

**Plant pathogens —
can we believe the names,
and why so many names?**

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Portion of Cambodian Quarantine Pest List

<i>Cercospora concors</i> (Casp.) Sacc.	FUN	Mycosphaerellaceae	Capnodiales		Potato	<i>Passalora concors</i> (Casp.) U. Braun & Crous
<i>Ceroplastes ruben</i>	INS	Coccididae	Homoptera	Pink wax scale	Mango	
<i>Chaetanaphothrips leeuweni</i>	INS	Thripidae	Thysanoptera	Rust thrips of Banana	Banana	
<i>Chloropulvinaria aurantii</i>	INS	Coccidae	Homoptera	Citrus cotton scale	Orange	
<i>Chrysomphalus dactiospermi</i>	INS	Diaspididae	Homoptera	Florida red seal	Orange	
<i>Cirsium arvense</i>	WEE	Asteraceae	Asterales	Canada thistle Rice	Potato	
<i>Citripestis sagittiferella</i>	INS	Pyralidae	Lepidoptera	Cilrus fruit borer	Orange	
<i>Coccus hesperidum</i>	INS	Coccidae	Homoptera	Brown Soft Scale	Durian	
<i>Cocus mangifera</i>	INS	Coccididae	Homoptera	Scale	Mango	
<i>Cocus pseudomagnoliarum</i>	INS	Coccidae	Homoptera	Seate	Orange	
<i>Cocus viridis</i>	INS	Coccidae	Homoptera	Green coffee seal	Orange	
<i>Colletotrichum atramentarium</i> (Berk. & Broome) Taubenh.	FUN	Glomerellaceae	Incertae sedis	Anthracoise	Potato	<i>Colletotrichum coccodes</i> (Wallr.) S. Hughes
						There are records of <i>C. gloeosporioides</i> from Cambodia, but the species on citrus is probably distinct
<i>Colletotrichum gloeosporioides</i> (Penz.) Penz. & Sacc.	FUN	Glomerellaceae	Incertae sedis	Anthracoise	Orange	
<i>Colletotrichum musae</i> (Berk. & M.A. Curtis) Arx	FUN	Glomerellaceae	Incertae sedis	Banana Black Rot	Banana	
<i>Clavibacter michiganensis</i> (Smith 1910) Davis et al. 1984	BAC	Microbacteriaceae	Actinomycetales	Bacterial canker of tomato		
Cucumber mosaic virus	VIR	Bromoviridae	Cucumovirus	Cucumber mosaic	Banana	
<i>Dacus tryoni</i>	INS	Tephritidae	Diptera	Queensland fruit fly	Orange	
<i>Deanolis albizonalis</i>	INS	Pyralidae	Lepidoptera	Mango fruit borer	Mango	
<i>Deightoniella torulosa</i> (Syd.) M.B. Ellis	FUN	Corynesporascaceae	Pleosporales	Fruit Spot on Banana	Banana	<i>Corynespora torulosa</i> (Syd.) Crous
						<i>Plenodomus tracheiphilus</i> (Petri) Gruyter, Aveskamp & Verkley
<i>Deuterophoma tracheiphila</i> Petri	FUN	Incertae sedis	Pleosporales	Mal secco disease of citrus	Orange	
<i>Dialeurodes citri</i>	INS	Aleyrodidae	Hemiptera	Citrus white fly	Orange	
<i>Diaporthe citri</i> F.A. Wolf	FUN	Diaporthaceae	Diaporthales	Melanose	Orange	<i>Phomopsis citri</i> H.S. Fawc. Already present under this name in list
						<i>Lasiodiplodia theobromae</i> (Pat.) Griffon & Maubl.
<i>Diplodia natalensis</i> Pole-Evans	FUN	Botryosphaeriaceae	Botryosphaeriales	Stem-end rot	Orange	
<i>Ditylenchus angustus</i> (butler) Filipjev	NEM	Anguinidae	Tylenchida	Rice stem nematode		
<i>Ditylenchus destructor</i>	NEM	Anguinidae	Tylenchida	Nematode	Potato, Orchid	
<i>Ditylenchus dipsaci</i>	NEM	Anguinidae	Tylenchida	Tuber-rot	Potato	
<i>Drosophila melanogaster meigen</i>	INS	Drosophilidae	Diptera	Common fruit fly	Mango, Orange	
<i>Elsinoe australis</i> Bitanc. & Jenkins	FUN	Elsinoaceae	Myriangiales	Sweet orange scab	Orange	
<i>Ephelis oryzae</i> ?same as next one	WEE	Poaceae	Cyperales	Bermudagrass	Rice	
						<i>Balansia oryzae-sativae</i> Hashioka
<i>Ephelis oryzae</i> Syd.	FUN	Clavicipitaceae	Hypocreales	Udbatta disease		
<i>Erosomyia mangiferae</i>	INS	Cecidomyiidae	Diptera	Mango gall midge	Mango	
<i>Pantoea stewartii</i> (Smith 1898) Mergaert et al. 1993	BAC	Enterobacteriaceae	Enterobacteriales	Bacterial wilt of maize		

Reasons for name changes

Person faults – Can we believe the names?

- wrongly identified
- differing opinions
- insufficient information

Nomenclatural changes – Why so many names?

- transferred to another genus
- changes due to more information (molecular)
 - species may be combined or split
- hybridization = new species, eg. *Phytophthora*

Evaluating the Reliability of a Pest Record (ISPM5 – International Standards for Phytosanitary Measures)

Collector/Identifiers

- **Taxonomic specialist**
- Professional specialist, diagnostician
- Scientist
- Technician
- Expert amateur
- Non-specialist
- Collector/identifier
- Not known



PREVIOUSLY – prior to 2013

**Many fungi had 2 (or more) names
(dual nomenclature)**

- **One name for the asexual state (stage)**
- **One name for the sexual state (stage)**
Sexual name took precedence

NOW - post
‘The Age of Enlightenment’

‘One fungus, one name’
Came into being 1 January 2013

BUT,
‘One fungus = Which name?’
**Generally earliest name takes
precedence**

Molecular revolution

Late 1980s, PCR made DNA variation accessible to systematic mycologists

Previously:

Biological species

A group of individuals which can breed together. They cannot breed with other groups, i.e., the group is reproductively isolated .

Now:

Phylogenetic species = explosion of species

A species is a “tip” on a phylogeny, i.e., the smallest set of organisms that share an ancestor and can be distinguished from other such sets.

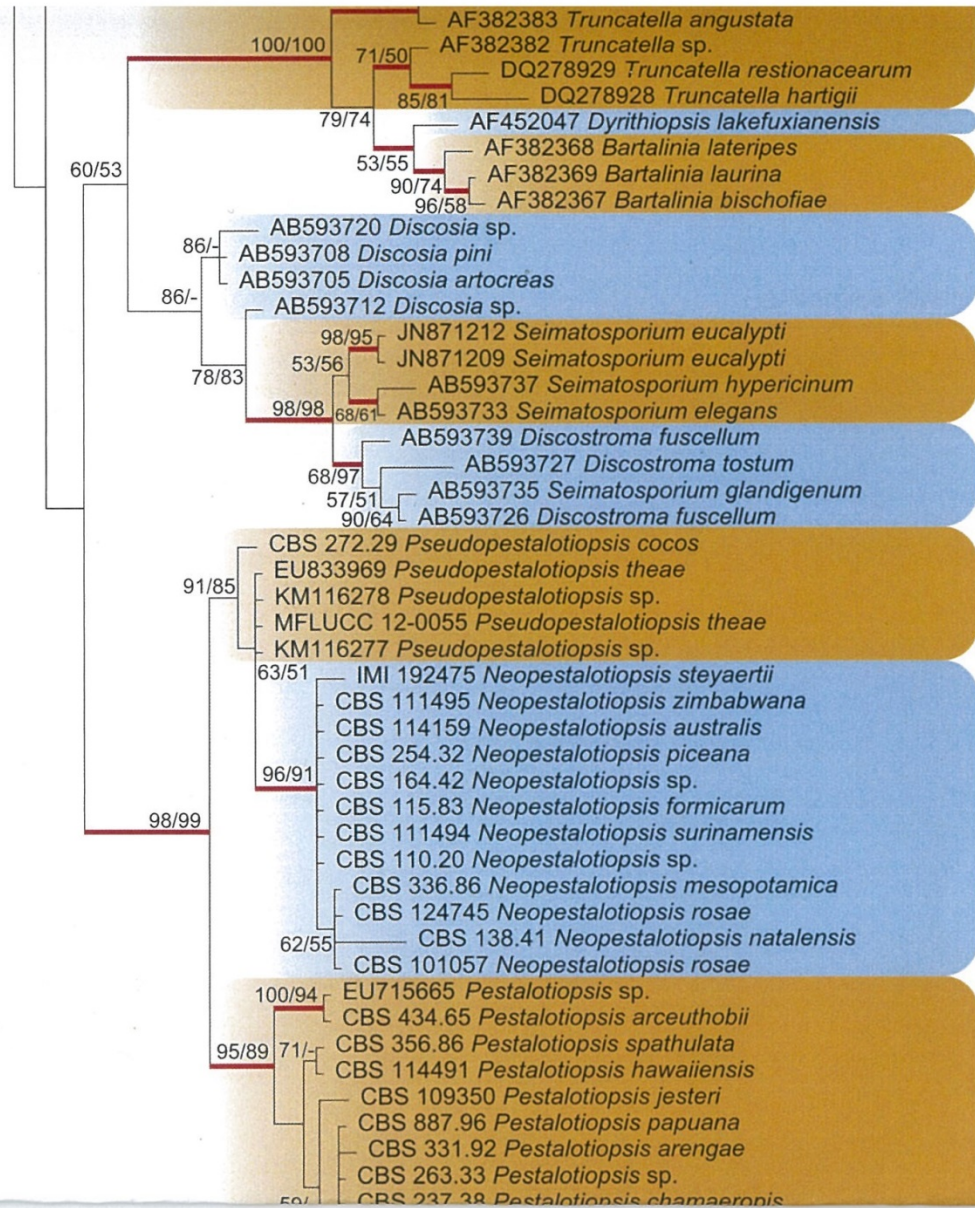
Pestalotiopsis

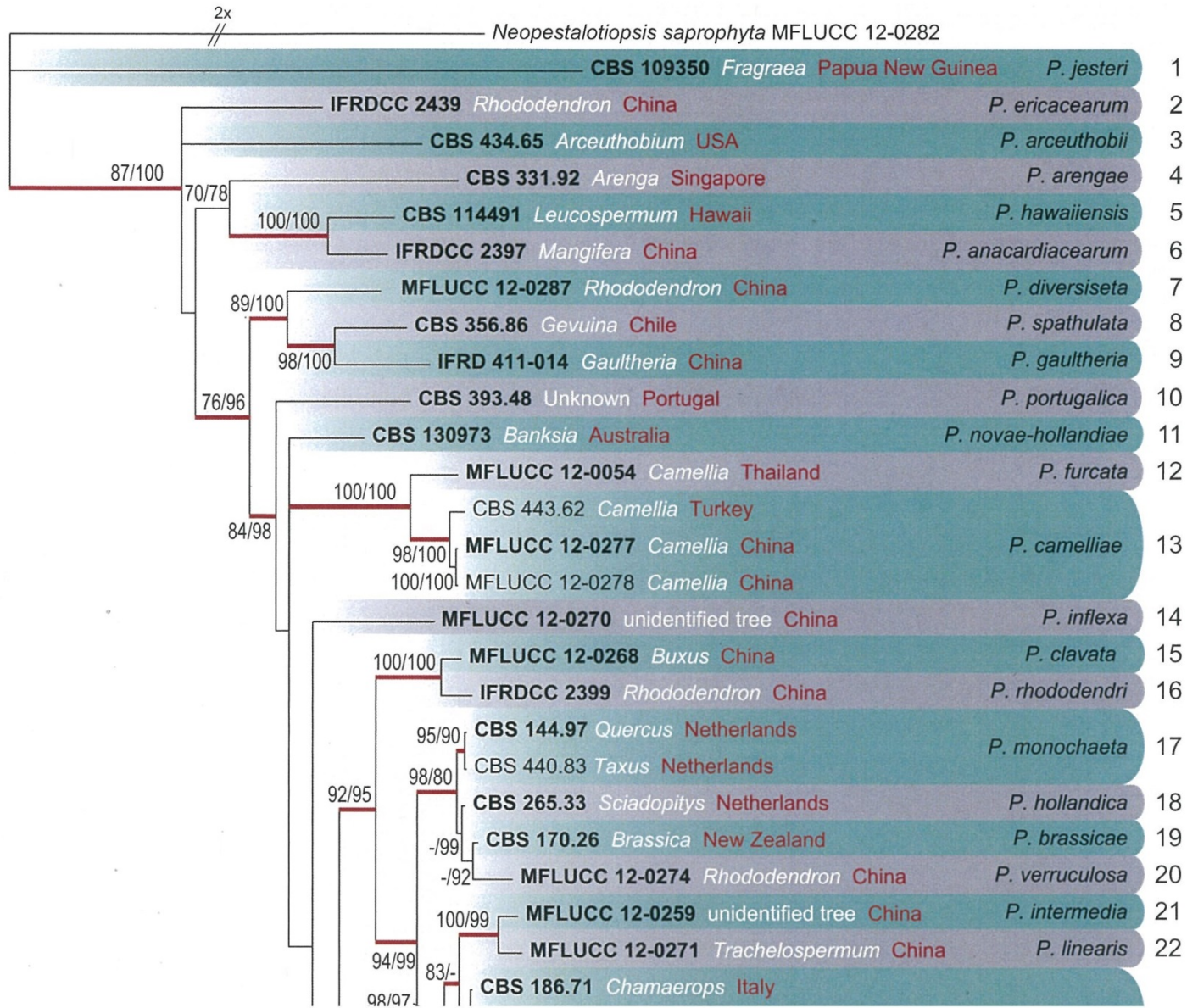
Leaf spots, leaf
necrosis, die backs



Pestalotiopsis = Pestalotiopsis + Pseudopestalotiopsis + Neopestalotiopsis

0.3





Colletotrichum

Anthracnose, fruit rots,
dieback, etc.



Colletotrichum gloeosporioides complex

- *C. gloeosporioides* was described in 1882
- Many additional *C. gloeosporioides*-like species described based on host
- Has been associated with ca. 500 host genera
- von Arx (1957) placed 600 taxa into synonymy with 11 accepted species, including 9 forms in *C. gloeosporioides*
- Weir et al. (2012) accepted 23 taxa within '*C. gloeosporioides*' clade – *C. gloeosporioides* more or less restricted to *Citrus*
- *C. fragariae* in *C. gloeosporioides* clade causes strawberry stolon disease not found in New Zealand

Colletotrichum in New Zealand (1)

Green = Pennycook 1989; Red = *C. gloeosporioides* group; Yellow = *C. boninense* group; Blue = *C. acutatum* group

C. acerbum NZ apple (bitter rot)

C. acutatum widespread on many hosts

C. acutatum f.sp. *pineum* = *C. acutatum*

C. alienum on fruit crops NZ, Australia

C. aotearoa on native plants NZ, ?China

C. atramentarium = ? *C. coccodes*

C. beeveri NZ on native plant

C. boninense on various plants NZ, Australia, Japan

C. brassicicola NZ on *Brassica*

G. cingulata f.sp. *camelliae*

C. circinans = ? *C. coccodes*

C. coccodes

C. coffeanum identification uncertain

Colletotrichum in New Zealand (2)

Green = Pennycook 1989; Red = *C. gloeosporioides* group; Yellow = *C. boninense* group; Blue = *C. acutatum* group

C. constrictum NZ on *Citrus* & *Solanum*

C. cymbidiicola on *Cymbidium* NZ, Australia

C. dacrycarpi NZ on *Dacrycarpus*

C. dematium = complex, many belong to other species

C. destructivum uncertain

C. fructigenum

C. gloeosporioides = more or less confined to citrus

C. graminicola = anthracnose of corn

C. horii on *Diospyros kaki* NZ, China, Japan

C. johnstonii NZ on fruit

C. kahawae ssp. *ciggaro* on many hosts NZ, Australia, Germany, South Africa

C. lagenarium

C. lindemuthianum uncertain, part of *C. orbiculare*?

Colletotrichum in New Zealand (3)

Green = Pennycook 1989; Red = *C. gloeosporioides* group; Yellow = *C. boninense* group; Blue = *C. acutatum* group

C. lini uncertain

C. linicola uncertain

C. musae on banana NZ, widespread elsewhere

C. novae-zelandiae NZ on fruit

C. orbiculare complex

C. parsoniae NZ on *Parsonsia*

C. phormii on *Phormium* NZ, Europe, South Africa

C. pyricola NZ on *Pyrus*

C. rhodocyclum = *C. phormii*

C. theobromicola widespread on many hosts

C. ti NZ on *Cordyline*

C. torulosum NZ on fruit

C. trifolii uncertain, part of *C. orbiculare*?

Phytophthora

- Traditionally thought of as soil pathogens attacking roots
- *P. infestans* – potato blight, aerial pathogen
- *P. colocasiae* – taro leaf blight, aerial pathogen
- *P. ramorum* – sudden oak death, rhododendron, etc.; 1995 California
- *P. agathidicida* – kauri die back
- Environmental screening – streams
- Pre 2000 – ca. 50 spp.; post 2000 – ca. 50 new spp.
- Colin Brasier estimates 200 – 600 spp.



Fusarium

Impediment to study of *Fusarium* has been the incorrect and confused application of species names to toxigenic and pathogenic isolates

Largely due to intrinsic limitations of morphological species recognition

***Fusarium* head blight disease of wheat and barley reached epidemic proportions within USA (and other parts of world including NZ) during 1990s**

Fusarium



- Primary causal agent *Fusarium graminearum* was thought to be a single species spanning 6 continents
- O'Donnell et al. (2004) identified 8 biogeographically structured, phylogenetically distinct species
- Monds et al. (2005) identified *F. graminearum* and *F. cortaderiae* in NZ maize and wheat
- *F. cortaderiae* thought to be of South American origin

Why are correct names important?

- To facilitate communication among plant pathologists, mycotoxicologists, and quarantine specialists so that active surveillance of global movement of pests can be undertaken
- To assist in preventing inadvertent intercontinental introduction of genetically unique foreign populations
- So toxin chemotypes can be accurately reported (eg, trichothecene *Fusarium* isolates)

Why are correct names important?

- To alert plant breeders of the importance of including all appropriate species in their breeding programs, to increase likelihood of developing new varieties with broad-based resistance
- To enhance success rate through introduction of biological control agents

THANKS

"IS THIS ONE OF THOSE DEALS
WHERE THE NAMES HAVE BEEN
CHANGED TO PROTECT
THE INNOCENT?"

