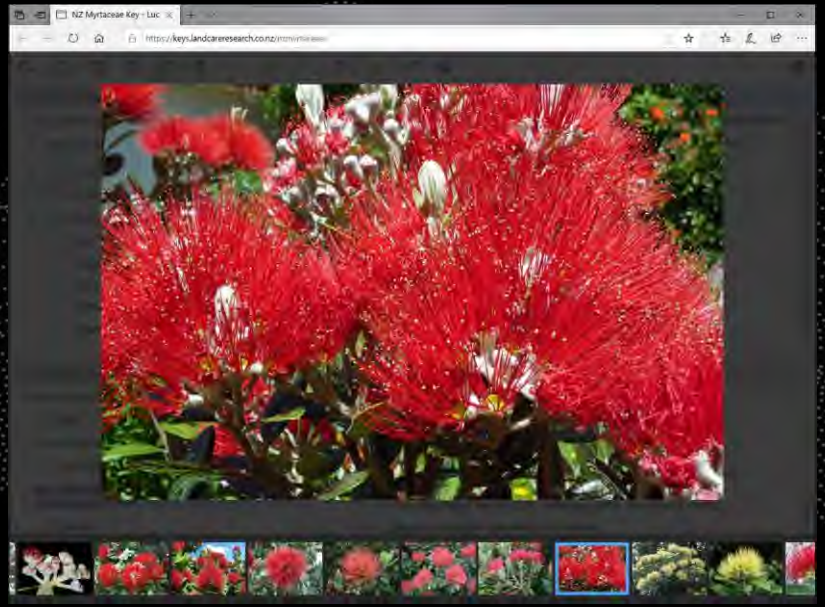
New app to identify plants at risk from myrtle rust



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Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

Murray Dawson et al.

Background

- Mar-May 2017: Myrtle rust arrived in NZ
- Need for rapid and accurate identification of host spp. to monitor and manage MR
  - Interactive, intuitive, easy-to-use tool
  - Web-based and mobile apps
- Oct 2018: MPI Request For Proposal
  - MWLR, Scion, Unitec collaboration
  - Lucid™ identification key platform
- Work began Feb 2019; completed July 2020
  - Here I'll outline the NZ Myrtaceae key
  - Live demonstration

Images: Robert Beresford
Plant & Food Research

Contributors

- Murray Dawson (MWLR)
- Matt Buys, Elizabeth Miller (Scion)
- Peter de Lange (Unitec)
- Chris Ecroyd
- Colin Ogle
- MPI a major contributor
  - Funded by Operational Research Programme
  - Planning, design, scope and feedback (PHEL)

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Biosecurity New Zealand Ministry for Primary Industries Manatū Ahu Matua

- Jeremy Rolfe (DOC)
- Trevor James (AgResearch)
- iNaturalist NZ community

Plant identification: Limitations of printed Floras

- Not user friendly
  - Technical language
  - Complex descriptions
  - Lack of illustrations

METROSIDEROS Banks ex Gaertn., 1788
2. *M. excelsa* Sol. ex Gaertn. Fruct. 1, 1788, 172, t. 34, f. 8.
M. tomentosa A. Rich. Essai Fl. N.Z. 1832, 336, t. 37.
Tree up to 20 m. tall; trunk up to 2 m. diam.; branches spreading; branchlets stout, tomentose. Lvs on short stout petioles; lamina (2.5)-5-10 × 2.5-3-5 cm., elliptic to oblong, acute or obtuse, coriac., thick, clad in white tomentum below (young plants occ. glab. below). Infl. of broad compound cymes with ∞ fls; pedicels stout, tomentose. Receptacle obconic; sepals deltoid; petals crimson, oblong. Stamens ∞, crimson, 3-4 cm. long. Ovary adnate to receptacle. Capsules 7-9 mm. long, tomentose, distinctly exserted, loculicidally 3-valved.
DIST.: Three Kings, N. Coastal forest south to Poverty Bay and Urenui. Inland on shores of lakes of Volcanic Plateau.
Pohutukawa.
FT. 1-2. FL. 12-1.

Description of pōhutukawa
Flora Vol. 1

Plant identification: Limitations of printed Floras

- Traditional printed keys
  - Only one start point
  - Only two choices
  - Often rely on floral characters
  - “Written by those who don’t need them for those who can’t use them”

1.	Fls white, or flushed with pink	2
	Fls crimson to scarlet, or yellow	5
2.	Lvs 35-90 × 25-50 mm.; filaments ± 3 cm.; receptacle ± 8 mm. long	8. albiflora
	Lvs not > 25 × 20 mm.; filaments ± 1 cm.; receptacle not > 5 mm. long	3
3.	Capsule distinctly exserted beyond receptacle-rim	7. perforata
	Capsule not exceeding receptacle-rim	4
4.	Lvs coriac., subacute, glab. or nearly so; branchlets glab. or nearly so	10. diffusa
	Lvs membr. acuminate, pubescent; branchlets pubescent	11. colensoi
5.	Plant a liane	6
	Plant a shrub or tree	7
6.	Lvs 35-75 mm. long, filaments scarlet, capsules 12-20 mm. long, urceolate	6. scandens
	Lvs 20-35 mm. long, filaments carmine, capsules 8-9 mm. long, subglobose	9. carminea
7.	Lvs clad in dense white tomentum below	8
	Lvs glabrous	9
8.	Lvs ± 2-5 cm. long; filaments 1-2 cm. long	1. kermadecensis
	Lvs ± 5-10 cm. long; filaments 3-4 cm. Long	2. excelsa
9.	Capsule distinctly exceeding receptacle	3. robusta
	Capsule not exceeding receptacle	10
10.	Lvs of lanceolate order, ± 1-2 cm. wide; capsules 8-9 mm. long; receptacle silky-hairy; us. a tall tree	4. umbellata
	Lvs of ovate order, ± 2-3 cm. wide; capsules 6-7 mm. long; receptacle glab.; us. a straggling shrub	5. parkinsonii

Traditional dichotomous key for *Metrosideros*
Flora Vol. 1

Interactive identification keys

- Multi-access
- Powerful and efficient
- Easy and fun to use
- More reliable than image recognition
- Allow for character misinterpretation
- Numerous taxa, characters, images

Lophomyrtus bullata. Images: Jeremy Rolfe, Peter Heenan, Chris Morse

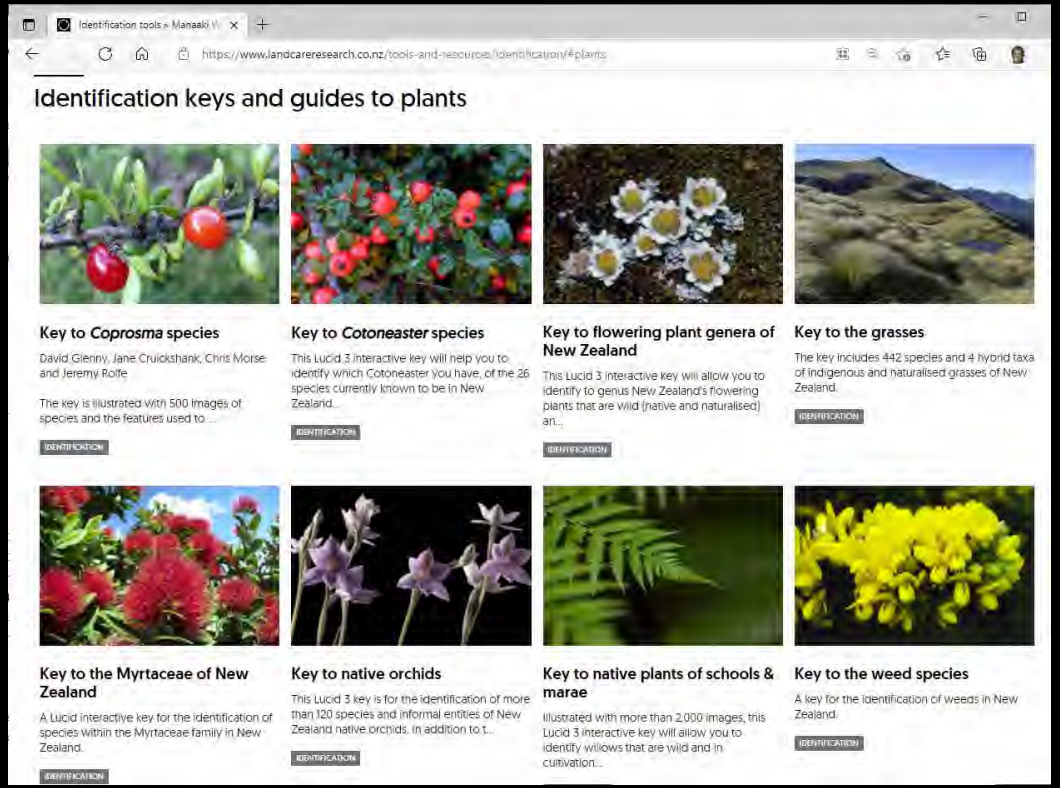
Myrtaceae leaf diversity


1 mm
Myrtaceae floral diversity

Myrtaceae fruit diversity

Interactive identification keys

- >10 NZ keys hosted by MWLR
  - Flowering plant genera
  - NZ Weeds Key
  - Grasses etc.
- Free and online
- Lucid™ platform



www.landcareresearch.co.nz/tools-and-resources/identification/#plants

Interactive identification keys

- >10 NZ keys hosted by MWLR
  - Flowering plant genera
  - NZ Weeds Key
  - Grasses etc.
- Free and online
- Lucid™ platform
- Smartphone derivatives

Get it on Google play

Download on the App Store

NZ Myrtaceae Key

- 97 taxa (species, subspecies, varieties, cultivars, hybrids)
  - NZ natives
  - Cultivated
  - Naturalised
- Species profiles
  - Written specifically for key
  - Extensive glossary
- 30 characters / 106 character states
- >1600 images
  - Taxa & diagnostic characters
  - Fully captioned

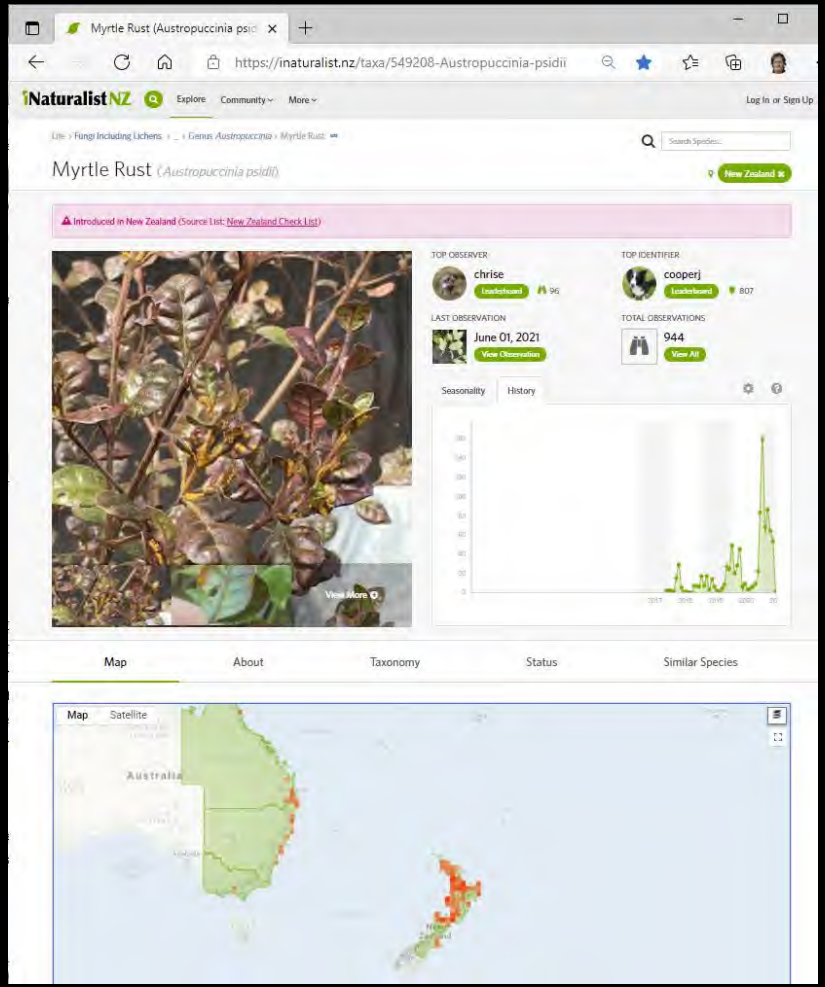
NZ Myrtaceae Key

- New tool works very well
  - Could be reworked for Australian Myrtaceae
- Challenging to produce
- Useful model for other biosecurity and border management issues?
  - Rapid, user friendly ID
  - Integration of resources




NZ Myrtaceae Key

- Identification of host species
- Not for reporting MR locations
  - iNaturalist platform
  - https://inaturalist.nz/



Taxon view

NZ Myrtaceae Key

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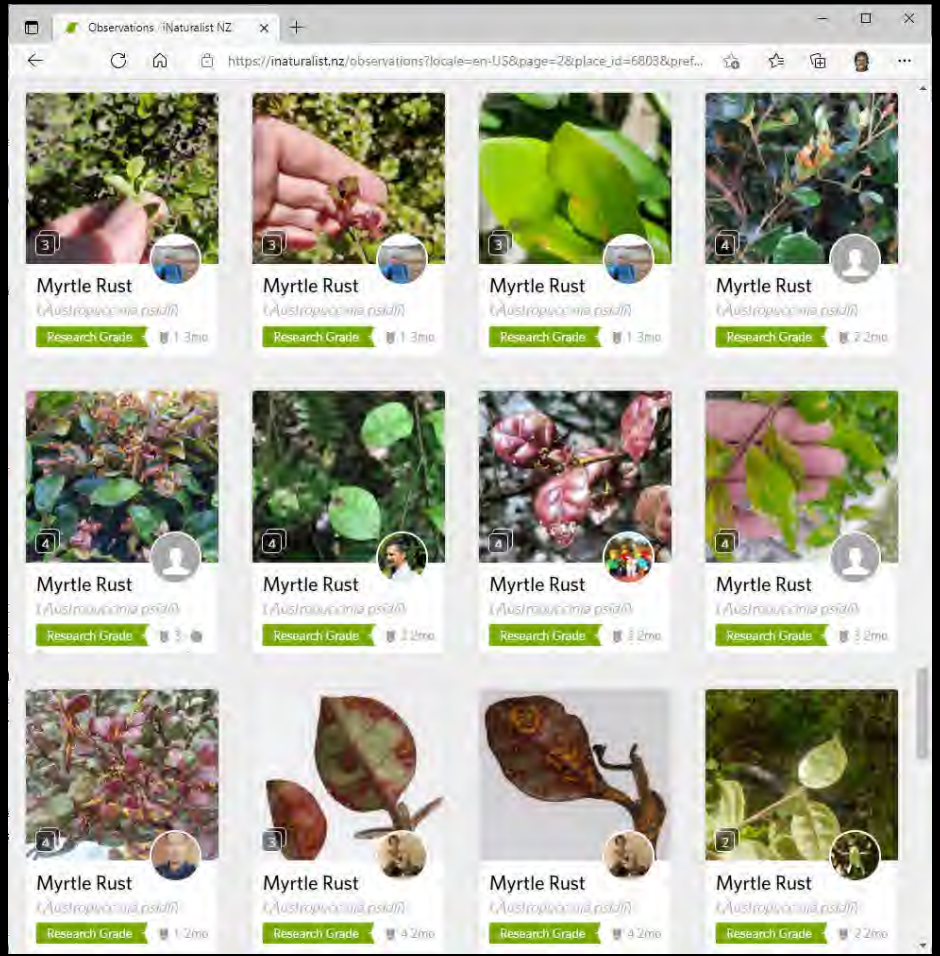

Group observations

NZ Myrtaceae Key

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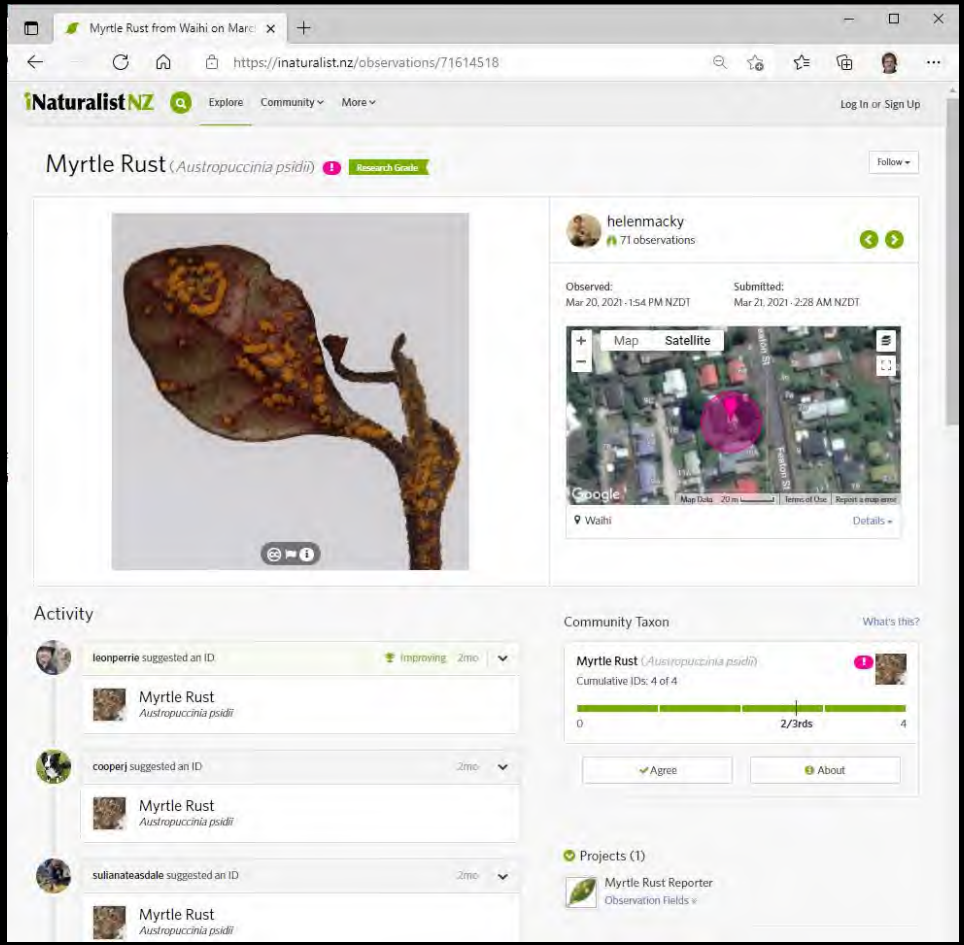
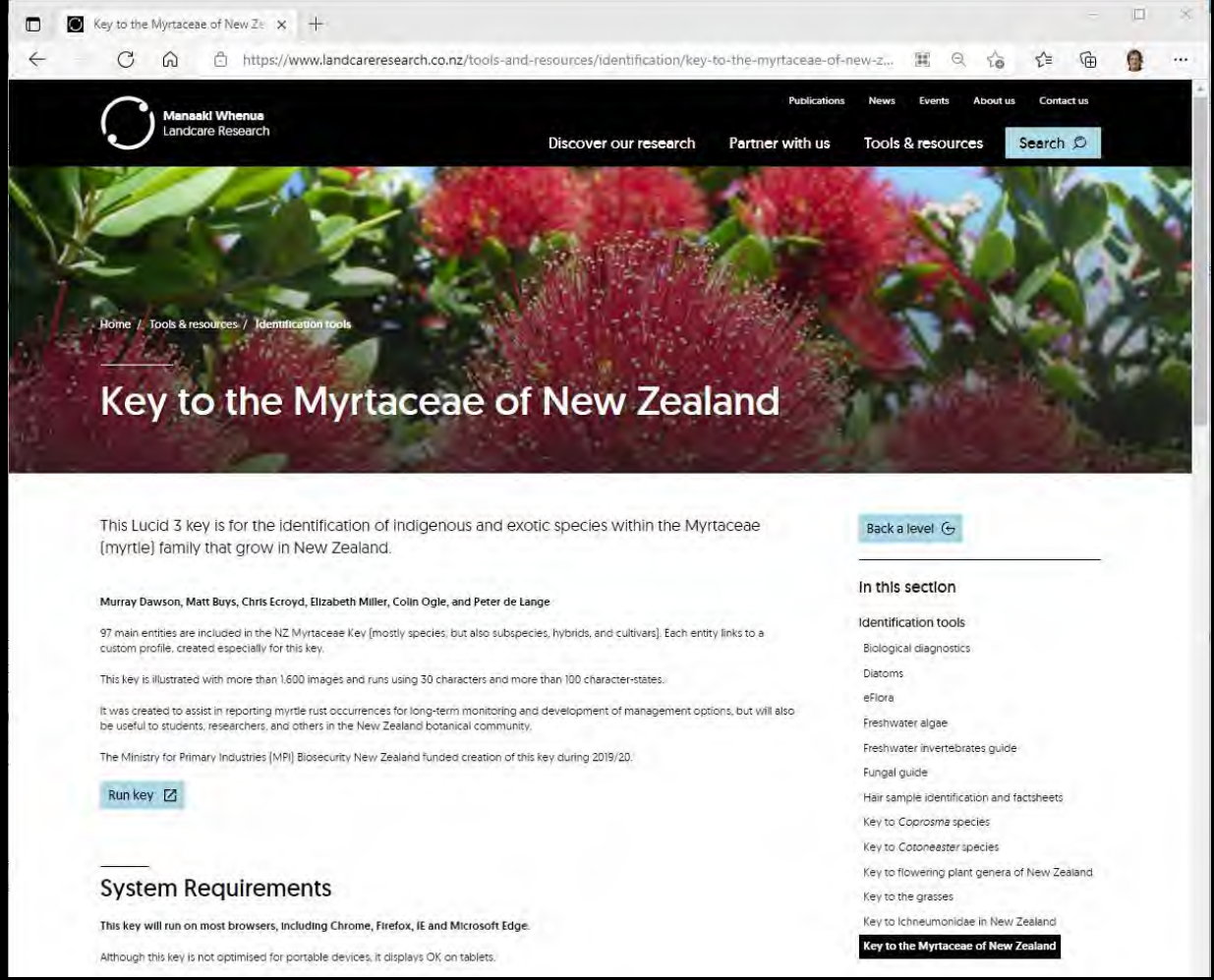


Individual observation

Live demo



https://www.landcareresearch.co.nz/tools-and-resources/identification/key-to-the-myrtaceae-of-new-zealand/