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Comprehensive pest list for New Zealand yam (Oca) (Oxalis tuberosa)

A Carpenter, K van Epenhuijsen & G Parmenter

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A report prepared for
Vegfed

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New Zealand Institute for Crop & Food Research Limited
Private Bag 11 600, Palmerston North, New Zealand

Contents

1 Executive summary

This comprehensive pest list conforms with the official format required by MAF Biosecurity for crops that might be exported (or imported). The format was supplied by Nikki Johnson, MAF Biosecurity. We leave it to Vegfed and the affected growers to decide if and when it is to be used. If required, an electronic copy can be supplied to add to the MAF database of comprehensive pest lists.

This list is based on 2 years of intensive field work in the Manawatu, Otago and Southland, with records from other places as they occurred. All identifications were supplied by either the MAF Reference Laboratory at Lincoln, or the Agri-Quality Laboratory at Lynfield. Specimens have been retained by those two services. This is not a complete comprehensive pest list as we have not done a literature survey to see what pests and diseases have been recorded on New Zealand yam in areas of New Zealand other than those mentioned above. The most difficult part of developing a comprehensive pest list is to ensure that the key primary data from the areas where the crop is grown in New Zealand are full and accurate, as this is the key information for export.

We have not attempted to categorise the pests at this stage. We are unsure if it is appropriate for us to do so, or if that is a process that MAF Biosecurity needs to retain control of for its own purposes. We are prepared to carry out the categorisation process if that would help the industry.

Our present understanding is that oca crops in New Zealand are largely free of viruses and have been that way for many years (John Fletcher pers.comm.).

2 Introduction

In New Zealand, oca *(Oxalis tuberosa)* is generally called yam. It is a root crop that originated in the Andes, and as far as we know, it is only grown commercially in Central and South America, and New Zealand. The USDA appears to believe the crop will not grow in North America. Small quantities are produced in Scotland and France. In both New Zealand and South America, *O. tuberosa* is attractive to pests and susceptible to diseases. Peter Allan (Agriculture New Zealand) describes oca planting in Peru: subsistence farmers place tubers in the ground and then put handfuls of a persistent organochlorine insecticide in the planting holes in an attempt to protect the plants from various beetles (PJT Allan pers comm.).

As part of a larger project funded by the Fresh Vegetable Sector of Vegfed, we have completed a 2 year study to firstly determine the pest and disease

issues that are faced in this country by the yam industry, and then to develop practical pest and disease control solutions for growers. This comprehensive pest list summarises all the pest and disease problems that have been identified over the 2 years. Disease and pest management strategies have been discussed elsewhere (van Epenhuijsen et al. 2001a, 2001b). No viruses were detected on samples received by John Fletcher (pers. comm.).

3 Methods

Yam crops were surveyed regularly throughout the 1999-2000 growing season (usually about every 6 weeks or once a month towards harvest) and samples taken of damaged and infected plants for diagnosis. Samples were sent to either MAF at Lincoln or AgriQuality at Lynfield for diagnosis. Specimens have been retained by these laboratories.

Crops in Manawatu, Otago and Southland were walked regularly. The Waimate District was sampled less systematically, but where problems were identified from time to time, regular sampling was carried out.

The format of the pest list (Appendix A) followed that specified by MAF Biosecurity.

Diseases associated with oxalis (PPIN, 2001) are included as Appendix B.

No pathogens associated with *O. tuberosa* were found in the Landcare Research Database.

Crop & Food Research surveyed crops around Feilding in 1999 and found no viruses present. We collected samples from the field and no viruses were found. Between 1999 and 2001 considerable time was spent cleaning up accessions from South America held in quarantine (Fletcher & Fletcher 2001).

4 Ackowledgements

The active co-operation of the following growers is acknowledged: in the North Island the Almadale Partnership (Peter Halford, David Halford and Clint Smythe), Warren Osbourne, Cho Min San, Ken Wong, Tom Young and Zhu Ye Ping; and in the South Island, Blair Spain, Andrew Barnes, John Freeman, and Ray Goddard. We also thank Dr John Marshall, John Fletcher, Mike Dance, Mark Braithwaite and Bas Deo for their input and assistance. Financial and operational support was provided by Vegfed. Mr Ron Gall facilitated co-ordination and communication with growers.

5 References

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Appendices

Appendix

Appendix A

The list of organisms recorded in New Zealand in association with New Zealand yam

Scientific name	Family	Class	Common name	Comments	References	Record
Fungi						
Alternaria alternata (Fr.) Keissler	Anamorphic Pleosporaceae	Hyphomycetes	Black mould	Commensal in stem rots	NZPPC 19335	Pennicook 1989
Aureobasidium pullulans (de Bary) G. Arnaud	Mitosporic fungi	Hyphomycetes	Black yeast	Commensal in stem rots	NZPPC 18656	Pennicook 1989
Botrytis cinerea Pers.	Anamorphic Sclerotiniaceae	Hyphomycetes	Grey mould	Causing stem rot	NZPPC 18513	Pennicook 1989
Cladosporium cladosporioides (Fresen) G.A. De Vries	Anamorphic Mycosphaerellaceae	Coelomycetes	Sooty mould	Commensal in stem and tuber rots	NZPPC 18414	Pennicook 1989
Colletotrichum coccodes (Wallr.) Hughes	Anamorphic Phyllachoraceae	Coelomycetes	Black dot root rot	Commensal in tuber rots	NZPPC 19335	Pennicook 1989
Colletotrichum trifolii Bain & Essary	Anamorphic Phyllachoraceae	Coelomycetes	Anthracnose	Commensal in stem rots	NZPPC 18721	Pennicook 1989
Cylindrocarpon candidum (Link) Wollenw.	Anamorphic Hypocreaceae	Hyphomycetes	Bark fungus	Commensal in tuber rots	NZPPC 18513	Pennicook 1989
Cylindrocarpon album (Sacc.) Wollenw.	Anamorphic Hypocreaceae	Hyphomycetes	Bark fungus	Commensal in tuber rots	NZPPC 18822	Pennicook 1989
Epicoccum purpurascens Ehrenb.	Mitosporic fungi	Hyphomycetes	Sooty mould	Commensal in stem rots	NZPPC 18656	Pennicook 1989
Fusarium avenaceum (Fries) Sacc.	Anamorphic Hypocreaceae	Hyphomycetes	Stem & root rot	Causing stem rot	NZPPC 18548	Pennicook 1989
Fusarium culmorum (W. G. Smith) Sacc.	Anamorphic Hypocreaceae	Hyphomycetes	Wheat root rot Wheat white head	Causing stem rot	NZPPC 18414	Pennicook 1989
Fusarium graminearum Schwabe	Anamorphic Hypocreaceae	Hyphomycetes	Wheat foot rot Wheat head blight	Causing tuber rot	NZPPC 18141	Pennicook 1989

Scientific name	Family	Class	Common name	Comments	References	Record
Fusarium moniliforme Sheldon	Anamorphic Hypocreaceae	Hyphomycetes	Damping off	Secondary invader in Rhizoctonia stem rot	NZPPC 18678	Pennicook 1989
Fusarium oxysporum Schlecht.	Anamorphic Hypocreaceae	Hyphomycetes	Fusarium wilt Fusarium crown rot	Causing stem rot	NZPPC 18513	Pennicook 1989
Fusarium solani (Mart.) Sacc.	Anamorphic Hypocreaceae	Hyphomycetes	Pea foot rot	Secondary invader in Rhizoctonia stem rot	NZPPC 18513	Pennicook 1989
Geotrichum candidum Link	Anamorphic Dipodascaceae	Hyphomycetes	Sour rot Rubbery rot [potatoes]	Causing cheesy rubbery tuber rot	NZPPC 18548	Pennicook 1989
Gliocladium roseum Bainier	Anamorphic Hypocreaceae	Hyphomycetes	Hard rot [carrots]	Commensal in rotting stems and tubers probably parasitic on Rhizopus, Mucor and Fusarium	NZPPC 18513	Pennicook 1989
Glomerella cingulata (Stoneman) Spaulding & Schrenk	Phyllachoraceae	Ascomycetes	Anthracnose Bitter rot	Commensal pathogen in stem rots	NZPPC 19335	Pennicook 1989
Itersonilia perplexans Derx	Mitosporic fungi	Basidiomycetes	Leaf smut, Flower blight	Associated with grey stem lesions	NZPPC 18960	Pennicook 1989
Mucor sp. Fresen	Mucoraceae	Zygomycetes	Mucor rot	Associated with tuber rot	NZPPC 18548	Pennicook 1989
Nectria inventa Pethybr.	Hypocreaceae	Ascomycetes	Brick orange mould	Commensal in tuber rot	NZPPC 18414	Pennicook 1989
Nectria radicicola Gerlach & Nilsson	Hypocreaceae	Ascomycetes	Root rot	Strongly associated with black tuber spots that became bleached	NZPPC 18414	Pennicook 1989

Scientific name	Family	Class	Common name	Comments	References	Record
Penicillium sp. Link	Anamorphic Trichocomaceae	Hyphomycetes	Blue mould, tuber rot	Causing rots of cut ends of tubers	NZPPC 18414	Pennicook 1989
Phoma exigua Desmaz.	Anamorphic Pleosporaceae	Coelomycetes	Phoma rot / leaf spot	Commensal in stem rots	NZPPC 18513	Pennicook 1989
Phomopsis sp. (Sacc.) Bubak	Anamorphic Valsaceae	Coelomycetes	Leaf spot	Role uncertain	NZPPC 18414	Pennicook 1989
Phytophthora megasperma Drechs.	Pythiaceae	Oomycetes	Phytophthora root rot	Causing tuber rot	NZPPC 18548	Pennicook 1989
Plectosphaerella cucumerina (Lindfors) Gams	Hypocreaceae	Ascomycetes	Decay fungus	Commensal in stem rots	NZPPC 18513	Pennicook 1989
Pythium sp. Pringsh.	Pythiaceae	Oomycetes	Pythium root and stem rot	Causing rancid tuber rot	NZPPC 18513	Pennicook 1989
Rhizoctonia sp. DC.	Anamorphic Ceratobasidiaceae	Agonomycetes	Rhizoctonia basal stem rot/collar rot: Scurf	Causing basal stem rot	NZPPC 18413	Pennicook 1989
Rhizopus stolonifer (Ehrenberg) Vuill.	Mucoraceae	Zygomycetes	Rhizopus soft rot, "Whiskers" rot	Commensal in cut tuber ends	NZPPC 18414	Pennicook 1989
Stilbella sp. Lindau	Mitosporic fungi	Hyphomycetes	Bark fungus	Commensal in tuber rots	NZPPC 18414	Pennicook 1989
Trichoderma viride Pers.	Anamorphic Hypocreaceae	Hyphomycetes	Trichoderma (Biocontrol agent) Trichoderma rot	Commensal in stem rots	NZPPC 18678	Pennicook 1989

Scientific name	Family	Group	Common name	Comments	References	Record
Bacteria						
Erwinia herbicola (Lohnis) Dye	Enterobacteriaceae	Bacteria	Epiphytic bacterium	Commensal in rots	NZPPC 18141	Bradbury 1986
Erwinia sp. Winslow et. al.	Enterobacteriaceae	Bacteria	Epiphytic bacterium	Commensal in rots	Carpenter 1999	Bradbury 1986
Springomonas sanguis	Pseudomonadaceae	Bacteria	Epiphytic bacterium	Commensal in rots	NPPR Lab.	Bradbury 1986
Serratia proteamaculans (Paine & Stansfield) Grimont	Enterobacteriaceae	Bacteria	Grass grub honey disease	Commensal in rots	NPPR Lab.	Bradbury 1986
Stenotrophomonas maltophilia (Hugh) Paleroni & Bradbury	Pseudomonadaceae	Bacteria	Epiphytic bacterium	Commensal in rots	NPPR Lab.	Bradbury 1986
Streptomyces sp. Waksman & Henrici	Streptomycetaceae	Bacteria	Scab	Commensal in tuber skins	NZPPC 18822	Pennicook 1989
Xanthomonas sp. Dowson	Pseudomonadaceae	Bacteria	Leaf spot, Wilt, Dieback	Commensal in rots	Carpenter 1999	Bradbury 1986
Insects						
Agrotis ipsilon aneituma (Walker)	Noctuidae	Lepidoptera	Greasy cutworm, Nguharu	Damage to stolons	Carpenter 1999	Scott 1984
Chinamiris indeclivis Eyles & Carvalho	Miridae	Heteroptera	-	Damage to foliage	NZPPC 18839	Eyles and Carvalho 1991
Clivina vagans Putzeys	Carabidae	Coleoptera	Maize seed beetle	Holes in tubers. Found in pastures and cultivated moist and muddy areas. Minor damage to corn. It is mainly a predator.	NPPR Lab. 3/00/215	Larochelle and Lariviere 2001
Ctenicera sp.	Elateriadae	Coleoptera	Wireworm	Holes in tubers. Chiefly predaceous or soil larvae, sometimes phytophagous to potatoes and cereal in spring	NPPR 3/99/149	Ferguson 1997
Costelytra zealandica White	Scarabaeidae	Coleoptera	Grass grub, tutaeruru	Primary pest damage to tubers larvae feed on roots of grasses	NZPPC 18659	Klimaszewski and Watt 1997
Harpalus affinis Schrank	Carabidae	Coleoptera	Native weevil	In cultivated fields and pastures feeds or seeds, aphids and flies, omnivorous mostly phytophaguns	NPPR Lab. 3/99/149	Townsend 1992

Scientific name	Family	Order/Group	Common name	Comments	References	Record
Catoptes sp.	Curculionidae	Coleoptera		Known to occur on economic crops	NPPR Lab	May 1993
Macromastix sp.	Tipuliadae	Diptera	Leather jacket	Few species feed on roots and damage pastures and other herbaceous plants	Carpenter 1999	Miller 1971
Meterana sp. Nr ochthistis	Noctuidae	Lepidoptera	-	Damage to foliage	NPPC 18658	Dugdale 1988
Naupactus leucoloma Boheman	Curculionidae	Coleoptera	White fringed	Primary pest -Holes in tubers	NZPPC 18660	Scott 1984
Typhaea stercorea L.	Mycetophagidae	Coleoptera	Hairy fungus beetle	Beetles do not feed on living plant material but a fungi beetle which may act as a carrier for Salmonella	NZPPC 19143	Jespersen 1997
Wiseana sp.	Hepialidae	Lepidoptera	Porina	Damage to stolons		Scott 1984
Mites						
Rhizoglyphus sp.	Acaridae	Acari	Mould mite	Detritus feeder on damaged yam and bulbs	NZPPC 18660	Scott 1984

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Appendix B

Diseases Associated with Oxalis tuberosa (oca, yam)

Pest Scientific Name	State Found As	Pest Family Name	PHA Code	Part Affected	Nature	Effect	Significance	Comments
Fusarium oxysporum	*F. oxysporum*	Hyphomycetes	11218	tubers & stems	primary	tuber and stem rot	Of possible economic significance if provided with favourable conditions for infections.	
Fusarium culmorum	*F. culmorum*	Hyphomycetes	13868	roots	secondary	root rot	Minor economic importance.	
Gibberella intricans	*Fusarium equiseti*	Ascomycetes	13869	stem base	potential primary	stem rot	Unknown.	
Nectria ochroleuca	*Gliocladium roseum*	Ascomycetes	13873	stem, roots	saprophyte		Not of economic importance.	
Fusarium culmorum	*F. culmorum*	Hyphomycetes	13887	stem	primary	stem lesions	Minor economic significance.	
Botryotinia fuckeliana	*Botrytis cinerea*	Ascomycetes	13954	tuber	primary	tuber rot	Economic pest.	
Phoma exigua var. exigua	*P. exigua var. exigua*	Coelomycetes	13955	tuber	secondary	tuber rot	Minor pest.	
Gibberella zeae	*Fusarium graminearum*	Ascomycetes	13956	tuber	secondary	tuber rot	Minor pest.	
Thanatephorus cucumeris	*Rhizoctonia solani*	Basidiomycetes	14271	tuber	primary	tuber rot	Economic pest.	
Nectria radicicola	*Cylindrocarpon destructans*	Ascomycetes	14451	tuber	primary	tuber rot	Economic pest.	
Gibberella avenacea	*Fusarium avenaceum*	Ascomycetes	14491	tuber	secondary	tuber rot	Minor pest.	
Pseudomonas fluorescens	N/A	Pseudomonadaceae	16538	tuber	saprophyte	tuber rot and stem end rot	None.	

Source of data: Plant Pest Information Network Database (PPIN), Ministry of Agriculture and Forestry, New Zealand.