SOUTHERN
eDNA SOCIETY

2nd Australian & New Zealand

ENVIRONMENTAL DNA CONFERENCE

eDNA Synergy -
Innovate, Collaborate, Implement

18–21 February 2025

Shed 6, Wellington, New Zealand

Environmental DNA for sensitive detection of *Varroa destructor* in honey bee hives

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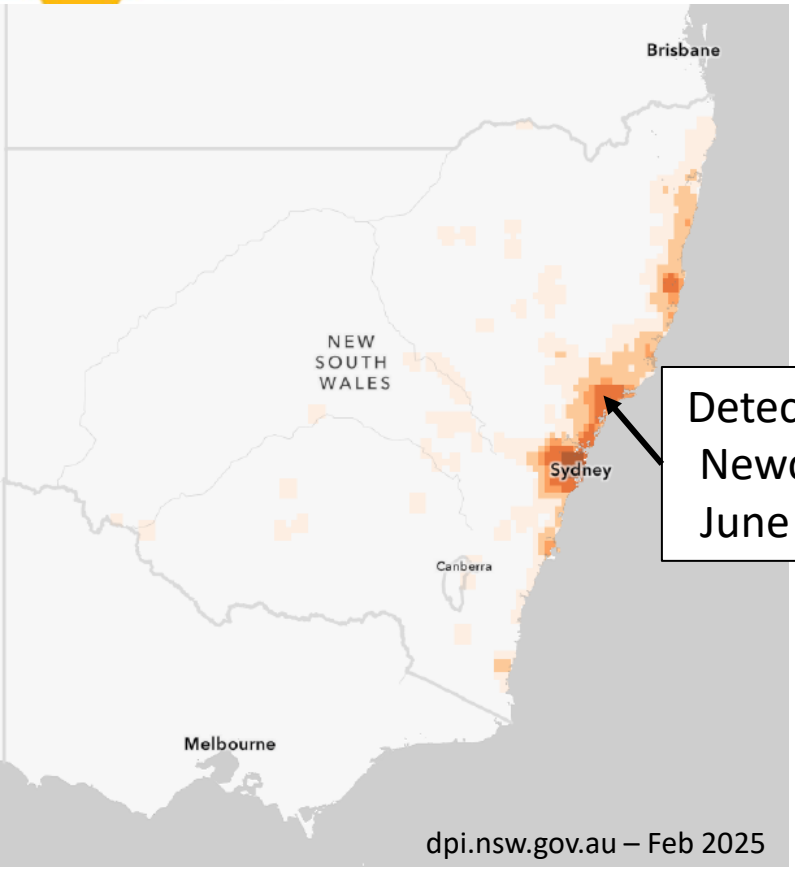
2nd Australian & New Zealand eDNA conference | 19 February 2025

Varroa mites are global honey bee pests

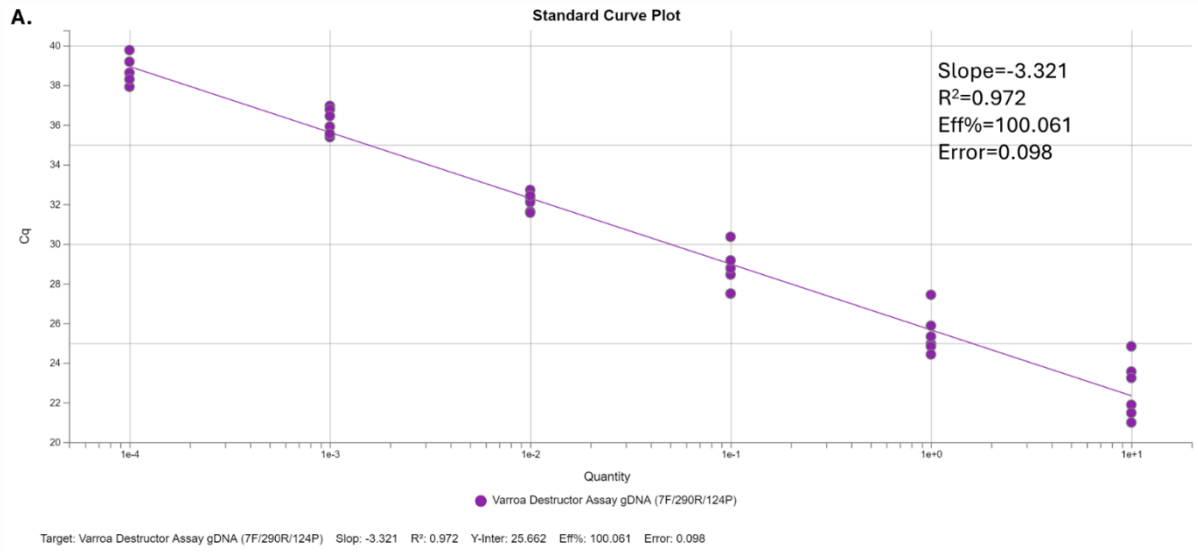


Detected in Newcastle June 2022

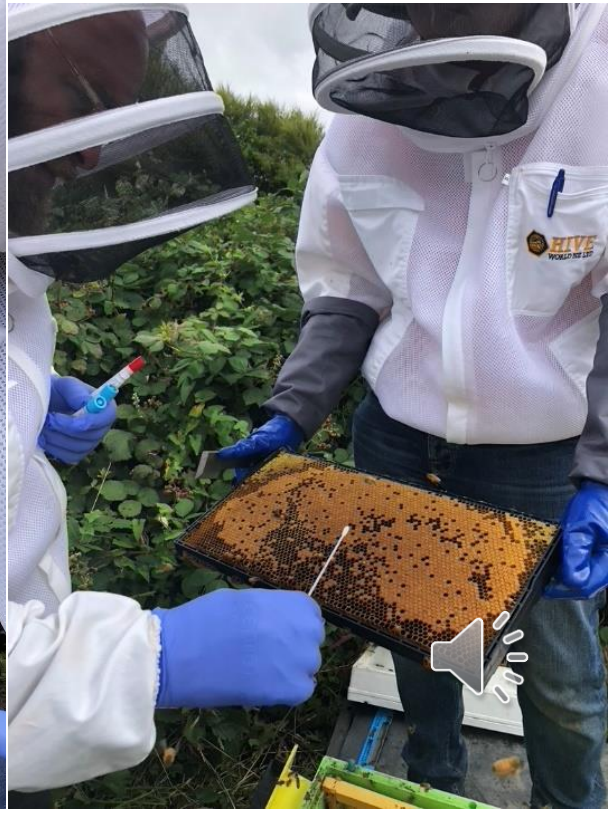
Varroa eDNA detection

Probe qPCR for *V. destructor* cox1 gene 284 bp

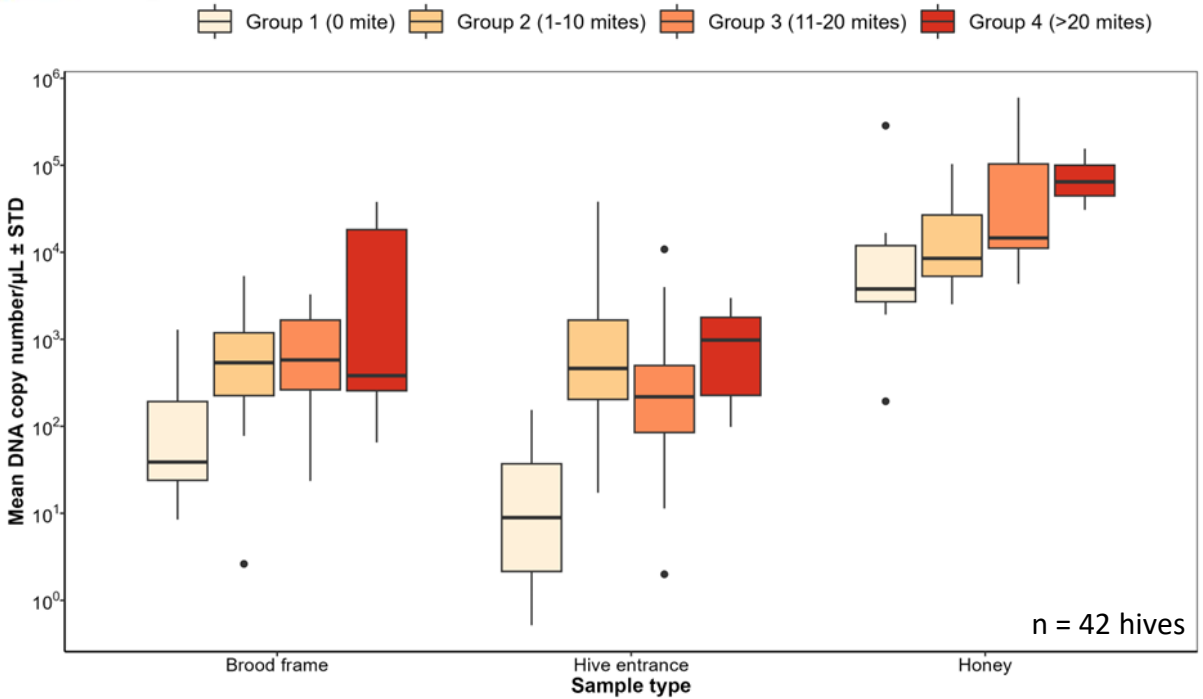
- Limit of quantification 3.6 DNA copies/µL



New Zealand field validation – Feb 2023



New Zealand field validation – Feb 2023



Av. mites/300 bees = 6.9 ± 14.1

Photo: Veto-Pharma

Method	Brood frame	Hive entrance	Honey	Alcohol wash
Sensitivity	0.57	0.31	0.91	0.55

Varroa eDNA in early mite invasion

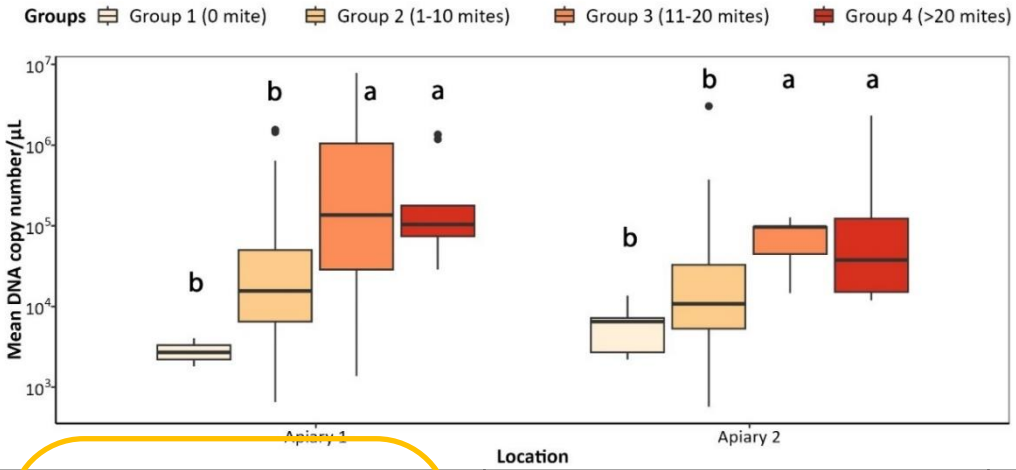
eDNA mites

alcohol wash

Varroa-naïve hives	Days										
	D1	D2	D3	D4	D5	D6	D7	D8	D15	D29	D57
1a											eDNA
											mites
1b								eDNA			eDNA
											mites
2a									mites	mites	
2b										eDNA	
										mites	
3a								eDNA	eDNA		eDNA
											mites
3b										eDNA	
										mites	
4a											eDNA
											mites
4b									mites	mites	
5a					eDNA			eDNA	mites	eDNA	
								mites		mites	
5b						eDNA				eDNA	
										mites	

< 5 mites/300 bees

NSW field validation – April/May 2024



	Apr 2-3		Apr 22-23		May 18-30	
	Apiary 1	Apiary 2	Apiary 1	Apiary 2	Apiary 1	Apiary 2
mites/300 bees	2.8	3.5	6.8	6.7	18.7	9.6
eDNA sensitivity	0.25	0.14	0.96	0.86	0.96	0.69
mite wash sensitivity	0.73	0.69	0.92	0.91	0.94	0.82

Summary and future directions

Robust Varroa eDNA detection from honey and swab samples

Can we improve eDNA recovery/detection at low mite levels?

- Increased sample replication and frequency

Honey eDNA for broad surveillance of varroa-free areas

Acknowledgements

Francisco Encinas-Viso

Liz Milla

Florence Bravo

Alejandro Trujillo Gonzalez

Jenn Soroka

Kymberly Crockett

Natale Snape

Richard Hall

Hayley Pragert

Frank Lindsay

NZ beekeepers

Francesco Martoni (photos)

Antonette Walford

Geoff Grossel

Uday Divi

Melissa Hindle

Submitted to *Environmental DNA*