

# elusive native pathogen?

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## 1996

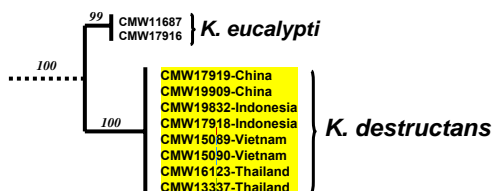
A devastating eucalypt leaf pathogen (Fig 1A), *Kirramyces destructans* was first described from 1-3 year old *Eucalyptus grandis* in Sumatra, Indonesia (1).

## 2000-2001

*K. destructans* has been reported from nurseries and young plantations in Thailand and Vietnam and from native *E. urophylla* in East Timor (2-3).

## 2005

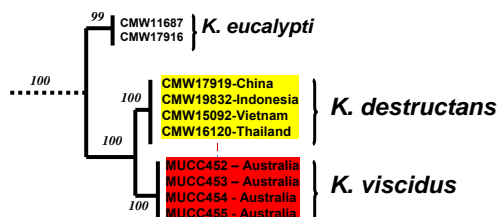
*K. destructans* reported from China (4). Based on molecular phylogenetic analysis using 5 gene regions *K. destructans* isolates from China, Indonesia, Thailand and Vietnam are identical.



First reports of the disease are from Indonesia and based on molecular data this is the probable source of all introductions in South-East Asia and China. Considered a major threat to biosecurity of Australia's eucalypts and productivity of plantations, but could it have originated in Australia? What about East Timor? Is it the origin of *K. destructans* or just another introduced population?

## 2006

From 2003-2006 regular surveys were conducted in Northern Australia. A devastating disease was observed (Fig 1B) and thought to be caused by *K. destructans*. However, when compared to Asian isolates there were fixed polymorphisms differing in all 5 gene regions sequenced and a new species *K. viscidus* was described (5).



**Table 1. Haplotypes observed for each microsatellite loci at each location. The number of isolates from each location is given in brackets. The last column provides the percent genotypic diversity where possible**

	VA1	VA2	VA13	DIVERSITY(%)
CHINA (30)	A	A	A	0.0
THAILAND (12)	A	A	A	0.0
VIETNAM (3)	A	A	A	
INDONESIA (61)	A	A-C	A	3.2
TIMOR (2)	A-B	C	A	
DERBY (8)	C	D	B-C	28.5
TIWI (30)	D-G	E-I	D-I	32.1
FNQ (14)	H-J	E,F,I-M	J-L	27.1
NO. HAPLOTYPES	10	13	12	

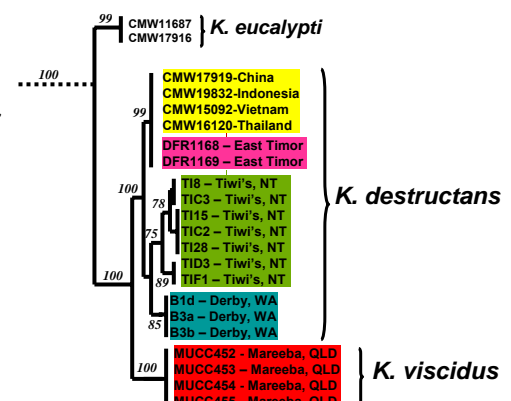


Fig 1. (A) *K. destructans* on *E. grandis* leaf (B) defoliation of *E. grandis* caused by *K. viscidus* (C) gap represents death of susceptible *E. grandis* x *E. camaldulensis* clone due to KLD in northern NSW

## 2007

*K. destructans* was reported from the Tiwi Islands and Derby in Australia. Unlike *K. destructans* isolates from Asia, variability was observed in the sequence data (6).

DNA was extracted from herbarium samples from East Timor and sequenced data was identical to that of isolates from Asia, supporting the hypothesis that east Timor was the most likely origin of the disease in Asia (Glen, unpubl. data)



## 2008

Three microsatellite loci were sequenced for all *K. destructans* isolates. A haplotype network can be drawn connecting all isolates (Fig. 2). Diversity among Asian isolates is low whilst diversity among Australian isolates is high (Table 1). It is still not clear whether *K. viscidus*, the isolates from Derby and the isolates from the Tiwi Islands are discrete species or part of a continuum that is *K. destructans*. Further studies are required to determine if *K. destructans* is a biosecurity threat or an elusive native pathogen. Meanwhile new diseases are emerging in Australia caused by other *Kirramyces* spp. which are impacting on productivity of sub-tropical eucalypt plantations (Fig 1C).

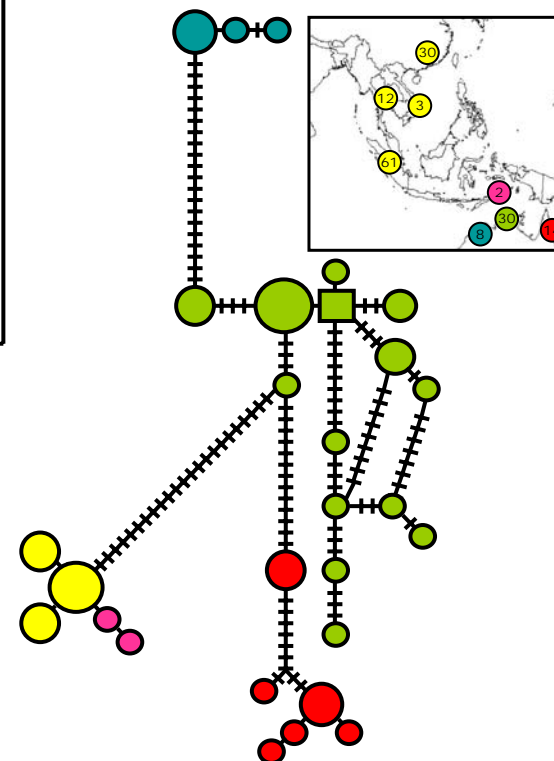


Fig 2. Haplotype network based on sequence data from three nuclear genes (ITS, EFL- $\alpha$  and  $\beta$ -tubulin) and the flanking regions from 3 microsatellite loci (VA1, VA2 and VA13). Colours correspond to collection location as shown on the map. Only 20 representative isolates were included from Asian collections (yellow).

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### References

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