Threatened Species Assessment

Asterophora mirabilis
Beech Nyctalis

Taxonomy

Asterophora mirabilis (T.W.May) Redhead & Seifert

This taxon was first described as *Nyctalis mirabilis*, in 1995. There are no other species of the genus *Asterophora* in Australia.

Current conservation status

Categorised as Rare in the 2014 Advisory list of rare or threatened flora (DEPI 2014).

Proposed conservation status

Endangered in Victoria

Criterion D

Asterophora mirabilis is an obligate mycoparasite, forming mycelium and fruit-bodies on the fruit-bodies of members of the *Russulaceae,* possibly one species of *Russula* (*R. ingwa*). It is known from only 10 locations in Victoria, in three subpopulations, with each location usually consisting of no more than 20 individuals, with a total population of no more than 240 individuals. It is an annual species and is dependent on the presence of the host. The low number of individuals means that it is assessed as Endangered under the D criterion.

Species Information

Description and Life History

A. mirabilis is a mushroom with a distinctive myco-parasitic habit, namely its fruiting-bodies appear on the old fruit-bodies of another host mushroom. The host is always a species of *Russulaceae,* most likely a species of *Russula.* Another distinctive feature of the taxon is its highly distinctive chlamydospores (resting spores) in the pileus tissue. There is one collection in MEL where the host is identified as *Russula ingwa.* Determination of the host is made harder because the host is often partially decayed by *A. mirabilis* (but identification of the host could be attempted in future by DNA sampling). Even though the host is generally blackened and decayed, the general shape and remaining surface features indicate that a single host species could be involved, but this needs to be confirmed. It is relevant that none of the host fruit-bodies have had any bright colours (red, orange etc.) as is commonly found in members of the *Russulaceae.* In contrast, *Russula ingwa* has a white pileus that becomes brown to dark brown in age. The taxon has both basidiospores and chlamydospores (resting spores). It is possible that the chlamydospores fall to the ground and are the source of infections of the host when fruit-bodies appear in following years, but this would be by establishment of new mycelia, and hence the species is assumed to be an annual.

Generation Length

The generation length of *Asterophora mirabilis* is inferred to be 1 years. Fruit-bodies occur on the fruit-bodies of another mushroom (a species of Russulaceae). The host fruit-bodies last no more than a couple of weeks, and therefore the taxon is assumed to be an annual.

Distribution

Within Victoria, there are known occurrences in the Otway Ranges (three localities), Central Highlands six localities) and at Wilsons Promontory (one locality). The taxon has been reported also from Tasmania.

Habitat

Where habitat details are available, about half the occurrences are in Cool Temperate Rainforest, with *Nothofagus cunninghamii* as the dominant tree. Other sites are mostly tall, wet *Eucalyptus* forest (with *Eucalyptus regnans, E. cypellocarpa* or *E. viminalis*).

Threats

If the taxon is restricted to a single host, then the distribution and habitat preference of the host becomes a significant factor. The one known host, *Russula ingwa* is known from only 10 collections in Victoria, from the Central Highlands, the Kinglake Range, and Mornington Peninsula, as well as an isolated record from the Portland district. Occurrences of the taxon are within a portion of this range (not in the westernmost site, and nor in the drier sites). Threats and demographic trends for the host are unknown.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 18,306 km² and the Area of Occupancy (AoO) is estimated to be 40 km², but other thresholds under this criterion have not been met.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C

The taxon is estimated to have 220 mature individuals, but other thresholds under this criterion have not been met.

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	<50	<250	<1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO <20 km2 or number of locations ≤5

Evidence:

Eligible under Criterion D as Endangered

The taxon is estimated to have 220 mature individuals. Each observation has been of fruit-bodies on one host fruit-body (at least as far as photos of records), and otherwise would be host fruit-bodies that are in very close proximity. Each occurrence is therefore regarded as a single genetic individual. Given the short time of appearance of fruit-bodies of the host and *Asterophora mirabilis* itself, it is quite possible that there would be additional individuals in each location. Therefore, at each location there are considered to be 20 genetic individuals, as a very conservative estimate (i.e. the number of observed genetic individuals is increased by a factor of 20 to allow for un-recorded individuals). However, the population at The Beeches is estimated as larger, at 60, due to multiple records from within 1 km of each other. For the 10 locations this gives 240 individuals

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

DEPI (2014). *Advisory list of rare or threatened plants in Victoria - 2014*. Department of Environment and Primary Industries, Melbourne. Retrieved from: https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/50448/Advisory-List-of-Rare-or-Threatened-Plants-in-Victoria-2014.pdf

May, T.W. and Fuhrer, B.A. (1995). *Nyctalis paradoxa* (Fungi: Agaricales), a new species from Australia. *Muelleria* 8: 385-390