**

Scientific name: *Transchelia discolor*
[Synonyms: *Tranzschelia pruni-spinosae* (Pers.) Dietel
and *Puccinia pruni-spinosae*]

What it looks like: Small spots develop on the leaves. They are pale yellow at first and become brown. Under the leaf there is a mass of powdery brown spores. Large areas of the leaf may be killed. Spots can develop on twigs and fruit.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in warm wet weather.

How the disease spreads: The fungus lives on twigs and old leaves. It spreads with wind and rain.

The damage: The disease causes leaves to fall off.
It is not important in Papua New Guinea because peaches are rarely grown.

Other plants that get the disease: It affects plants in the peach family - apricots, nectarines.

Control:

1. Fungicide chemicals can be used.

References:

CMI distribution maps of Plant Diseases No 223
Vock, N.T., 1978, A Handbook of Plant Diseases in colour Vol 1 Queensland DPI

Disease: # Water blister of pineapple

(Also called Base rot of pineapple)

Scientific name: *Ceratocystis paradoxa* (Dade) C.Moreau
[Synonym: *Ceratostomella paradoxa* Dade**]**

What it looks like: Yellowish white leaf spots develop on the leaves. Suckers can develop a base rot. Fruit can rot. The diseased parts are soft and watery and have a smell.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse at temperatures of 15°-21°C. It also gets worse with moisture and shade. It normally gets started where the plant is damaged.

How the disease spreads: The fungus is very common in soil. It gets into plants through wounds. Spores can be spread by wind and rain.

The damage: Fruit rot. Plants can die.

Other plants that get the disease: Sugarcane, coconut, bananas, betel nut, coffee, cacao, maize.

Control:

1. Use dry healthy suckers. Cure slips before planting.
2. Don't plant pineapples and sugarcane together.
3. Get rid of diseased plant parts.
4. Don't damage plants.
5. Leave a stalk on fruit that is cut
6. Plant during dry sunny weather.
7. Dry off tops and butts before planting.
8. Plant pineapples on mounds or well-drained soil.

References:

CMI Descriptions of Pathogenic Fungi No 143, 1967
Graham, K.M., 1971, Plant Diseases of Fiji HMSO p 166
Holliday, P., 1980, Fungus Diseases of Tropical Crops Cambridge p 62
Vock, N.T., 1978, A handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: # Leaf spot silver beet

(Also affects beetroot.)

Scientific name: *Cercospora beticola* Sacc.

What it looks like: Small brown spots with a red edge develop on leaves. These get larger (up to 4 mm wide) and this develops an ashy grey centre. The centres often drop out.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease spreads during wet windy weather.

How the disease spreads: The fungus can be carried on the seed. It can live on old silver beet remains in the soil. The spores blow in the wind.

The damage: It mostly occurs on older leaves.

Other plants that get the disease: It can also get on spinach and some weeds.

Control: Not normally necessary.

1. It can be controlled with fungicides eg mancozeb or zineb.

References:

CMI Descriptions of Pathogenic Fungi No 721, 1982 and Distribution Map 96
Vock, N.T., 1978, A Handbook of Plant Diseases in colour Vol 1 Queensland DPI

Disease: # Eye spot strawberry

(Also called leaf spot and white spot)

Scientific name: *Mycosphaerella fragariae* (Tul. & C.Tul.) Lindau
Asexual: *Ramularia brunnei* Peck.
[Synonym: *Ramularia tulasnei* Sacc.]

What it looks like: Small red to purple spots develop on leaves. The centres of these dry out and small black fruiting bodies of the fungus can appear in the centre of older spots. Leaves may dry out and fall off. Occasionally fruit may develop sunken brown spots.

The cause: The disease is caused by a fungus.

The conditions it likes: The disease gets worse in wet cool weather. It gets worse in wet soils and shaded areas.

How the disease spreads: The disease can be introduced on planting material and can spread from old plants. The fungus can survive on old leaves and plant remains.

The damage: Leaves die off early and fruit can be damaged.

Other plants that get the disease: The disease only occurs on strawberry.

Control:

1. Remove severely affected plant parts.
2. Use clean planting material
3. Do not plant strawberries in wet or shady areas.
4. Chemical fungicides can be used.

References:

CMI Descriptions of Pathogenic Fungi No 708, 1981
Vock, N.T., 1978, A Handbook of plant diseases in colour Vol 1 Queensland DPI

Another fungal leaf spot of strawberry is caused by the fungus *Cercosporina vexans* (Massal) Moesz [Syn. *Cercospora vexans* C Massal]. It probably forms a spot with a yellow ring around it.

Disease: # Scorch of strawberry

Scientific name: *Diplocarpon earlianum* (Ell. & Ev.) Wolf.
Asexual: *Marssonina fragariae* (Lib.) Kleb.

What it looks like: Small purple irregular spots develop on the leaves. The centres become brown. Small shiny raised fruiting bodies can be seen on the top surface of the leaf. Leaves can become dry.

The cause: The disease is caused by a fungus.

The conditions it likes: It gets worse in wet weather. It also gets worse when plants are in shade. It gets worse in wet soils. Temperatures about 20° to 25°C favour the fungus.

How the disease spreads: The disease spreads from planting material and from diseased old plants. The spores on plants can blow around in the wind in wet weather.

The damage: Mostly older strawberry leaves are attacked.

Other plants that get the disease: The disease only occurs on strawberry.

Control:

1. Use healthy planting material.
2. Do not plant in wet or shady areas.
3. It can be controlled with fungicide chemicals.
4. There are varieties of strawberry that do not get the disease.

References:

CMI Descriptions of Pathogenic Fungi No 486, 1976
Vock, N.T., 1978, A Handbook of plant diseases in colour Vol 1 Queensland DPI

Disease: **Pink disease**

Scientific name: *Phanerochaete salmonicolor* (Berk. & Broome) Julich
[Synonym: *Corticium salmonicolor* Berk & Broome**]**

What it looks like: Leaves wilt turn brown and die. Gum comes out from the twigs. It has pink fungal threads that turn yellow. The fruiting bodies occur as red lumps on the lower side of the dead branch and as a pink crust in the crotches.

The cause: The disease is caused by a fungus.

The conditions it likes: The spread of disease is favoured by high humidity, shade and rainfall. The optimum temperature for spores (basidiospores) to germinate is 18° - 32°C.

How the disease spreads: It spreads by spores in the air in damp weather.

The damage: It can cause severe defoliation of many perennial crops. The disease is often much worse in crops which are already growing poorly because of other factors.

Other plants that get the disease: It damages a large number of tropical trees. Food trees include pigeon pea, orange, loquat, soursop, jackfruit, Panama berry. Non-food trees include tea, Calliandra, Cassia, coffee, Crotalaria, Rubber, Leucaena, Tephrosia, Cacao.

Control:

1. Scrape off the infection and treat the infected area with a fungicide paste.
2. Use copper fungicides during the rainy season.
3. Prune off infected branches during the dry season.

References:

CMI Descriptions of Pathogenic Fungi No 511, 1976
Holliday, P., 1980, Fungus Diseases of Tropical Crops p 112

Anthracnose

This is the name of several diseases on plants caused by a fungus called *Glomerella cingulata*. The fungus that causes it also occurs on many other plants that are not food plants. *Glomerella cingulata* is recorded on soursop, betel nut, five corner, capsicum, pawpaw, lemon, grapefruit, coconut, tree tomato, yam, soybean, mango, cassava, granadilla, avocado, guava, ginger, tree tomato, winged bean.

The fungus often causes damage to the flowers and seeds with the tips of plants getting spots or dying back. The types of symptoms are called wither tip or tip dieback on cassava, fruit rot on chilli and five corner, leaf blotch on ginger, stem death on granadilla, flower blight, or blossom blight on mango, soursop, and sweetsop and anthracnose or leaf spots on cassava, yam, tree tomato, and mango.

Diseases called anthracnose are common in a wide range of crops. Where the sexual stage of the fungal life cycle is known, the fungi belong to the genus *Glomerella* of the Ascomycetes or sac fungi class. All species of *Glomerella* have the same type of imperfect stage in their life cycle. This is called *Gloeosporium* or *Colletotrichum*. This division is artificial and both groups should be regarded as the same. The basis for the division was on conidial structures that changed with relative humidity. The fungus that causes red rots on sugarcane and coastal pitpit is probably a different fungus, *Glomerella tucumanensis*.

Often these diseases have similar conditions where they occur. Normally it is poor growing conditions with low soil fertility. As well the microclimate around the plant is often poor. The movement of air is poor, the access to light is poor and the conditions are damp and the weather humid. The control of the diseases is mostly by improving the growing conditions, raising the soil fertility, pruning plants or increasing the spacing and avoiding plant injury. The disease gets started more easily with plants that are damaged.

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Flower blight mango	*Glomerella cingulata*	253
Leaf spot snake gourd	*Colletotrichum orbiculare*	162
Leaf blight cassava	*Colletotrichum capsici*	95
Red rot sugarcane	*Glomerella tucumanensis*	191
Smudge of onions	*Colletotrichum circinans*	124
Wither tip of cassava	*Colletotrichum capsici*	
and	*Glomerella cingulata*	95
Yam leaf spots	*Glomerella cingulata*	237

Bacterial soft rot

These soft squashy rots may occur in a number of vegetables especially introduced vegetables like cabbages, tomato, onion etc. They have been recorded on banana, cabbage, Chinese cabbage, choko, cucumber, lettuce, marita, onion, potato, sweet potato, taro and tomato. They probably occur on a number of other plants. Three slightly different bacteria cause these diseases.

They are:

Erwinia carotovora subsp. *carotovora*
Erwinia chrysanthemi
and *Erwinia carotovora* subsp. *aseptica*

The disease starts out as a soft water soaked region starting where there has been some sort of damage from an insect or other cause. This develops quickly into a soft squashy rot with a bad smell.

The disease gets worse in warm wet weather. The bacteria can be spread around by insects but can also be in infected planting material or spread between infected plants or fruits in storage.

Especially for fruits in storage, it is important to keep the temperature low (10°C) and keep good air circulation around the fruit. The fruit being stored should also be as dry as possible.

In the field every attempt should be made to reduce damage to the plants.

For further information see Plant pathology note No 18: Harvest 8(3) p 141.

Bacterial wilt

Bacterial wilt can affect a number of different plants. This includes: aibika, blackberried nightshade, capsicum, eggplant, peanut, potato, and tomato.

The bacterium that causes this disease becomes a problem in warmer places. There are slightly different forms or races of this bacterium.

When the bacteria start to attack, one branch of the plant starts to wilt. This is because bacteria block the cells that conduct the water through the plant. Eventually the whole plant collapses and dies. If the stem of an infected plant is cut just above the ground, a brown discoloration of the internal tissues can be seen. With potato tubers a ring of milky drops will form around the cut section of the tuber.

The bacteria mostly spread through the roots but with bananas they can be spread by insects. The disease causing bacteria can also be spread on knives and other tools that are used to cut the plants.

Old plant parts left in the soil can keep the bacteria alive in the soil.

Bacterial wilt can only be controlled effectively by using varieties of crops that get the disease less. With crops like potatoes and tomatoes it is important to intercrop and not plant the plants near each other in a row or line.

See DPI Plant pathology note 15: Harvest 7(4) p 180

Damping-off of seedlings and collar rots

Several different fungi are involved.

1. *Athelia rolfsii.*

The fungus *Athelia rolfsii* has also been called *Corticium rolfsii* and *Sclerotium rolfsii*. The diseases it causes are often called Sclerotial wilts. White threads of fungus spread over parts of the plants near the soil surface. Sclerotia or hard resting parts normally develop after the host plant has died. The fungus can grow on living plants or dead plant material near the soil surface. The fungus can spread on planting material and by the activities of people.

Infection of the plant commonly occurs near ground level and extends a few centimetres above and below this. This produces collar rots and plants wilt. Wet soil, shading and crowding between plants increases the disease. The disease develops best at temperatures of 25°-35°C.

It causes wilt and collar rot of peanut;
collar rot of Jerusalem artichoke, lettuce, & common bean;
red rot of the leaf sheath of sugarcane and pitpit;
collar rot and wilt of European potatoes.

On non-food plants it causes collar rot of tea, caladium, crotalaria, carnation, *Eleusine indica, Eucharis sp.,* lucerne, phlox, African violet and vanilla cuttings. It probably also damages beet, cabbage family plants, citrus, cucumber, figs, tomato, bananas and plants in the capsicum family.

The control is by disinfecting any vegetative planting material to reduce the chance of transferring the disease, as well as removing or burying crop residues. Some host plants have resistance between different varieties but the effect of the growing environment and the age of the plant is often sufficiently great to make the other factors less helpful.

Plants attacked:
Athelia rolfsii: capsicum, giant taro, artichoke, lettuce, naranjilla, pawpaw, peanut, pomelo, potato, rice, sugarcane, sunflower, sweet potato, tomato.

Scientific names: *Athelia rolfsii* (Curzi) Tu & Kimbrough
[Synonym: *Corticium rolfsii* (Sacc.) Curzi
and *Pellicularia rolfsii* (Curzi) West.]

See DPI Plant pathology note 3: Harvest

2. Botryodiplodia theobromae

The fungus called *Botrydiplodia theobromae* has had at least 17 different scientific names and this has created some confusion. It is a fungus that affects over 500 different species of plants. It is mainly a fungus that attacks plants that are already weakened. After a plant has been wounded it can attack and is also a common fungus associated with rots in storage.

The fungus can be spread about in the wind and by water but also is carried on seeds and in the soil. Insects can also spread the fungus. The fungal conidia can live on seeds for 4 months.

For plants in storage a temperature below 10°C is normally sufficient to reduce the damage from this storage rot fungus.

It can cause problems such as collar rot of peanuts, stem rot of pawpaw and leaf spot on citrus. As well it is known to be involved with storage rots in yams, cassava and sweet potato. It is also associated with die-back and pod rot of cacao.

Plant attacked:
Botryodiplodia theobromae: peanut, pawpaw, citrus, coconut, apple, cassava, sago, banana, nutmeg, avocado, wheat, corn, (also on tea, coffee, oil palm, cotton, hibiscus, cacao and other trees.)

Scientific names:
Asexual stage: *Botryodiplodia theobromae* Pat.
Sexual stage: *Physalospora rhodina* Berk. & Curt. apud Cooke

3. Pythium spp.

Pythium arrhenomanes	Chinese taro.
Pythium butleri	Citrus, cucumber, tomato, common bean, eggplant, potato, corn. Also known to damage capsicum, pawpaw, watermelon, and ginger
Pythium deliens	Cucumber
Pythium irregulare	Watermelon
Pythium splendens	Cucumber, banana (Also known to rot taro corms)
Pythium vexans	Pineapple, coconut, banana and cacao

Many of the Pythium fungi live in the soil. They cause dying off of plants in very wet soil. They are often associated with *Phytophthora spp*. fungi.

The diseases include:
Damping off of watermelon, Root rot of Chinese taro and taro, root rot of bananas, collar rot of corn, damping off of cucumber, root rot of durian, collar rot and stem rot of eggplant, wilt of outside pineapple leaves, collar rot of tomato and root rot of tree tomato.

4. *Rhizoctonia sp.* fungi

Rhizoctonia solani	Peanut, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, lablab bean, tomato, mint, common bean, pepper, winged bean, potato, sorghum, cowpea, corn, ginger. (Also coffee, oil palm, eucalyptus, rubber, leucaena, siratro, tobacco, geranium, patchouli, stylo, teak & cacao.)
Thanatephorus sasakii	Rice

These tend to be worse in seedbeds and where there is a high level of organic matter. They are also more severe in warmer conditions. They are often associated with *Fusarium spp*. fungi. They are not necessarily associated with over-watering. This fungus can cause root rots and collar rots but also causes leaf blights and large pale dead areas on the leaves of many plants.

Scientific names:
Sexual: *Thanatephorus cucumeris* (Frank) Donk
Asexual: *Rhizoctonia solani* Kuhn.
[Synonym: *Pellicularia filamentosa* (Pat.) Rogers
and *Corticium solani* (Prill.& Del.) Bourd. & Galz.**]**

Blossom blights

Choanephora cucurbitarum	Silver beet, beetroot, chilli, pawpaw, taro, lablab bean, cassava, winged bean, sorghum, rice bean.

This fungus occurs commonly on plant remains during their decomposition. The spores called conidia are spread by insects, wind and rain. It can attack the young growing parts of plants and cause soft wet rots. On some beans such as winged bean and cowpea it can get on the flowers stopping beans being produced. On amaranth it can cause a wet rot of young seedlings especially in nurseries. It also attacks the flowers and fruits of pumpkin family plants as well as pawpaw, okra and capsicum. With each of these the attacks on the flowers stops the fruit production.

It can cause blossom blight of taro but as the flowers and seeds of taro are not a major part of normal production except for plant breeders this is not serious.

The fungus can also continue to cause rots of fruit etc after harvest.

The disease normally occurs under wet conditions and when plants are crowded.

The most important control for this disease is to establish growing conditions for strong healthy growth of the plants. This includes good levels of soil fertility and not having excess nitrogen. Plants need to be well spaced so that the wind can allow leaves and flowers to dry and avoid wet conditions suitable for the fungus to get started. With a number of crops there are varieties that are less likely to be damaged by the disease.

Downy mildews

There is a group of fungi called downy mildews. They cause similar symptoms on crops. These include patches or spots on the upper surface of the leaves. On the under side of the leaves under the spots there is a furry or downy growth of fungi. These look downy because the fungal threads have branched ends with spores. These spores can be blown by the wind or spread by water. The spores must land on moist leaves to be able to grow. They also need high humidity to be able to continue to grow. When dry conditions come these fungi may die out. They can affect a number of different vegetables and be produced by different fungi.

Plant	**Fungus**
Bitter cucumber	*Pseudoperonospora cubensis*
Chinese cabbage	*Peronospora parasitica*
Coastal pitpit	*Peronosclerospora sp.*
Corn	*Peronosclerospora sacchari*
Cucumber	*Pseudoperonospora cubensis*
Grapes	*Plasmopara viticola*
Melon	*Pseudoperonospora cubensis*
Pumpkin	*Pseudoperonospora cubensis*
Squash, marrow	*Pseudoperonospora cubensis*
Sugarcane	*Peronosclerospora sacchari*

Powdery mildews

This name applies to a group of fungi. They attack a number of different plants. Mostly they begin as a small faint white spot on the leaves. These spots increase in size with suitable weather conditions. The whole surface of the leaf can be covered with a white powdery fungus. Stems and fruit can also be attacked. Young leaves that are attacked can be distorted in shape and can curl up at the edges. These fungi require high humidity but not rainy weather to start growing. But once the fungus has started it can continue in wet or dry conditions. They mostly do best at a temperature range of 11° to 28°C.

Plants with powdery mildews recorded include:
Aibika, bitter cucumber, bottle gourd, cowpea, cucumber, grape, green gram bean, melon, pawpaw, pumpkin, squash, marrow, watermelon, winged bean, yard-long bean

Sooty moulds

These fungi grow on the secretion left behind by small sap sucking insects. The fungi are not actually attached to the plant surface. This can easily be shown by wetting your finger and rubbing the black fungus off the leaf. The leaf underneath is usually still green and healthy although the sooty mould covering may have been stopping the sunlight and therefore preventing the leaf from working properly. So to control the fungus it is necessary to control the insect. many of these insects are looked after by ants and sometimes to stop the insect it is necessary to kill the ants that look after the insect. Once the ants and insect are gone the sooty mould normally soon washes of in the rain.

These sooty moulds can be seen very commonly on the leaves of almost all small trees and shrubs both cultivated and wild.

Sooty mould fungi
Asterina sp.
Borinquenia sp.
Capnodium sp.
Capnodium thuemenii
Chaetothyrium boedijnii
Chaetothyrium sp.
Epicoccum sp.
Lembosia terminaliae
Meliola citricola
Meliola erythrinae
Meliola erythrinae var *psophocarpi*
Meliola juttingii
Meliola mangiferae
Meliola sp.
Microxyphium sp.

Root knot nematodes

These very small (invisible to the eye) worm-like nematodes are in almost all soils and build up in large numbers when crops like food plants are grown. In coastal regions they can stop crops growing in old garden sites. They attack the roots of the plants and as the plant tries to grow new cells to replace the damaged ones the roots become twisted and knotted. This means that the roots cannot function normally and and there is reduced uptake of water and plant nutrients. Plants therefore become wilted and stunted. Damage caused by nematodes can also allow other root rots to get started in plants.

Amaranth, banana, bean-common, bitter cucumber, broccoli, cabbage, capsicum, carrot, cauliflower, chilli, cucumber, eggplant, ginger, grapes, lablab bean, lesser yam, lettuce, lima bean, melon, mung bean, okra, parsley, parsnip, passionfruit, pawpaw, pea, potato, rice, rice bean, silver beet, soya bean, sunflower, taro, tomato, tree tomato, winged bean and many other plants.

See Plant pathology note no 5: Harvest 6(3) p 154.

Other nematodes

Other nematodes also do damage. Some of these include:

Nematode	**Scientific name**
Burrowing nematode	*Radopholus similis*
Citrus nematode	*Tylenchulus semipenetrans*
and others such as	*Helicotylenchus multicinctus*
and	*Hirschmanniella miticausa*
and	*Pratylenchus sp.*
and	*Rotylenchus sp.*

Cercospora leaf spots

Cercospora leaf spots are caused by one of the very common tropical fungi. They cause leaf spots on many different plants. At present scientists have not finished studying these fungi and so the naming is incomplete and unsatisfactory. Many of those called *Cercospora* have recently been given slightly different names such as *Pseudocercospora* and *Cercosporina* and *Cercosporidium* as scientists try and recognise the differences that exist between this large group. Each of these names is from the asexual stage of the life cycle and when the sexual stage is found it is often possible to more correctly name the fungus. Often the sexual stages are called *Mycosphaerella,* but sometimes the perfect state is *Sphaerulina, or Mycovellosiella*.

Most of these fungi cause round brown spots on leaves and often the spot is surrounded with a yellow ring as a poison from the fungus kills off the leaf ahead of where the fungal spot is growing.

Fungus	**Food plant**
Cercospora beticola Saccardo	Silver beet, beetroot
Cercospora canescens	Soybean, lablab bean, common bean, green gram, cowpea, yard-long bean
Cercospora catappae	*Terminalia*
Cercospora citrullina	Watermelon, squash, bitter cucumber
Cercospora oryzae	Rice
Perfect state is:	
Sphaerulina oryzina Hara	
Cercospora physalidis	Cape gooseberry
Cercospora sorghi	Sorghum, corn
Cercospora taccae	Polynesian arrowroot
Cercospora vexans	Strawberry
Now *Cercosporina vexans* (Massal) Moesz	
Cercosporella sp.	

Mycosphaerella arachidis Deighton Asexual: *Cercospora arachidicola* Hori	On peanuts
Mycosphaerella berkeleyi Jenkins Asexual: *Cercosporidium personatum* (Berk & Curtis) Deighton (Syn. *Cercospora personata* (Berk & Curtis) Ell & Ev.)	On peanuts
Mycosphaerella brassicicola Asexual: *Cercospora brassicicola* Henn.	On cabbage family
Mycosphaerella cruenta Latham Asex. *Pseudocercospora cruenta* (Sacc.)Deighton [Syn. *Cercospora cruenta* Sacc.]	On cowpeas
Mycosphaerella fijiensis Morelet var. *difformis* Asex. *Paracercospora fijiensis* (Morelet) [Syn.*Cercospora fijiensis* Mor.	On banana

and *Pseudocercospora fijiensis* (Mor.)Deight.]	
Mycosphaerella henningsii Sivan Asexual: *Cercosporidium henningsii* (Allescher) Deighton [Syn. *Cercospora henningsii* Allesch]	On cassava
Mycosphaerella musicola Leach Asexual: *Cercospora musae* Zimm.	On banana
Mycosphaerella papuana Asexual*: Cercospora dioscoreae-pyrifoliae*	On banana
Mycovellosiella cajani (P.Henn.) Rangel ex Trotter Asexual: *Cercospora cajani* P.Henn.	On pigeon pea
Mycovellosiella koepkei (Kruger) Deighton [Syn. *Cercospora koepkei* Kruger]	On sugarcane; pitpit
Pseudocercospora artocarpi (H & P Sydow) Deighton [Syn. *Cercospora artocarpi*]	On breadfruit
Pseudocercospora fuligena (Roldan) Deighton [Syn. *Cercospora fuligena* Roldan]	On tomato
Pseudocercospora protensa (Sydow) Deighton [Syn. *Cercospora protensa* Sydow]	On elephant foot yam
Pseudocercospora psophocarpi (Yen) Deighton [Syn. *Cercospora psophocarpi* Yen]	On winged bean
Pseudocercospora timorensis (Cooke) Deighton [Syn. *Cercospora timorensis* Cooke]	On sweet potato
Pseudocercospora ubicola (W.Y.Yen) Deighton [Syn. *Cercospora ubicola* Yen]	On yam
Pseudocercospora ubi (Racib.) Deighton [Syn *Cercospora ubi* Racib]	On potato yam, yam

Algal leaf spots *Cephaleuros virescens*

This is an alga that attacks plants. It occurs on forest trees and can spread from there onto other plants, especially those grown under partial shade. It causes leaves to die and fall off. The alga can occur on trunks, stems, leaves and fruit and cause injury. The damage is normally worse in warm weather and in wet weather. It attacks a wide range of fruit bearing trees. Some of these from Papua New Guinea include:

Cashew, soursop, bixa, tea, cinchona, citron, grapefruit, pomelo, coffee, swamp taro, Chinese cherry (*Flacourtia inermis*), rubber, banana, avocado, pepper, guava, cacao, vanilla.

Organisms as secondary diseases

These don't normally attack healthy plants but can occur on poorly growing plants and help decay of plants already attacked by some other diseases.

Apiospora montagnei	IMI descriptions 1052.
Memnoniella echinate	IMI descriptions 1055
Nigrospora sphaerica	IMI descriptions 1056
Pithomyces sacchari	IMI descriptions 1059
Pithomyces maydicus	IMI descriptions 1058

Heart rot *Phellinus noxius*

This disease caused by a fungus can affect a number of trees. Spores can blow in the wind.

Some of the trees affected include Albizzia, Cassia, Tephrosia, coconut (Brown root rot p98), rubber, leucaena, cacao, coffee, kapok, Panama Berry, Galip (Canarium almond- heart rot p238), Oil palms (Upper stem rot), mangosteen, avocado (root rot), rambutan, Japanese cherry, lime, mandarin, pepper (Root rot), tea and the decaying stumps of various forest trees.

On coconut and oil palm dead spots develop on the trunk. The trunk collapses. Sometimes before this occurs the leaves may turn yellow, wilt and hang down. The spots on the trunk are dark brown with dark brown zones. It mostly attacks palms over 10 years old. Palms in poor soil conditions especially low potassium, get the disease more. The disease takes 1 to 3 years before the palm is killed. For control on palms, spots need to be found early and cut out. The area needs to then be treated with coal tar. Dead palms should be removed.

For Heart rot of galip a crust of brown fungal threads and dirt (2-3 cm thick) forms around the roots. The shelf like fruiting body has rings of ridges and is purple brown on top and darker underneath. The fungus may only attack after plants are weakened. Young trees can quickly be killed.

References: CMI Description of Plant pathogenic Fungi No 195 and Kranz, J., 1977, Diseases, Pests and Weeds of Tropical Crops p 162

Phytophthora palmivora

This fungus causes a range of diseases on over 135 different plants. It attacks cacao (Black pod), rubber (black stripe), pawpaw (root rot p128), coconut (Bud rot p99), tree tomato (root rot) and others. It occurs in warm areas with a high rainfall. Spores can spread by wind and rain. It can be in the soil.

With bud rot of coconut spots develop especially on young nuts and at the stalk end. The fungus often occurs around the roots of coconuts and may spread from here. The disease mostly starts following damage to the young nuts. Nuts fall off early.

With root rot of pawpaw the older leaves turn yellow and collapse hanging limply around the trunk. The young leaves then die and the plant dies. Large roots show a soft wet decay and small roots are missing. Fruit can also be affected by this fungus. Plants especially in wet areas die. For control avoid wet areas, do not replant pawpaws into soil where the disease is known to occur, plant only disease free trees from a nursery which has clean soil and avoid damage to pawpaw trunks as this reduces trunk rot.

References:

CMI Descriptions of Pathogenic Fungi No 831

Holliday, 1980, Fungus Diseases of Tropical Crops CUP p

Krantz, J *et al,* (eds), 1977, Diseases, Pests and Weeds in Tropical Crops Verlag Paul Parey p 121

References

In this book I have only listed a few references. They are meant to be the ones that a field worker may at some stage be able to get access to or be able to make use of. Naturally specialists have a large range of more specific books with much more detail but often this has detailed information on the nature and recognition of the fungus and other details that are not immediately useful to field workers. As well I have tended to be biased towards books that have illustrations as this is the sort of information a field officer needs to be able to at least attempt to work intelligently with diseases as they are encountered by farmers.

Allen, D.J., 1983, The Pathology of Tropical Food Legumes. Wiley- Interscience.
Cook, A.A., 1975, Diseases of Tropical & Sub Tropical fruits and nuts. Hafner
CMI Description of Pathogenic Fungi - *These are put out irregularly to give precise details on the fungus and its naming. So far a little over 1,000 numbered sheets have been produced.*
De Leon, C., 1978, Maize diseases A Guide for field identification CIMMYT Info Bull No11
Fahy, P.C. & Persley, G.J. (eds), 1983, Plant Bacterial Diseases A Diagnostic Guide Academic Press
Frohlich, G & Rodewald, W, 1970, Pests & Disease of Tropical Crops Pergamom Press
Graham, K.M., 1971, Plant Diseases of Fiji. HMSO. *Although getting a little old it is well illustrated and in plain English.*
Harvest. *The quarterly magazine of the Department of Agriculture and Livestock in Papua New Guinea which has regular good articles on pests and diseases suitable for field workers in the country.*
Holliday, P, 1980, Fungus Diseases of Tropical Crops Cambridge Press *Specialised on the fungi. Not illustrated.*
Hughes, C.G. et al (ed), 1964, Sugarcane diseases of the world. Vol 1.
Kranz, J et al (ed), 1977, Diseases, Pests and Weeds in Tropical Crops Verlag Paul Parey
Lozano, J.C. et al, 1976, Field problems in Cassava. CIAT.
Lozano, J.C. & Booth, R.H., Diseases of cassava. CIAT Series DE-5.
Martin, J.P. *et al*, 1961, Sugarcane Diseases of the World. Vol 1. Elsevier.
Ou, S.H., 1973, A Handbook of rice diseases in the tropics IRRI.
Persley, D.M., et al (eds),1989, Fruit and Nut Crops - a disease management guide. Queensland DPI Information Series QI 88018
Pest Control in Bananas PANS Manual No 1
Pest Control in Groundnuts PANS Manual No 2
Pest Control in Rice PANS Manual No 3
Pest Control in Tropical Root Crops PANS Manual No4
Plant Pathology Notes. *A numbered series produced by Plant Pathologists in Papua New Guinea.*
Ricaud, C et al, 1989, Diseases of Sugarcane. Elsevier.
Stover, R.H., 1972, Banana, Plantain and Abaca Diseases CAB
Schwartz, H.F. & Galvez, G.E.(ed), 1980, Bean production problems CIAT
Vock, N.T., 1978, A Handbook of plant diseases in Colour Two Volumes Queensland DPI. *Loose leaf books with good colour illustrations. Recommendation are revised regularly but are often too specialised for Papua New Guinea subsistence farmers.*
Wardlaw, C.N., 1971, Banana Diseases Longmans Press

Fungi causing diseases of food plants

Fungus	**Food plant**
Alternaria brassicae	Broccoli, Chinese cabbage, turnip
Alternaria brassicicola	Brussels sprouts, cabbage, cauliflower, turnip
Alternaria cichorii	Chickory, endive,
Alternaria dauci	Carrot
Alternaria passiflorae	Passionfruit
Alternaria porri	Bunching onion, leek, onion, shallot
Alternaria raphani	Radish
Alternaria solani	Potato, tomato
Aporhytisma urticae	Castanopsis chestnuts
Armillaria mellea	Banana, coffee, tea, cacao
Ascochyta citri	Lemon
Ascochyta dolichi	Lablab bean
Ascochyta erythrinae	Indian coral tree
Aspergillus niger	Peanut, beans, cassava, rice
Asterina sp.	
Athelia rolfsii	Capsicum, giant taro, artichoke, lettuce, naranjilla, pawpaw, peanut, pomelo, potato, rice, sugarcane, sunflower, sweet potato, tomato
Bipolaris incurvata	Coconut
Bipolaris panici-miliacei	Highland pitpit
Bipolaris sacchari	Sugarcane
Bipolaris stenospila	Sugarcane
Brachysporium arecae	Betel nut
Borinquenia sp.	Sooty mould
Botryodiplodia theobromae	Peanut, pawpaw, citrus, coconut, apple, cassava, sago, banana, nutmeg, avocado, wheat, corn, tea, coffee, oil palm, cotton, hibiscus, cacao and other trees
Capnodium sp.	Sooty mould
Capnodium thuemenii	*Ficus*
Ceratocystis fimbriata	Sweet potato
Ceratocystis paradoxa	Pineapple, coconut, sugarcane
Cercospora artocarpi	Breadfruit
Cercospora beticola	Silver beet, beetroot
Cercospora canescens	Soybean, lablab bean, common bean, green gram, cowpea, yard-long bean
Cercospora catappae	*Terminalia*
Cercospora citrullina	Watermelon, squash, bitter cucumber
Cercospora oryzae	Rice
Cercospora physalidis	Cape gooseberry
Cercospora sorghi	Sorghum, corn
Cercospora taccae	Polynesian arrowroot
Cercospora vexans	Strawberry
Cercosporella sp.	Sugarcane
Cercosporidium henningsii	Cassava
Cerotelium fici	*Ficus*
Chaetothyrium boedijnii	Coffee, highland kapiak, cacao
Chaetothyrium fusisporum	*Finschia* nuts
Chaetothyrium sp.	
Choanephora cucurbitarum	Silver beet, beetroot, chilli, pawpaw, taro, lablab

	bean, cassava, winged bean, sorghum, rice bean
Cladosporium colocasiae	Taro
Cladosporium musae	Banana
Cladosporium oxysporum	Common bean,
Clasterosporium cocoicola	Coconut
Cochliobolus cynodontis	Rice
Cochliobolus geniculatus	Rice, wheat
Cochliobolus hawaiiensis	Rice
Cochliobolus heterostrophus	Sorghum, corn
Cochliobolus lunatus	Pineapple, capsicum, eggplant, sorghum
Cochliobolus miyabeanus	Rice
Colletotrichum capsici	Soya bean, cassava
Colletotrichum circinans	Onion, shallot
Colletotrichum lindemuthianum	Common bean, winged bean
Colletotrichum musae	Banana
Colletotrichum orbiculare	Snake gourd
Cordana musae	Banana
Corticium penicillatum	Coconut
Corticium salmonicolor	Soursop, sweetsop, jackfruit, lemon, orange, loquat, mango, cassava, pepper, and other trees
Corynespora casiicola	Pawpaw, tomato, common bean, cowpea
Crossopsora antidesmae-dioicae	Chinese laurel
Curvularia sp.	Pineapple, capsicum, centrosema, eggplant, sorghum
Cylindrosporium dioscoreae	Lesser yam
Deightoniella papuana	Coastal pitpit, sugarcane
Deightoniella torulosa	Banana
Diaporthe citri	Citrus
Didymella lycopersici	Tomato
Diplocarpon earlianum	Strawberry
Elsinoe batatas	Sweet potato
Elsinoe fawcetti	Citrus
Entyloma oryzae	Rice
Fulvia fulva	Tomato
Fusarium equiseti	Peanut, coconut, tomato, winged bean, potato, sorghum
Fusarium lateritium	Citrus, coffee, rice
Fusarium oxysporum	Peanuts, sweet potato, banana, tomato, sorghum, corn
Gaeumannomyces graminis	Rice
Ganoderma lucidum	Coconuts, tea, cacao
Gibberella baccata	Citrus
Gibberella fujikuroi	Rice, winged bean, coastal pitpit, sugarcane, sorghum,
Glomerella cingulata	Soursop, betel nut, five corner, capsicum, pawpaw, lemon, grapefruit, coconut, tree tomato, yam, soya bean, mango, cassava, granadilla, avocado, guava, ginger
Glomerella tucumanensis	Coastal pitpit, sugarcane
Goplana australis	Yam
Goplana dioscoreae	Greater yam, yam
Graphium sp.	

Guignardia calami	Betel nut
Guignardia dioscoreae	Lesser yam
Guignardia musae	Banana
Hamaspora acutissima	Raspberry
Helotium inocarpi	Aila
Lembosia pandani	Pandanus
Lembosia terminaliae	*Terminalia*
Leptosphaeria sacchari	Sugarcane
Leptosphaerulina trifolii	Peanut
Leveillula taurica	Cotton, potato, capsicum
Macrophoma pandani	Pandanus
Macrophomina phaseolina	Coconut, banana, beans
Magnaporthe grisea	Rye, etc
Magnaporthe salvinii	Rice
Marasmiellus epochnous	Mint
Marasmius crinisequi	Coconut
Melanographium sp.	Sago
Meliola sp.	
Meliola citricola	Lime, citrus
Meliola erythrinae	Indian coral tree
Meliola juttingii	Pandanus
Meliola mangiferae	Mango
Memnoniella echinata	Secondary on many plants
Metasphaeria oryzae-sativae	Rice
Microxyphium sp.	
Mycosphaerella alocasiae	Giant taro
Mycosphaerella arachidis	Peanut
Mycosphaerella berkeleyi	Peanut
Mycosphaerella brassicicola	Chinese cabbage, cabbage
Mycosphaerella caricae	Pawpaw
Mycosphaerella cruenta	Cowpeas
Mycosphaerella fijiensis	Banana
Mycosphaerella fragariae	Strawberry
Mycosphaerella henningsii	Cassava
Mycosphaerella musicola	Banana
Mycosphaerella pinodes	Pea
Mycovellosiella cajani	Pigeon pea
Mycovellosiella koepkei	Coastal pitpit, sugarcane
Mycovellosiella oryzae	Rice
Mycovellosiella phaseoli	Beans
Mycovellosiella puerariae	Kudzu
Myrothecium roridum	Aibika, tapa plant, soya bean, hibiscus, betel pepper, and ornamentals
Neojohnstonia colocasiae	Taro
Nigrospora sphaerica	Secondary on many plants
Oidium sp.	Aibika, pawpaw, watermelon, melon, cucumber, pumpkin, squash, bitter cucumber, winged bean,
Penicillium sp.	
Periconia byssoides	Common bean,
Peronosclerospora sacchari	Sugarcane
Peronosclerospora sp.	
Peronospora parasitica	Chinese cabbage

Pestalotia eugeniae	Surinam cherry
Pestalotiopsis palmarum	Coconut
Phaeocytostroma sacchari	Sugarcane
Phaeodactylium alpiniae	Turmeric
Phaeoisariopsis griseola	Common bean
Phaeoseptoria oryzae	Rice
Phakopsora pachyrhizi	Soybean
Phakopsora vignae	Lima bean
Phanerochaete salmonicolor	Soursop, sweetsop, jackfruit, lemon, orange, loquat, mango, cassava, pepper, and other trees
Phellinus noxius	Lime, coconut, mango, avocado, pepper, tea, coffee, oil palm, rubber, cacao
Phoma exigua	Lima bean, potato
Phoma pomorum	Apple
Phoma destructiva	Tomato
Phoma sorghina	*Polytoca macrophylla*
Phomopsis ipomoea-batatas	Sweet potato
Phyllachora coicis	Job's tears
Phyllachora graminis	Job's tears
Phyllachora kaernbachii	*Ficus*
Phyllachora minutissima	Highland pitpit
Phyllachora musicola	Banana
Phyllachora sacchari	Coastal pitpit, sugarcane,
Phyllosiphon sp.	
Phyllosticta dioscoreae	Lesser yam
Phytophthora cinnamomi	Avocado
Phytophthora citricola	Chinese taro
Phytophthora colocasiae	Taro
Phytophthora cryptogea	
Phytophthora infestans	Potato
Phytophthora palmivora	Pawpaw, coconut, tree tomato, oil palm, rubber, cacao
Phytophthora nicotianae	Aibika, tomato, passionfruit, avocado,
Pithomyces sacchari	Secondary on many plants
Plasmopara viticola	Grapes
Pleocyta sacchari	Sugarcane
Podonectria sp.	Mandarin
Pseudocercospora fuligena	Tomato
Pseudocercospora protensa	Elephant foot yam
Pseudocercospora psophocarpi	Winged bean
Pseudocercospora timorensis	Sweet potato
Pseudocercospora ubi	Potato yam, yam
Pseudoepicoccum cocos	Coconut
Pseudoperonospora cubensis	Melon, cucumber, pumpkin, squash, bitter cucumber
Puccinia arachidis	Peanut
Puccinia finschiae	Finschia nuts
Puccinia kuehnii	Coastal pitpit, sugarcane
Puccinia nakanishikii	Lemon grass
Puccinia operta	Job's tears
Puccinia polysora	Corn
Puccinia sorghi	Corn

Pyrenochaeta sp.	Coffee
Pyricularia zingiberi	Ginger
Pythium arrhenomanes	Chinese taro
Pythium butleri	Citrus, cucumber, tomato, common bean, eggplant, potato,
Pythium deliense	Cucumber
Pythium irregulare	Watermelon
Pythium splendens	Cucumber, banana
Pythium vexans	Pineapple, coconut, banana and cacao
Ramichloridium musae	Banana
Ramulispora sacchari	Sugarcane
Rhizoctonia solani	Peanut, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, lablab bean, tomato, mint, common bean, pepper, winged bean, potato, sorghum, cowpea, corn, ginger, coffee, oil palm, eucalyptus, rubber, leucaena, siratro, tobacco, geranium, patchouli, stylo, teak & cacao
Rhizopus stolonifer	Peanut, sweet potato, cassava, wheat
Rigidoporus microporus	Coconut, tea, coffee, oil palm, rubber, leucaena and cacao
Sarcopodium vanillae	Tahitian vanilla
Sclerotinia fuckeliana	Shallot, sunflower
Septoria apiicola	Celery
Septoria lactucae	Lettuce
Septoria lycopersici	Tomato
Setosphaerica turcica	Corn
Sphaceloma fawcettii	Lemon, citron, *Clymenia*
Sphacelotheca reiliana	Sorghum
Sphaerotheca fuliginea	Cowpea
Sphaerulina sp.	Rice, sago
Spongospora subterranea	Potato
Sporidesmium macrurum	Coconut, coffee
Stachylidium bicolor	Pineapple, coffee
(*Stagonospora sacchari*	Sugarcane)
Stemphylium lycopersici	Tomato
Streptomyces scabies	Potato
Synchytrium minutum	Kudzu
Synchytrium phaseoli	Rice bean
Synchytrium psophocarpi	Winged bean
Taphrina deformans	Peach
Thanatephorus cucumeris	Peanut, Ceylon spinach, cabbage, capsicum, chilli, pawpaw, coconut, carrot, lablab bean, tomato, mint, common bean, pepper, winged bean, potato, sorghum, cowpea, corn, ginger, coffee, oil palm, eucalyptus, rubber, leucaena, siratro, tobacco, geranium, patchouli, stylo, teak & cacao
Thanatephorus sasakii	Rice
Tranzschelia pruni-spinosae	Peach
Trichobotrys pannosa	Pineapple
Uncinula necator	Grapes
Uredo alocasiae	Giant taro
Uredo artocarpi	Breadfruit family

Uredo dioscorea-sativae	Potato yam
Uredo musae	Banana
Uredo palmifoliae	Highland pitpit
Uromyces appendiculatus	Common bean, yard-long bean, cowpea
Uromyces musae	Banana
Uromyces setariae-italicae	Highland pitpit
Uromyces viciae-fabae	Broad bean
Ustilaginoidea virens	Rice
Ustilago avenae	Oats
Ustilago zeae	Corn
Verrucispora proteacearum	Finschia nuts
Zygosporium gibbum	Sago

Fungi, Bacteria, Algae, Nematodes and viruses causing diseases.

Fungi are often very small. This means they are hard to study. As well, there are a very large number of fungi. And they have very complicated lifecycles. Sometimes they have sexual lifecycles and sometimes they have asexual lifecycles. As well the sexual and asexual stages can vary. As well as that, many fungi look different when they are collected from different plants, or are grown in a laboratory, or are grown at different temperatures and moisture levels. For many fungi the sexual stage has not yet been found and sometimes when the sexual and asexual stages are seen separately it is not realised, or difficult to prove that they are two stages of the same fungus. At times people simply make mistakes when they are describing fungi. For these and other reasons, there are often different names for the same fungus or the name changes sometimes several times. This becomes confusing but without using scientific names it would not be possible to be sure that two people looking at some similar disease on a crop were in fact talking about the same cause. It is for this reason that scientific names and naming is important. The names look confusing but in the Latin language they have a meaning. The list that follows is for the different names that have been used for fungi causing diseases of food plants in Papua New Guinea. I have tried to put the sexual name for the fungus as this is eventually the most reliable, but at times another name is used and the list will refer you back to the other names or the name of the sexual stage. You may not need this list, but then some people will not be able to make good use of the book without this list.

(Fungi unless marked)

Acroconidiellina arecae	
Actinopeltis sp.	
Alternaria alternata	
Alternaria brassicae	
Alternaria brassicicola	
Alternaria cichorii	
Alternaria cucumerina	
Alternaria dauci	
Alternaria padwickii	See *Trichoconiella padwickii*
Alternaria passiflorae	
Alternaria porri	
Alternaria raphani	
Alternaria solani	
Alternaria tenuis	
Anthostomella cylindrospora	
Anthostomella fusispora	
Aphelenchoides sp.	Nematode
Aphelenchoides parietinus	See *Aphelenchus parietinus*
Aphelenchus avenae	Nematode
Aphelenchus parietinus	Nematode
Apiospora camptospora	
Apomelasmia urticae	See *Aporhytisma urticae*
Aporhytisma urticae	
Armillaria mellea	
Armillariella mellea	See *Armillaria mellea*
Ascochyta citri	
Ascochyta convolvuli	
Ascochyta dolichi	
Ascochyta erythrinae	

Ascochyta phaseolarum	See *Phoma exigua*
Ascochyta pinodes	See *Mycosphaerella pinodes*
Ascochyta rhei	
Aspergillus flavus	
Aspergillus melleus	
Aspergillus niger	
Asterina sp.	
Athelia rolfsii	
Beniowskia spaeroides	
Bipolaris cynodontis	See *Cochliobolus cynodontis*
Bipolaris hawaiiensis	See *Cochliobolus hawaiiensis*
Bipolaris incurvata	
Bipolaris maydis	See *Cochliobolus heterstrophus*
Bipolaris oryzae	See *Cochliobolus miyabeanus*
Bipolaris panici-miliacei	
Bipolaris sacchari	
Bipolaris sorghicola	
Bipolaris stenospila	
Bipolaris zeae	
Brachysporium arecae	
Borinquenia sp.	
Botryodiplodia theobromae	
Botryosphaeria festucae	
Botrysporium sp.	
Botryotinia fuckeliana	
Botrytis cinerea	See *Botryotinia fuckeliana*
Botrytis sp.	
Brachysporium arecae	See *Acroconidiellina arecae*
Bursaphalenchus sp.	Nematode
Capnodium sp.	
Capnodium thuemenii	
Cephaleuros pulvinatus	See *Cephaleuros virescens*
Cephaleuros virescens	Alga
Ceratelium fici	
Ceratocystis fimbriata	
Ceratocystis paradoxa	
Ceratostomella fimbriata	See *Ceratocystis fimbriata*
Ceratostomella paradoxa	See *Ceratocystis paradoxa*
Cercospora arachidicola	See *Mycosphaerella arachidis*
Cercospora artocarpi	See *Pseudocercospora artocarpi*
Cercospora batatae	See *Pseudocercospora timorensis*
Cercospora bataticola	See *Phaeoisariopsis bataticola*
Cercopora beticola	
Cercospora brassicicola	See *Mycosphaerella brassicicola*
Cercospora canescens	
Cercospora catappae	
Cercospora citrullina	
Cercospora cruenta	See *Mycosphaerella cruenta*
Cercospora diffusa	
Cercospora dioscoreae-pyrifoliae	See *Mycosphaerella papuana*
Cercospora fijiensis	See *Mycosphaerella fijiensis*
Cercopsora fuligena	See *Pseudocercospora fuligena*

Cercospora henningsii See *Mycosphaerella henningsii*
Cercospora koepkei See *Mycovellosiella koepkei*
Cercospora longipes
Cercospora longissima
Cercospora musae See *Mycosphaerella musicola*
Cercospora oryzae See *Sphaerulina oryzina*
Cercospora papayae
Cercspora penzigii
Cercospora personata See *Mycosphaerella berkeleyi*
Cercospora physalidis
Cercospora protensa See *Pseudocercospora protensa*
Cercospora psophocarpi See *Pseudocercospora psophocarpi*
Cercospora sorghi
Cercospora taccae
Cercospora timorensis See *Pseudocercospora timorensis*
Cercospora ubi See *Pseudocercospora ubi*
Cercospora vexans See *Cercosporina vexans*
Cercosporella sp. See *Ramulispora sacchari*
Cercosporidium henningsii See *Mycosphaerella henningsii*
Cercosporidium personatum See *Mycosphaerella berkeleyi*
Cercosporina vexans
Cerotelium fici
Chaetomium sp.
Chaetophoma sp.
Chaetothyrium boedijnii
Chaetothyrium fusisporum
Chaetothyrium sp.
Chloridium musae See *Veroneae musae & Periconiella musae*
Choanephora cucurbitarum
Cladosporium atriellum
Cladosporium colocasiae
Cladosporium fulvum See *Fulvia fulvum*
Cladosporium herbarum
Cladosporium musae
Cladosporium oxysporum
Clasterosporium cocoicola
Cochliobolus bicolour
Cochliobolus cynodontis
Cochliobolus geniculatus
Cochliobolus hawaiiensis
Cochliobolus heterostrophus See *Bipolaris maydis*
Cochliobolus lunatus
Cochliobolus miyabeanus
Colletotrichum capsici
Colletotrichum circinans
Colletotrichum falcatum See *Glomerella tucumanensis*
Colletotrichum gloeosporioides See *Glomerella cingulata*
Colletotrichum graminicola
Colletotrichum lagenarium See *Colletotrichum orbiculare*
Colletotrichum lindemuthianum
Colletotrichum musae
Colletotrichum orbiculare

Cordana musae	
Corticium penicillatum	
Corticium rolfsii	See *Athelia rolfsii*
Corticium salmonicolor	See *Phanerochaete salmonicolor*
Corticium sasakii	See *Thanatephorus sasakii*
Corticium solani	See *Thanatephorus cucumeris*
Corynespora cassiicola	
Corynespora sp.	
Crossopsora antidesmae-dioicae	
Curvularia geniculata	See *Cochliobolus geniculatis*
Curvularia lunata	See *Cochliobolus lunatus*
Curvularia sp.	
Cylindricocarpon musae	
Cylindrosporium dioscoreae	
Cytoplea sp.	
Dactylaria dioscoreae	
Deightoniella papuana	
Deightoniella torulosa	
Diaporthe citri	
Dictyosporium toruloides	
Didymella citri	
Didymella lycopersici	
Didymella sp.	
Diplocarpon earlianum	
Diplodia sp.	
Dreschlera bicolor	See *Cochliobolus bicolor*
Dreschlera cynodontus	See *Cochliobolus cynodontus*
Dreschlera hawaiiensis	See *Cochliobolus hawaiiensis*
Dreschlera incurvata	See *Bipolaris incurvata*
Dreschlera oryzae	See *Cochliobolus miyabeanus*
Dreschlera panici-miliacei	See *Bipolaris panici-miliacei*
Dreschlera maydis	See *Bipolaris maydis*
Dreschlera sacchari	See *Bipolaris sacchari*
Dreschlera sorghicola	See *Bipolaris sorghicola*
Dreschlera stenospila	See *Bipolaris stenospila*
Dreschlera turcica	See *Setosphaeria turcica*
Elsinoe batatas	
Elsinoe fawcetti	
Enterobacter cloacae	
Enterobacterium sp.	Bacterium
Entyloma oryzae	
Epicoccum cocos	See *Pseudoepicoccum cocos*
Epicoccum nigrum	
Epicoccum purpurascens	See *Epicoccum nigrum*
Epicoccum sp.	
Erwinia herbicola	Bacterium
Erwinia carotovora subsp. *atroseptica*	Bacterium
Erwinia carotovora subsp. *carotovora*	Bacterium
Erwinia chrysanthemi	Bacterium
Erysiphe cichoracearum	

Exserohilum turcicum	See *Setosphaeria turcica*
Flavobacterium sp.	Bacterium
Flavodan flavus	
Fomes lignosus	See *Rigidoporus microporus*
Fomes lucidus	See *Ganoderma lucidum*
Fomes noxius	See *Phellinus noxius*
Fulvia fulvum	
Fusarium equiseti	
Fusarium lateritium	
Fusarium moniliforme	See *Gibberella fujikuroi*
Fusarium moniliforme var. *subglutinans*	
Fusarium oxysporum	
Fusarium semitectum	
Fusarium solani	
Gaeumannomyces graminis	
Ganoderma lucidum	
Geotrichum candidum	
Geotrichum sp.	
Gibberella baccata	See *Fusarium lateritium*
Gibberella fujikuroi	
Gibberella intricans	See *Fusarium equiseti*
Gloeosporium sp.	
Gloeosporium catechu	See *Glomerella cingulata*
Gloeosporium musarum	See *Colletotrichum musae* or *Glomerella cingulata*
Gloeosporium pestis	See *Glomerella cingulata*
Glomerella cingulata	
Glomerella tucumanensis	
Goplana australis	
Goplana dioscoreae	
Graphium sp.	
Guignardia arecae	See *Guignardiae calami*
Guignardia calami	
Guignardia dioscoreae	
Guignardia musae	
Hamaspora acutissima	
Hansfordia pulvinate	
Haplobasidion musae	
Helicobasidium purpureum	
Helicotylenchus multicinctus	Nematode
Helminthosporium hawaiiensis	See *Cochliobolus hawaiiensis*
Helminthosporium incurvatum	See *Bipolaris incurvata*
Helminthosporium maydis	See *Cochliobolus heterostrophus*
Helminthosporium oryzae	See *Cochliobolus miyabeanus*
Helminthosporium sacchari	See *Bipolaris sacchari*
Helminthosporium stenospila	See *Bipolaris stenospila*
Helminthosporium torulosum	See *Deightoniella torulosa*
Helminthosporium turcicum	See *Setosphaeria turcica*
Helminthosporium sp.	
Helotium inocarpi	
Hexogonia umbrosa	See *Pseudofavolus polygrammus*
Hirschmanniella miticausa	Nematode

Hoplolaimus seinhorsti	Nematode
Illosporium sp.	
Isariopsis griseola	See *Phaeoisariopsis griseola*
Johnstonia colocasiae	See *Neojohnstonia colocasiae*
Kuskia oryzae	
Leiosphaerella longispora	
Lembosia pandani	
Lembosia terminaliae	
Leptosphaeria coniothyrium	
Leptosphaeria oryzina	
Leptosphaeria sacchari	
Leptosphaeria salvinii	See *Magnaporthe salvinii*
Leptosphaerulina trifolii	
Longidorus sp.	
Macrophoma musae	See *Guignardia musae*
Macrophoma pandani	
Macrophomina phaseolina	
Macrophomina phaseoli	See *Macrophomina phaseolina*
Magnaporthe grisea	
Magnaporthe salvinii	
Marasmiellus epochnous	
Marasmiellus inoderma	
Marasmiellus semiustus	
Marasmius crinisequi	
Marasmius palmivorus	
Marasmius sacchari	
Marasmius semiustus	See *Marasmiellus semiustus*
Marssonina fragariae	
Melanconium palmarum	
Melanographium sp.	
Meliola sp.	
Meliola citricola	
Meliola erythrinae	
Meliola erythrinae var. *psophocarpi*	
Meliola juttingii	
Meliola mangiferae	
Meloidogyne hapla	Nematode
Meloidogyne incognita	Nematode
Meloidogyne javanica	Nematode
Metasphaeria oryzae-sativae	
Microxyphium sp.	
Monodisma fragilis	
Monilia sp.	
Moniliochaetes infuscans	
Mucor hiemalis	
Mycosphaerella alocasiae	
Mycosphaerella arachidicola	See *Mycosphaerella arachidis*
Mycosphaerella arachidis	
Mycosphaerella berkeleyi	
Mycosphaerella brassicicola	
Mycosphaerella caricae	

Mycosphaerella contraria
Mycosphaerella cruenta
Mycosphaerella fijiensis
Mycosphaerella fragariae
Mycosphaerella henningsii
Mycosphaerella holci
Mycosphaerella melonis
Mycosphaerella musicola
Mycosphaerella papuana
Mycosphaerella pinodes
Mycosphaerella striatiformis
Mycovellosiella cajani
Mycovellosiella koepkei
Mycovellosiella oryzae
Mycovellosiella phaseoli
Mycovellosiella puerariae
Myrothecium roridum
Nectria haematococca See *Fusarium solani*
Neojohnstonia colocasiae
Nigrospora oryzae See *Khuskia oryzae*
Nigrospora sphaerica
Nigrospora sacchari
Nigrospora sp.
Oidium caricae
Oidium tuckeri See *Uncinula necator*
Oidium sp. See also *Erysiphe sp.*
Ophiobolus oryzinus See *Gaeumannomyces graminis*
Paecilomyces sp.
Paracercospora fijiensis See *Mycosphaerella fijiensis*
Pellicularia filamentosa See *Thanatephorus cucumeris*
Penicillium citrinum
Penicillium digitatum
Penicillium funiculosum
Penicillium italicum
Penicillium javanicum
Penicillium vermiculatum See *Talaromyces flavus*
Penicillium sp.
Periconia byssoides
Periconia minutissima
Periconiella musae See also *Veronaea musae*
Peronosclerospora miscanthi
Peronosclerospora sacchari
Peronosclerospora sorghi
Peronosclerospora sp.
Peronospora parasitica
Peronospora trifoliorum
Pestalotia eugeniae
Pestalotia palmarum See *Pestalotiopsis palmarum*
Pestalotiopsis disseminata
Pestalotiopsis japonica
Pestalotiopsis palmarum
Pestalotiopsis papposa

Pestalotiopsis psidii	
Pestalotiopsis strictica	
Pestalotiopsis theae	
Pestalotiopsis sp.	
Phaeocytostroma sacchari	
Phaeodactylium alpiniae	
Phaeoisariopsis bambusae	
Phaeoisariopsis bataticola	
Phaeoisariopsis griseola	
Phaeoseptoria oryzae	
Phakopsora pachyrhizi	
Phakopsora vignae	
Phanerochaete salmonicolor	
Phellinus gilvus	
Phellinus noxius	
Phoma exigua	
Phoma pomorum	
Phoma destructiva	
Phoma sorghina	See *Mycosphaerella holci*
Phomopsis citri	See *Diaporthe citri*
Phomopsis ipomoea-batatas	
Phyllachora coicis	
Phyllachora graminis	
Phyllachora kaernbachii	
Phyllachora minutissima	
Phyllachora musicola	
Phyllachora sacchari	
Phyllosiphon sp.	Alga
Phyllosticta batatas	See *Phomopsis ipomoea-batatas*
Phyllosticta dioscoreae	See *Guignardia dioscoreae*
Phyllosticta musarum	See *Guignardia musae*
Phyllosticta sp.	
Phyllostictina musarum	See *Guignardia musae*
Physalospora tucumanensis	
Phytophthora cinnamomi	
Phytophthora citricola	
Phytophthora colocasiae	
Phytophthora cryptogea	
Phytophthora infestans	
Phytophthora palmivora	
Phytophthora nicotianae var. *nicotianae*	
Phytophthora nicotianae var. *parasitica*	
Phytomonas citri	See *Xanthomonas campestris* var *citri*
Pithomyces chartarum	
Pithomyces sacchari	
Plasmopara viticola	
Plectronidium minor	
Pleocyta sacchari	See *Phaeocytostroma sacchari*
Podonectria sp.	
Polyporus gilvus	See *Phellinus gilvus*

Practylenchus sp.	Nematode
Proboscispora manihotis	
Pseudocercospora artocarpi	
Pseudocercospora cruenta	See *Mycosphaerella cruenta & M. contraria*
Pseudocercospora fijiensis	See *Mycosphaerella fijiensis*
Pseudocercospora fuligena	
Pseudocercospora musae	See *Mycosphaerella musicola*
Pseudocercospora protensa	
Pseudocercospora psophocarpi	
Pseudocercospora stahlii	
Pseudocercospora timorensis	
Pseudocercospora ubi	
Pseudocercospora ubicola	
Pseudoepicoccum cocos	
Pseudofavolus polygrammus	
Pseudomonas cepacia	Bacterium
Pseudomonas solanacearum	Bacterium
Pseudomonas syringae pv *maculicola*	Bacterium
Pseudoperonospora cubensis	
Pteroconium sp.	See *Apiospora camptospora*
Puccinia arachidis	
Puccinia citrata	See *Puccinia nakanishikii*
Puccinia finschiae	
Puccinia kuehnii	
Puccinia nakanishikii	
Puccinia operta	
Puccinia paullula	
Puccinia polysora	
Puccinia purpurea	
Puccinia sorghi	
Pyrenochaeta sp.	
Pyricularia grisea	See *Magnaporthe grisea*
Pyricularia oryzae	
Pyricularia zingiberi	
Pythium arrhenomanes	
Pythium butleri	
Pythium carolinianum	
Pythium deliense	
Pythium irregulare	
Pythium myriotylum	
Pythium spendens	
Pythium vexans	
Radopholus similis	Nematode
Ramichloridium musae	See *Periconiella musae & Veronaea musae*
Ramularia deusta	See *Mycovellosiella phaseoli*
Ramularia phaseoli	See *Mycovellosiella phaseoli*
Ramularia sp.	
Ramularia oryzae	See *Mycovellosiella oryzae*
Ramulispora sacchari	
Rhabditis sp.	Nematode
Rhizoctonia solani	See *Thanatephorus cucumeris*

Rhizopus nigricans	See *Rhizopus stolonifer*
Rhizopus stolonifer	
Rigidoporus lignosus	
Rigidoporus microporus	
Rotylenchus sp.	Nematode
Sarcopodium vanillae	
Schiffnerula mirabilis	
Sclerospora sacchari	See *Peronosclerospora sacchari*
Sclerotinia fuckeliana	See *Botryotinia fuckeliana*
Sclerotium rolfsii	See *Athelia rolfsii*
Scolecotrichum musae	See *Cordana musae*
Scopulariopsis brevicaulus	
Scutellina badio-berberis	
Scutellonema sp.	
Septoria apiicola	
Septoria lactucae	
Septoria lycopersici	
Septoria oryzae	
Setosphaerica turcica	
Sphaceloma batatas	See *Elsinoe batatas*
Sphaceloma fawcettii	See *Elsinoe fawcettii*
Sphaceloma fawcettii var *scabiosa*	
Sphaceloma reiliana	
Sphacelotheca reiliana	
Sphacelotheca sorghi	
Sphaerophragmium boanense	
Sphaerotheca fuliginea	
Sphaerulina sp.	
Spaerulina oryzina	
Spongospora subterranean	
Sporidesmium macrurum	
Stachylidium bicolor	
Stagonospora sacchari	
Stagonospora sp.	
Stemphylium lycopersici	
Stigmina mangiferae	
Streptomyces scabies	Bacterium
Synchytrium minutum	
Synchytrium phaseoli	
Synchytrium psophocarpi	
Talaromyces flavus	
Taphrina deformans	
Tetraploa aristate	
Thanatephorus cucumeris	
Thanatephorus sasakii	
Thielaviopsis paradoxa	See *Ceratocystis paradoxa*
Tiarosporella madreeya	
Tranzschelia pruni-spinosae	
Trematosphaerella bambusae	
Trichobotrys pannosa	
Trichoconiella padwickii	
Trichoderma sp.	

Trichoderma koningii	
Trichoderma viridus	
Trichometasphaeria turcica	See *Setosphaeria turcica*
Tripospermum sp.	
Tylenchus semipenetrans	Nematode
Uncinula necator	
Uredo alocasiae	
Uredo artocarpi	
Uredo dioscoreae-sativae	
Uredo hiulca	See *Goplana dioscoreae*
Uredo musae	
Uredo operta	See *Puccinia operta*
Uredo palmifoliae	
Uredo passiflorae	
Uromyces appendiculatus	
Uromyces dolichi	See *Uromyces appendiculatus*
Uromyces fabae	See *Uromyces viciae-fabae*
Uromyces leptodermus	See *Uromyces setariae-italicae*
Uromyces musae	
Uromyces phaseoli	See *Uromyces appendiculatus*
Uromyces setariae-italicae	
Uromyces viciae-fabae	
Uromyces vignae	See *Uromyces appendiculatus*
Ustilaginoidea virens	
Ustilago avenae	
Ustilago maydis	See also *Ustilago zeae*
Ustilago zeae	
Ustulina deusta	
Veronaea musae	
Verrucispora proteacearum	
Verticillium intertextum	
Verticillium sp.	
Volutella sp.	
Wentiomyces javanicus	
Xanthomonas campestris pv *aracearum*	Bacterium
Xanthomonas campestris pv *betlicola*	Bacterium
Xanthomonas campestris pv *citri*	Bacterium
Xanthomonas campestris pv *campestris*	Bacterium
Xanthomonas campestris pv *glycines*	Bacterium
Xanthomonas campestris pv *vesicatoria*	Bacterium
Xanthomonas citri	See *Xanthomonas campestris* var. *citri*
Xanthomonas phaseoli	Bacterium
Xiphinema sp.	Nematode
Xylohypha sp.	
Zygosporium gibbum	
Zygosporium parasiticum	See *Zygosporium gibbum*

Plant disease index

and	*Goplana australis*	
and	*Goplana dioscoreae*	
Yellow leaf mould kudzu	*Mycovellosiella puerariae*	71
Yellow spot, sugarcane	*Mycovellosiella koepkei*	197

Diseases not described above:

Leaf spot on Aila (*Inocarpus fagifer*)

Leaf spot on Amaranth

Leaf spot on Betel nut

Leaf spot on *Bridelia tomentosa*

Leaf spot on Candle nut (*Aleurites moluccana*)

Leafspot on *Castanopsis acuminatissima*

Leafspot on Elephant foot yam

Leafspot on Governor's plum

Leaf spot on ginger

Leaf spot on *Ipomoea tuba*

Leaf spot on kangkong

False rust on Kudzu (*Pueraria lobata*)

Leaf spot on *Morinda citrifolia*

Leaf spot on Palpal (*Erythrina variegata*)

Leaf spot on sago

Leaf spot on Talis (*Terminalia impediens*)

Leaf spot on Ton (*Pometia pinnata*)

Tu-lip (*Gnetum gnemon*) Exobasidium

Leaf spot on Coastal almond
(*Terminalia catappa*)

Virus in Valanguar (*Polyscias verticillata*)

Leaf spot Watercress