

**WEEDS and  
PLANT PATHOGENIC  
FUNGI and VIRUSES**  
in TOKELAU



SPC Land Resources Division  
Suva, Fiji

# WEEDS and PLANT PATHOGENIC FUNGI and VIRUSES in TOKELAU

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# ABSTRACT

Plant pathogenic fungi and a plant pathogenic virus of Tokelau are documented, together with the atolls' weeds. All records of plant pathogens are new to Tokelau because this is believed to be the first such survey. The lists include 8 pathogenic fungi from 13 host plants, and 1 plant pathogenic virus. Five plants potentially significant as environmental weeds were recorded. Voucher specimens of all pathogenic fungi collected are held in the New Zealand Fungal Herbarium. Brief descriptions of the diseases are provided, with notes on their distribution, transmission and host range.

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# 1. INTRODUCTION

## 1.1 Tokelau

Tokelau 9°00S, 172°00W consists of three atolls 483 km north of Samoa. Fakaofu is the southernmost atoll, with Nukunonu 64 km to its north and Atafu a further 92 km north. The land area of Tokelau is approximately 12 square kilometres. The mean average temperature is 28°C, with July being the coolest month and May the warmest. From April to November, the east–southeasterly trade winds dominate climatic conditions. Rainfall is irregular but heavy, averaging about 2500 mm per year (Tokelau Council of Ongoing Government 2005).

The islets (motu) are made up of coral rubble and sand mixed with a thin layer of humus and the soil is of generally low fertility. The highest point above sea level is 5 metres. The principal terrestrial ecosystems are beach scrub and coconuts, but there are remnants of atoll forest, with species of *Cordia*, *Pisonia* and *Guettarda* on Tokelau and Long islets in Nukunonu Atoll (Parham 1971; Dahl 1986). Because of the low fertility and distance from sources of biodiversity (e.g. high volcanic islands), the plant life is limited. Sixty-seven vascular plants have been recorded, including 16 species of weeds and grasses and 13 of cultivated plants (Anon. 1989).

The poor soils make growing crops in Tokelau harder than it is on high volcanic islands. Coconut and pandanus are the most common plant species, although other species common to central Polynesia are found in smaller numbers. Staple food crops include bananas, papaya, pulaka (*Cyrtosperma chamissonis*) and breadfruit. Tokelau occasionally exports green coconuts to Samoa.

## 1.2 Plant disease survey in Tokelau

No previous systematic plant disease survey of Tokelau could be confirmed by the authors. From records in the New Zealand Fungal Herbarium, it appears that wood-colonising fungi were collected by K. Wodzicki in 1968 and identified and stored by herbarium staff (<http://nzfungi.landcareresearch.co.nz/>). No plant pathogenic fungi or viruses are recorded in the *CABI Crop Protection Compendium* or the *FAO Global Plant and Pest Information System*. No publications (either formal or in the “grey literature”) could be found that refer to plant pathogenic fungi or viruses from Tokelau.

All plant disease records documented in this technical report are new records. The current survey was carried out in conjunction with an insect survey and the results of that survey will be recorded elsewhere. In general the plant life of the three atolls tended to be very healthy and pathogen-free (refer to the insect survey report for an account of the scale and ant problems experienced on Tokelau). Plant diseases are less diverse than those on high volcanic islands such as Fiji or Samoa that have a richer plant life. The spectrum of diseases observed appears similar to that on other atolls surveyed.

## 3.3 Weed survey in Tokelau

The plants of Tokelau are well-documented by Parham (1971) and Whistler (1987), who identify many weed species. This present survey adds to their lists.

## 1.4 Relevance of surveys

It is important for countries to maintain their national pest lists, and the current survey was in support of this aim. A pest list helps a country to know what plant pathogens it does not have, and to target appropriate quarantine measures to keep out undesirable organisms.



## 2. METHODS

### 2.1 Field-collection technique for plant pathogenic fungi

Tokelau agriculture tends to be concentrated in small, mixed gardens, making it possible to inspect nearly all the plants in an area, first by walking through and then by making closer visual inspections of symptoms detected. All major crops on the three atolls were surveyed and 32 suspected plant pathogenic fungal specimens were collected (see Appendix 2 for details). For every set of symptoms observed, one specimen was taken in a manner appropriate to that type of specimen. For fungal diseases, a “whole plant” photo of the plant showing symptoms was taken in the field.

### 2.2 Specimen-preparation and identification techniques for plant pathogenic fungi

Due to restrictions on import of plant specimens into Fiji, the host country for the SPC Plant Protection Service, all specimens for taxonomic identification or validation were sent to taxonomic specialists overseas. Valid import permits for these specialists are held at SPC, and conditions for import were followed in preparing specimens. Specimens showing evidence of sporulation were dried for 24–48 hours by pressing in newspaper using a plant press and a mobile plant specimen dryer (*photo below*). If suspected fungal disease specimens were not showing evidence of sporulation, they were incubated for 24–48 hours in a moist chamber (polythene bag) and then dried in the same manner as described above. Fungal disease specimens were determined by Dr Eric McKenzie using light microscopy.



*Mobile plant specimen dryer and plant press.*

### 2.3 Specimen preparation techniques for suspected plant pathogenic viruses

Seven suspected plant viral infections were collected (see Appendix 3 for details), surface sterilised and desiccated using anhydrous calcium chloride. The dried specimens were sent to Dr Phil Jones, Tropical Virus Unit, Plant Pathogen Interactions Division, IACR Rothamsted, United Kingdom. All plant specimens were examined by transmission electron microscopy and the one virus detected identified by immunosorbent electron microscopy.

### 2.4 Field collection and specimen preparation techniques for weeds

Although many plants considered weeds on other islands are valued on the atolls, all plants known as weeds either in other countries or by the local people were collected (see Appendix 4 for details). Whole plants with flowers and seeds were collected, pressed and dried as for plant pathogenic fungal specimens.

### 3. HOST PLANTS, FUNGI AND A VIRUS

As a result of the survey reported here, 14 new host/fungus combinations, and one new plant virus/host combination were recorded (Table 1).

**Table 1.** New records of plant pathogenic fungi and a virus identified from the survey of Tokelau.

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**Family****Host****Pathogen (Collection no.)****APOCYNACEAE**

*Plumeria obtusa* L.; frangipani

*Coleosporium plumeriae* Pat.; leaf rust (TK01 & 41b)

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK41a)

**ARALIACEAE**

*Polyscias guilfoylei* (Bull) Bailey; aralia

*Phoma* sp.; leaf spot (TK56)

**ARECACEAE**

*Cocos nucifera* L.; coconut

*Pseudoepicoccum cocos* (F. Stevens) M.B. Ellis; brown leaf spot (TK17)

**ASTERACEAE**

*Wedelia trilobata* (L.) Hitchc.; sea daisy

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK53b)

*Myrothecium roridum* Tode; leaf spot (TK53a)

**CUCURBITACEAE**

*Cucurbita maxima* Duch.; pumpkin

*Papaya ringspot virus*, watermelon-infecting strain (TK36)

**LAURACEAE**

*Persea americana* Mill.; avocado

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK51)

**MORACEAE**

*Artocarpus altilis* (Parkins.) Fosb.; breadfruit

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK64)

**MUSACEAE**

*Musa* sp.; banana

*Deightoniella torulosa* (Syd.) M.B. Ellis; leaf spot (TK30)

**RUBIACEAE**

*Gardenia taitensis* DC.; tiale tiale

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK45)

*Guettarda speciosa* L.; puapua

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK31)

*Morinda citrifolia* L.; nonu

*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk; anthracnose (TK16)

**TACCACEAE**

*Tacca leontopetaloides* (L.) Kuntze; Polynesian arrowroot

*Cercospora taccae* (Syd. & P. Syd.) Chupp; leaf spot (TK29)

**TILIACEAE**

*Triumfetta procumbens* Forst. f.; beach burr

*Cercospora triumfeticola* Munjal, Lall & Chona; leaf spot (TK24 & 61)

# 4. ANNOTATED ACCOUNT OF THE FUNGI AND THE VIRUS

## 4.1 Fungi

**CERCOSPORA** Fresenius, 1863 (anamorphic fungi, hyphomycetes)

***Cercospora taccae*** (Syd. & P. Syd.) Chupp, *Monograph of Cercospora*: 560 (1954)

on *Tacca leontopetaloides* (Polynesian arrowroot) (PDD 76665) (Fig. 8)

DISEASE: leaf spots circular to irregular up to 10 mm diam., reddish-brown, sometimes zonate and sometimes surrounded by yellow halo. OTHER HOSTS: *Tacca palmata*. TRANSMISSION: airborne. DISTRIBUTION: Philippines, American Samoa, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Niue, Palau, Samoa, Tonga, Tuvalu, Vanuatu, and Wallis and Futuna. DESCRIPTION AND ILLUSTRATION: Chupp (1953, p. 560).

***Cercospora triumfetticola*** Munjal, Lall & Chona, *Indian Phytopath.*, Suppl. Issue 12(2): 135 (1960)

on *Triumfetta procumbens* (beach burr) (PDD 76662, PDD 76675)

DISEASE: leaf spots circular up to 5 mm diam., grey or brown with a dark brown or black border. The lesions may totally or partially abscise. OTHER HOSTS: *Triumfetta rotundifolia*. TRANSMISSION: airborne. DISTRIBUTION: India, Cook Islands, Kiribati, Marshall Islands, Niue, Tuvalu. DESCRIPTION AND ILLUSTRATION: Munjal et al. (1959, p. 135).

**COLEOSPORIUM** Lév., 1847 (Basidiomycota, Urediniomycetes, Uredinales)

***Coleosporium plumeriae*** Pat., *Bull. Soc. mycol. Fr.* 18: 178 (1902)

on *Plumeria obtusa* (frangipani) (PDD 76668, PDD 76672) (Fig. 1)

DISEASE: rust. Small yellow sori on the undersides of leaves. Leaves become necrotic and, with severe infections, premature abscission of the leaves occurs. OTHER HOSTS: many *Plumeria* species. TRANSMISSION: airborne. DISTRIBUTION: Australia, Indonesia, Hawaii and mainland USA, American Samoa, Cook Islands, Fiji, French Polynesia, New Caledonia, Samoa, Solomon Islands, Vanuatu, Wallis and Futuna. DESCRIPTION AND ILLUSTRATION: Traquair and Kokko (1980), Ogata and Gardner (1992).

**DEIGHTONIELLA** S. Hughes, 1952 (anamorphic fungi, hyphomycetes)

***Deightoniella torulosa*** (Syd.) M.B. Ellis, *Mycol. Pap.* 66: 7 (1957)

on *Musa* sp. (banana) (PDD 76676)

DISEASE: leaf blotch and tip rot of fruit. Elsewhere reported as a fruit speckle, and on abaca as a pseudostem rot. On older leaves can cause oval, tan spots with a black border. On suckers may cause leaf tip and leaf edge necrosis. OTHER HOSTS: *Musa* is the main genus from which *D. torulosa* is recorded. It has also been recorded from other plants from the Order Zingiberales (Heliconiaceae, Costaceae, Musaceae). TRANSMISSION: airborne. CONTROL: may be controlled by a general fungicide programme or fungicide fruit dip. It is often evident under poor growing conditions. DISTRIBUTION: circumglobal in the tropics. DESCRIPTION AND ILLUSTRATION: Subramanian (1968).

**GLOMERELLA** Spauld. & H. Schrenk, 1903 (Ascomycota, Xylariales)

**Glomerella cingulata** (Stoneman) Spauld. & H. Schrenk, *Science*, 17:751(1903)

on *Artocarpus altilis* (breadfruit) (PDD 76674) (Fig. 5)  
*Gardenia taitensis* (tiale tiale) (PDD 76666)  
*Guettarda speciosa* (puapua) (PDD 76677) (Fig. 6 a and b)  
*Morinda citrifolia* (nonu) (PDD 76669) (Fig. 7 a and b)  
*Persea americana* (avocado) (PDD 76673) (Fig. 4)  
*Plumeria obtusa* (frangipani) (PDD 76663) (Fig. 1)  
*Wedelia trilobata* (sea daisy) (PDD 76671)

DISEASE: anthracnose. OTHER HOSTS: on over 500 plant species. TRANSMISSION: airborne, seedborne, infected crop residues. CONTROL: cultivar resistance, cultural controls, fungicides. DISTRIBUTION: worldwide. DESCRIPTION AND ILLUSTRATION: Mordue (1971), Sutton (1980).

**MYROTHECIUM** Tode, 1790 (anamorphic fungi, hyphomycetes)

**Myrothecium roridum** Tode, *Fung. mecklenb. sel.* 1: 25 (1790)

on *Wedelia trilobata* (sea daisy) (PDD 76664)

DISEASE: associated with irregular leaf spots. OTHER HOSTS: many plant species can be attacked, although this fungus is often a secondary invader. Common in soil. TRANSMISSION: airborne, waterborne, soilborne, seedborne in some plants. DISTRIBUTION: worldwide, especially common in warm countries (CMI Map No. 458). DESCRIPTION AND ILLUSTRATION: Fitton and Holliday (1970).

**PHOMA** Saccardo, 1880 (anamorphic fungi, coelomycetes)

**Phoma** sp.

on *Polyscias guilfoylei* (aralia) (PDD 76667) (Fig. 2)

DISEASE: leaf spot.

**PSEUDOEPICOCCUM** M.B. Ellis, 1971 (anamorphic fungi, hyphomycetes)

**Pseudoepicoccum cocos** (F. Stevens) M.B. Ellis, *Dematiaceous Hyphomycetes* (Kew): 270 (1971)

on *Cocos nucifera* (coconut) (PDD 76670)

DISEASE: brown leaf spot. Spots oval, up to 10 x 4 mm, usually smaller, reddish-brown, sometimes zonate with a pale centre, usually with a distinct darker margin on upper leaf surface; margin usually less distinct on lower surface; usually present on older leaves. Powdery black masses of spores usually evident on lower surface. OTHER HOSTS: *Areca* spp., *Elaeis guineensis* (oil palm). TRANSMISSION: airborne. DISTRIBUTION: West Indies, Africa, Pakistan, Southeast Asia, widespread in Pacific. DESCRIPTION AND ILLUSTRATION: Ellis (1971).

## 4.2 Virus

**PAPAYA RINGSPOT VIRUS, CUCURBIT-INFECTING STRAIN**

**Papaya ringspot virus (PSRV-W) type w**  
previously Watermelon mosaic virus 1

on *Cucurbita maxima* (pumpkin) (Fig. 3)

DISEASE: light green on dark green mosaic on the leaves and minor leaf distortion. OTHER HOSTS: infects cucurbits only. TRANSMISSION: aphids. DISTRIBUTION: worldwide. DESCRIPTION AND ILLUSTRATION: Brunt (1996).

## 5. WEEDS

Many plants considered weeds on other islands are valued on the atolls of Tokelau but, as noted earlier, all plants known as weeds either here or in other countries were collected. Five plants—*Cenchrus echinatus*, *Eleusine indica*, *Sporobolus elongatus*, *Triumfetta rhomboidea* and *Wedelia trilobata*—have been assessed to be of environmental concern to Pacific Islands (PIER 2005). The classifications by the *Global Compendium of Weeds* (Randall 2002) have been included for reference only; it is important to assess a plant in each location to determine if it is potentially invasive (and whether or not this is desirable). *Cassytha filiformis* is also considered invasive and it was observed to be spreading where it was present.

Family	Global Compendium of Weeds classification (Randall 2002)
<i>Weed</i>	
<b>ASTERACEAE</b>	
<i>Conyza bonariensis</i> L.; hairy fleabane	Weed–Naturalised–Introduced–Environmental weed–Casual alien
<i>Synedrella nodiflora</i> (L.) Gaertn.; synedrella	Weed–Naturalised–Introduced–Environmental weed
<i>Sphagneticola (Wedelia) trilobata</i> (L.) Hitchc.; sea daisy	Weed–Naturalised–Introduced–Garden escape–Environmental weed–Cultivation escape
<b>BRASSICACEAE</b>	
<i>Lepidium virginicum</i> L.; peppergrass	Weed–Naturalised–Introduced–Casual alien–Cultivation escape
<b>CASSYTHACEAE</b>	
<i>Cassytha filiformis</i> L.; dodder, fetai	
<b>COLCHICACEAE</b>	
<i>Gloriosa superba</i> L.; glory lily	Weed–Naturalised–Garden escape–Environmental weed
<b>CONVOLVULACEAE</b>	
<i>Ipomoea macrantha</i> Roem. & Schult.; moonflower	Weed
<i>Ipomoea pes-caprae</i> (L.) R. Br.; beach morning glory, fue moa	Noxious weed–Introduced
<b>CRASSULACEAE</b>	
<i>Kalanchoe pinnata</i> (Lam.) Pers.; Canterbury bells	Weed–Naturalised–Environmental weed–Cultivation escape
<b>CYPERACEAE</b>	
<i>Cyperus compressus</i> L.; flat sedge	Weed–Naturalised–Introduced–Environmental weed
<i>Fimbristylis dichotoma</i> (L.) Vahl; two-leaved fimbristylis	Weed–Native weed
<b>EUPHORBIACEAE</b>	
<i>Chamaesyce (Euphorbia) atoto</i> (L.) Millsp.; pulu tai	Weed
<i>Chamaesyce hirta</i> (L.) Millsp.; hairy spurge	Weed–Naturalised–Environment weed
<i>Euphorbia cyathophora</i> J.A. Murray; Mexican fire plant	Weed–Naturalised–Introduced–Garden escape–Environmental weed
<i>Phyllanthus amarus</i> L.; carry-me-seed	Weed–Naturalised–Casual Alien
<b>PEPEROMIACEAE</b>	
<i>Peperomia pellucida</i> (L.) H.B.K.; peperomia	Weed–Naturalised–Introduced–Garden escape–Environmental weed–Cultivation escape

<b>POACEAE</b>	
<i>Cenchrus echinatus</i> L.; burr grass, vao tuitui	Weed–Noxious weed–Naturalised–Introduced–Environmental weed
<i>Eleusine indica</i> (L.) Gaertner; goosegrass	Weed–Quarantine weed–Naturalised–Introduced
<b>POACEAE (continued)</b>	
<i>Eragrostis amabilis</i> (L.) Wight & Arn. (current name) <i>Eragrostis tenella</i> (L.) P. Beauv. ex Roem. & Schult; feather lovegrass (name provided by Mr Tuiwawa)	Weed–Naturalised–Introduced
<i>Sporobolus elongatus</i> (Retz.) P. Beauv; wiregrass	Weed–Naturalised–Native weed
<i>Sporobolus indicus</i> var. <i>pyramidalis</i> (Beauv.) Veldkamp; West Indian dropseed (current name) <i>Sporobolus jacquemontii</i> Kunth (name provided by Mr Tuiwawa)	Weed–Naturalised
<b>SOLANACEAE</b>	
<i>Physalis angulata</i> L.; wild cape gooseberry, vivao	Weed–Naturalised–Introduced–Casual alien
<i>Solanum americanum</i> Mill.; black nightshade	Weed–Naturalised–Environmental weed–Casual alien
<b>TILIACEAE</b>	
<i>Triumfetta rhomboidea</i> Jacq.; Chinese burr, maufu, maufu vao	Weed–Quarantine weed–Noxious weed–Naturalised–Native weed–Introduced
<b>URTICACEAE</b>	
<i>Laportea ruderalis</i> (Forst. f.) Chew; ateate	Not a weed

## 6. PLANT FAMILIES AND GENERA

<b>APOCYNACEAE</b> <i>Plumeria</i>	<b>MORACEAE</b> <i>Artocarpus</i>
<b>ARALIACEAE</b> <i>Polyscias</i>	<b>MUSACEAE</b> <i>Musa</i>
<b>ARECACEAE</b> <i>Cocos</i>	<b>PEPEROMIACEAE</b> <i>Peperomia</i>
<b>ASTERACEAE</b> <i>Conyza</i> <i>Sphagneticola</i> <i>Synedrella</i>	<b>POACEAE</b> <i>Cenchrus</i> <i>Eleusine</i> <i>Eragrostis</i> <i>Sporobolus</i>
<b>BRASSICACEAE</b> <i>Lepidium</i>	<b>RUBIACEAE</b> <i>Gardenia</i> <i>Guettarda</i> <i>Morinda</i>
<b>CASSYTHACEAE</b> <i>Cassytha</i>	<b>SOLANACEAE</b> <i>Physalis</i> <i>Solanum</i>
<b>COLCHICACEAE</b> <i>Gloriosa</i>	<b>TACCACEAE</b> <i>Tacca</i>
<b>CONVOLVULACEAE</b> <i>Ipomoea</i>	<b>TILIACEAE</b> <i>Triumfetta</i>
<b>CRASSULACEAE</b> <i>Kalanchoe</i>	<b>URTICACEAE</b> <i>Laportea</i>
<b>CUCURBITACEAE</b> <i>Cucurbita</i>	
<b>CYPERACEAE</b> <i>Cyperus</i> <i>Fimbristylis</i>	
<b>EUPHORBIACEAE</b> <i>Chamaesyce</i> <i>Euphorbia</i> <i>Phyllanthus</i>	
<b>LAURACEAE</b> <i>Persea</i>	

# 7. COMMON AND SCIENTIFIC NAMES OF PLANTS

English	Tokelau	Botanical
aralia		<i>Polyscias guilfoylei</i>
avocado	avoka	<i>Persea americana</i>
banana	fai	<i>Musa</i> sp.
beach burr	puapua	<i>Triumfetta procumbens</i>
beach gardenia	puapua	<i>Guettarda speciosa</i>
beach morning glory	fue moa	<i>Ipomoea pes-caprae</i>
black nightshade	magalo, polo	<i>Solanum americanum</i>
breadfruit	ulu	<i>Artocarpus altilis</i>
burr grass		<i>Cenchrus echinatus</i>
Canterbury bells		<i>Kalanchoe pinnata</i>
carry-me-seed		<i>Phyllanthus amarus</i>
Chinese burr	fitotolo	<i>Triumfetta rhomboidea</i>
coconut	niu	<i>Cocos nucifera</i>
dodder	fetai	<i>Cassytha filiformis</i>
feather lovegrass		<i>Eragrostis amabilis</i>
flat sedge		<i>Cyperus compressus</i>
frangipani	puafiti	<i>Plumeria</i> sp.
glory lily		<i>Gloriosa superba</i>
goosegrass		<i>Eleusine indica</i>
hairy fleabane		<i>Conyza bonariensis</i>
hairy spurge		<i>Chamaesyce hirta</i>
Indian mulberry	nonu	<i>Morinda citrifolia</i>
Mexican fire plant		<i>Euphorbia cyathophora</i>
moonflower		<i>Ipomoea macrantha</i>
peppergrass		<i>Lepidium virginicum</i>
Polynesian arrowroot	mahoa	<i>Tacca leontopetaloides</i>
		<i>Euphorbia atoto</i>
Pumpkin	mauteni	<i>Cucurbita maxima</i>
sea daisy		<i>Wedelia trilobata</i>
shiny bush		<i>Peperomia pellucida</i>
synedrella		<i>Synedrella nodiflora</i>
Tahitian gardenia	tiale tiale	<i>Gardenia taitensis</i>
two-leaved fimbriatylis		<i>Fimbristylis dichotoma</i>
West Indian dropseed		<i>Sporobolus indicus</i> var. <i>pyramidalis</i>
wild cape gooseberry	vivao	<i>Physalis angulata</i>
wiregrass		<i>Sporobolus elongatus</i>
		<i>Laporteia ruderalis</i>
	Fale-o-te-kimoa	<i>Psilotum nudum</i>
	Fau	<i>Pipterus argenteus</i>
	Fetai	<i>Cassytha filiformis</i>
	Fitotolo	<i>Cocos nucifera</i>
	Gagie	<i>Pemphis acidula</i>
	Gahe vao	<i>Procris pedunculata</i>
	Gahu	<i>Scaevola taccada</i>
	Kanava	<i>Cordia subcordata</i>
	Laumea	<i>Asplenium nidus</i>
	Lau maile	<i>Phymatosorus scolopendria</i>
	Lau maile kimoa	<i>Messerschmidia argentea</i>
	Lau talotalo	<i>Crinum asiaticum</i>
	Mahoa	<i>Tacca leontopetaloides</i>
	Mutia	<i>Lepturus repens</i>
	Niu	<i>Cocos nucifera</i>
	Nonu	<i>Morinda citrifolia</i>
	Pua	<i>Calophyllum inophyllum</i>
	Pua fiti	<i>Plumeria</i> sp.
	Puapua	<i>Guettarda speciosa</i>
	Puka	<i>Hernandia nymphaefolia</i>
	Puka kakai	<i>Pisonia grandis</i>
	Tauhunu	<i>Messerschmidia argentea</i>
	Tiale tiale	<i>Gardenia taitensis</i>



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# APPENDIX 1 Figures

Images of plant disease symptoms caused by various pathogens on various hosts ordered by plant family.

## APOCYNACEAE

**Figure 1:** *Plumeria obtusa* L.; frangipani (TK01 & 41 a and b)



Pathogens: *Coleosporium plumeriae* Pat. (small lesions)  
*Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk (large necrotic leaf margins)

## ARALIACEAE

**Figure 2:** *Polyscias guilfoylei* (Bull) Bailey; aralia (TK56)



Pathogen: *Phoma* sp

## CUCURBITACEAE

**Figure 3:** *Cucurbita maxima* Duch.; pumpkin  
(TK36)



Pathogen: Papaya ringspot virus type w (PSRV-W)

## LAURACEAE

**Figure 4:** *Persea americana* Mill.; avocado  
(TK51)



Pathogen: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk



## MORACEAE

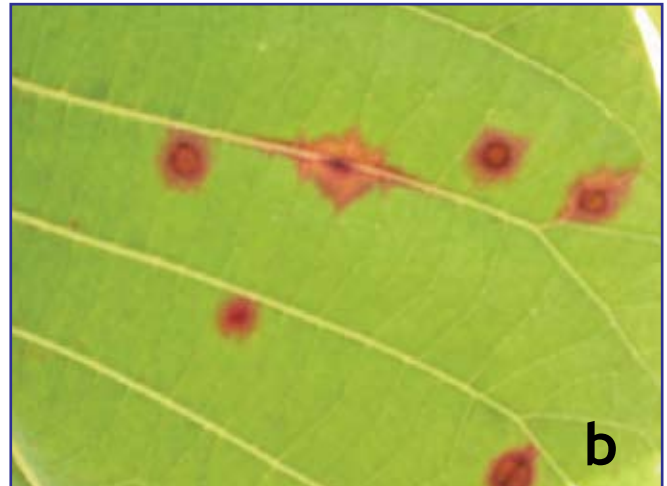
**Figure 5:** *Artocarpus altilis* (Parkins.) Fosb.; breadfruit (TK64)



Pathogen: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk

## RUBIACEAE

**Figure 6:** *Guettarda speciosa* L.; puapua (TK31)



Pathogen: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk  
a. (whole tree symptoms) and b. (leaf spot close up)

**Figure 7 :** *Morinda citrifolia* L.; nonu (TK16)



Pathogen: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk

## TACCACEAE

**Figure 8 :** *Tacca leontopetaloides* (L.) Ktze.; Polynesian arrowroot (TK29)



Pathogen: *Cercospora taccae* (Syd. & P. Syd.) Chupp

APPENDIX 2 Details of plant pathogen (fungal) specimens collected in Tokelau, June – July 2002

Date	Host	Location	Details	Collector	Confirmed ID	Landcare Herbarium No.
TK01	<i>Plumeria obtusa</i> Frangipani	Fakaofu Atoll Present on all three atolls in Tokelau	Rust observed on leaves	J.G. Wright	<i>Coleosporium plumeriae</i>	PDD 76668
TK02	<i>Cocos nucifera</i> Coconut	Fenua Loa Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright		No ID possible
TK16	<i>Morinda citrifolia</i> Nonu	Fenua Loa Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76669
TK17	<i>Cocos nucifera</i> Coconut	Fenua Loa Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright	<i>Pseudoepicoccum cocos</i>	PDD 76670
TK19	<i>Pandanus tectorius</i>	Fenua Loa, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright		No ID possible
TK20	<i>Phymatosorus scolopendria</i> Laumale	Fenua Loa, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright		No ID possible
TK21	<i>Pisonia grandis</i> Pukakakai	Fenua Loa Fakaofu Atoll	Necrotic leaf lesions	J.G. Wright		No ID possible
TK22	<i>Hernandia nymphaeifolia</i> Puka	Fenua Loa, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright		No ID possible
TK24	<i>Triumfetta rhomboidea</i> Fitoto	Fenua Loa, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Leaf spot	J.G. Wright	<i>Cercospora triumfeticola</i>	PDD 76662
TK28	<i>Cyrtosperma chamissonis</i> Pulaka	Motu where they grow pulaka Fakaofu Atoll	Leaf spot	J.G. Wright		No ID possible
TK29	<i>Tacca leontopetaloides</i> Polynesian arrowroot Mahoa	Motu? Fakaofu Atoll On all three atolls in Tokelau	Leaf spot	J.G. Wright	<i>Cercospora taccae</i>	PDD 76665
TK30	<i>Musa sp.</i>	Fenua Fala Fakaofu Atoll Present on all three atolls in Tokelau	Leaf spot/ streak	J.G. Wright	<i>Deightonella torulosa</i>	PDD 76676
TK31	<i>Guettarda speciosa</i> Pua Pua	Fenua Loa, Fakaofu Atoll Present on all three atolls in Tokelau	Leaf spot	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76677
TK32	<i>Gardenia taitensis</i> Tiale Tiale	Fenua Fala, Fakaofu Atoll	Sooty mould associated with scale insects	J.G. Wright		No ID possible

Date		Host		Location		Details		Collector	Confirmed ID	Landcare Herbarium No.
TK37	25-06-02	<i>Saccharum officinarum</i> Sugarcane	Fale, Fakaofu Atoll On all three atolls in inhabited areas where sugar cane is planted	Small red leaf spot present along leaf lamina. Older spots coalesce to form red streaks along veins.	J.G. Wright		No ID possible			
TK38	25-06-02	<i>Cocos nucifera</i> Coconut	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau	Large necrotic/grey leaf spot	J.G. Wright		No ID possible			
TK41a	28-06-02	<i>Plumeria</i> sp. Frangipani	Fale, Atafu Atoll Present on all three atolls in Tokelau	Rust hyperparasite?	J.G. Wright	<i>Coleosporium plumeriae</i>	PDD 76672			
TK41b	28-06-02	<i>Plumeria</i> sp. Frangipani	Fale, Atafu Atoll Present on all three atolls in Tokelau	Leaf edge necrosis	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76663			
TK42	28-06-02	<i>Hymenocallis littoralis</i> Spider lily Lautalotalo	Fale, Atafu Atoll Present on all three atolls in Tokelau	Red leaf spot	J.G. Wright		No ID possible			
TK43	28-06-02	<i>Pandanus tectorius</i>	Fale, Atafu Atoll Present on all three atolls in Tokelau	Yellow leaf spot	J.G. Wright		No ID possible			
TK44	28-06-02	<i>Guetarda speciosa</i> Pua Pua	Fale, Atafu Atoll	Raised red leaf lesion	J.G. Wright		No ID possible			
TK45	01-07-02	<i>Gardenia taitensis</i> Tiale Tiale	Fale, Nukunonu atoll	Leaf spot	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76666			
TK47	01-07-02	<i>Musa</i> sp Cooking banana	Fale, Nukunonu Atoll	Small leaf spot	J.G. Wright		No ID possible			
TK49	01-07-02	<i>Freycinetia</i> sp. Lakie	Muli, Nukunonu Atoll	Leaf lesions	J.G. Wright		No ID possible			
TK51	01-07-02	<i>Persea americana</i> Avocado	Fale, Nukunonu Atoll	Large leaf lesions, possibly due to environ-mental damage?	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76673			
TK52	01-07-02	<i>Hymenocallis littoralis</i> variegated	Fale, Nukunonu Atoll	Red leaf spot	J.G. Wright		No ID possible			
TK53a	01-07-02	<i>Wedelia trilobata</i>	Muli, Nukunonu	Leaf spots	J.G. Wright	<i>Myrothecium roridum</i>	PDD 76664			
TK53b	01-07-02	<i>Wedelia trilobata</i>	Muli, Nukunonu	Leaf spots	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76671			
TK56	02-07-02	<i>Polyscias guilfoylei</i> Aralia	Motuhunga, Nukunonu Atoll	Leaf spot	J.G. Wright	<i>Phoma</i> sp.	PDD 76667			
TK61	03-07-02	<i>Triumfetta rhomboidea</i> Fitotolo	Hilakehe, Nukunonu Atoll	Leaf spot Possibly same as TK24	J.G. Wright	<i>Cercospora triumfeticola</i>	PDD 76675			
TK62	03-07-02	Bird's nest fern Lau mea	Motu Akea, Nukunonu Atoll	Small leaf spots enlarging and forming shot holes	J.G. Wright		No ID possible			
TK63	03-07-02	<i>Fagraea berteriana</i> Pua	Te Olopuka, Nukunonu Atoll	Fungal fruiting bodies are present.	J.G. Wright		No ID possible			
TK64	03-07-02	<i>Artocarpus altiiis</i> Breadfruit	Fale, Nukunonu Atoll	Leaf lesions	J.G. Wright	<i>Glomerella cingulata</i>	PDD 76674			
TK65	02-07-02	<i>Artocarpus altiiis</i> Breadfruit	Muli, Nukunonu Atoll	Leaf spots, not pathogenic? Cephaluros?	J.G. Wright		No ID possible			

APPENDIX 3 Details of suspect virus specimens collected in Tokelau

Accession no.	Date collected	Host	Location	Collector	Virus identification	Serology + / -	EM no.
TK15	21-06-02	<i>Musa sapientum</i>	Fenua Fala, Fakaofu Atoll	J.G. Wright	nothing seen		
TK26	22-06-02	<i>Cyrtosperma chamissonis</i>	Motu Kie, Fakaofu Atoll	J.G. Wright	nothing seen		
TK27	22-06-02	<i>Cyrtosperma chamissonis</i>	Motu Kie, Fakaofu Atoll	J.G. Wright	nothing seen		
TK35	24-06-02	<i>Polyscias</i> sp.	Fenua Fala, Fakaofu Atoll	J.G. Wright	nothing seen		
TK36	25-06-02	<i>Cucurbita maxima</i>	Fale, Fakaofu Atoll	J.G. Wright	nothing seen		
TK46	01-07-02	<i>Abelmoschus manihot</i>	Fale, Nukunonu Atoll	J.G. Wright	nothing seen microtubes ?		
TK54	01-07-02	<i>Cucurbita maxima</i>	Fale, Nukunonu Atoll	J.G. Wright	filaments 750 poty	+WMV2	44054/44057



**APPENDIX 4**  
**Details of plant specimens collected in Tokelau**

Accession No.		Date	Location	Details		Collector
TK03		21-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau	Weed predominantly around habitations; not seen on uninhabited motu	J.G. Wright	
TK04		21-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau	Introduced by people as ground cover, has overtaken grasses but is kept in confined areas at this stage Not on uninhabited motu	J.G. Wright	
TK05		21-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau	Primarily on inhabited motu	J.G. Wright	
TK06		21-06-02	Fenua Fala, Fakaofu Atoll	Found only on inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK07		21-06-02	Fenua Fala, Fakaofu Atoll	Found only in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK08		21-06-02	Fenua Fala, Fakaofu Atoll	Found only in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK09		21-06-02	Fenua Fala, Fakaofu Atoll	Found only in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK10		21-06-02	Fenua Fala, Fakaofu Atoll	Found in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK11		21-06-02	Fenua Fala, Fakaofu Atoll	Found on beachside	J.G. Wright	
TK12		21-06-02	Fenua Fala, Fakaofu Atoll	Found in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK13		21-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau	Found in inhabited areas around wet spots (e.g. near watertanks)	J.G. Wright	
TK14		21-06-02	Fenua Fala, Fakaofu Atoll	Found in inhabited areas Present on all three atolls in Tokelau	J.G. Wright	
TK18		21-06-02	Fenua Loa, Fakaofu Atoll	Present on all three atolls in Tokelau on inhabited and uninhabited atolls	J.G. Wright	
TK23		21-06-02	Fenua Loa, Fakaofu Atoll	Localised to uninhabited motu of Fakaofu atoll	J.G. Wright	
TK25		22-06-02	Motu Kie, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls	Possibly invasive	J.G. Wright	
TK33		22-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited and uninhabited atolls		J.G. Wright	

Accession No.		Date	Location	Details		Collector
TK34	22-06-02	Fenua Fala, Fakaofu Atoll Present on all three atolls in Tokelau on inhabited motu			J.G. Wright	
TK48	01-07-02	Fale, Nukunonu Atoll Present on all three atolls in Tokelau on inhabited motu			J.G. Wright	
TK50	01-07-02	Fale, Nukunonu Atoll			J.G. Wright	
TK55	02-07-02	Fale, Nukunonu Atoll		Shade-loving, prefers moist areas; seen only on inhabited area of Nukunonu atoll	J.G. Wright	
TK57	02-07-02	Nukunonu Atoll		Seen only on inhabited area of Nukunonu atoll	J.G. Wright	
TK58	02-07-02	Muli, Nukunonu Atoll			J.G. Wright	
TK59 Note not included in PLD because duplication	02-07-02	Muli, Nukunonu Atoll			J.G. Wright	
TK60	02-07-02	Motuhunga, Nukunonu Atoll		Few plants introduced from Samoa	J.G. Wright	
TK66	05-07-02	Fale, Nukunonu Atoll On all three atolls in Tokelau		Although considered invasive elsewhere, it does not seem invasive here; not found on uninhabited motu	J.G. Wright	
TK67	06-07-02	Fale, Nukunonu Atoll On all three atolls in Tokelau in inhabited and uninhabited motu			J.G. Wright	