Monitoring macrofungi on DRF sites sprayed with Phosphite

Progress report – July 2004

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Preliminary monitoring of fungi on sites sprayed with Phosphite was carried out at Gull Rock and Vancouver Peninsula in July 2004. The monitoring was undertaken in order to satisfy requirements set out by the Australian Pesticides and Veterinary Medicines Authority for the renewal of the off-label permit for the aerial application of Phosphite to native vegetation and the need to "monitor for evidence of effects on non-pathogenic and beneficial fungi and secondary effects on organisms that depend on these fungi for food and nutrient cycling".

1. Gull Rock – 5/7/04

Site

The gull rock site is woodland dominated by several species of *Banksia*, including *B. coccinea* and *B. attenuata*. The study site is an infected area approx 1 ha in size, being approx. 0.5 ha on either side of an unnamed track. The area on the western side of the track has had two autumn applications (4-6 weeks apart) of Phosphite in each of the years 1996, 1999, 2001 and 2004 at the rate of 12 kg ha^{-1} of (potassium) Phosphite. The eastern side of the road has not been sprayed. Each area extends approx. 120m N-S and approx. 30-40m E-W on either side of the road.

Survey method

In each sprayed and unsprayed area all macrofungal species and the number of fruitbodies were recorded in each of 2 x 100m transects 4m wide. On each area the two transects were approx 10m apart. In addition 2 similar transects were monitored, one approx 20 m west of the disease boundary of the unsprayed area and the other approx. 200m north in an apparently healthy woodland dominated by *B. coccinea*.

Results

Only 19 species of fungi were recorded at the Gull Rock site (Table 1). Most species recorded on the 'healthy' transects were not recorded on the infested transects and *vice versa*. There were fewer species recorded on the sprayed sites compared to the unsprayed sites, but more than double the number of fruitbodies were recorded on the area sprayed with Phosphite. The difference in species composition between the infested and healthy areas may be attributed to the lack of groundcover on the infested areas, and the obviously more open nature of the community as a result of dieback. The ground cover on the healthy areas was dominated by monocots, such as *Lomandra* spp., *Dasypogon bromeliifolius* and *Hypolaena exsulca*, which created a moister environment with little or no exposed ground. In contrast the ground was very exposed in the infested area with little or no litter layer.

Table 1. The species of fungi recorded at Gull Rock.

Species	'Control'	+ P spray	- P spray
Amanita umbrinella	1		
Calocera sp.			42
Coltricia oblectans		9	45
Cortinarius sp. 'purple brown'	3		
Cortinarius spp. (unidentified)	1	1	
Discomycete 'tiny yellow, stalked'	35		
Inocybe sp.	9		
Inocybe sp. 'scaly cap'		11	4
laccaria lateritia		3	
Laccaria masonii		448	106
Lepiota cristata	1		
Mycena mijoii	3		
Mycena sp. 'tiny white umbrella'	7		
Omphalina chromaceae	9		1
Omphalotus nidiformis			2
Parasite on *Coltricia oblectans*			2
Psilocybe coprophila			1
Pycnoporus coccineus	4		
Thelephora aff. *terrestris* 'light brown'		2	6
# species	**10**	**6**	**9**
# fruitbodies	**73**	**474**	**209**

Total species = 19

2. Vancouver Peninsula – 6/7/04

Site

The Vancouver Peninsula site is coastal woodland dominated by *Eucalyptus marginata*, *Banksia grandis* and *B. brownii*. The sprayed area is approximately 1ha in size (100 x 100m) on a SW facing slope directly above the shores of Princess Royal Harbour. The site has had two autumn applications (4-6 weeks apart) of Phosphite in each of the years 1996, 1999, 2001 and 2004 at the rate of 12 kg ha^{-1} of (potassium) Phosphite. The unsprayed area monitored was also 1 ha in size, situated approx. 200 m SE of the sprayed area.

Survey method

In each sprayed and unsprayed area all macrofungal species and the number of fruitbodies were recorded in each of 2 x 100m transects 4m wide. On each area the two transects ran along the slope and were approx 40m apart. No monitoring was undertaken on an uninfested area as disease expression at this location was not obvious and it could not be guaranteed that dieback was not present.

Results

In all, 35 species of macrofungi were recorded (Table 2). The number of species recorded in each area was very similar, but only one-quarter of the species occurred on both sites. The number of fruitbodies recorded on the area sprayed with Phosphite was 3.5 times greater that on the unsprayed area.

Table 2. The species of fungi recorded at Vancouver Peninsula.

Species	+ P spray	- P spray
Amanita cf. *bruneibulbosa*		1
Amanita sp. (unidentified)	1	1
Amanita xanthocephala	2	
Armillaria luteobubalina	8	
Coltricia oblectans	8	
Cortinarius sp. 'chestnut'		9
Cortinarius sp. 'purple-brown'		5
Cortinarius sp. 'viscid pink-brown'		1
Cortinarius spp. (unidentified)		11
Entoloma sp. 'honey'	1	
Entoloma sp. 'tall grey-brown'	2	1
Galerina sp.	15	11
Gymnopilus sp. 'slender'		3
Hydnum repandum	44	2
Hygrocybe conica	1	
Inocybe sp. 'scaly cap'	5	4
Inocybe sp. 'tan skirt'	1	
Laccaria lateritia	42	3
Laccaria masonii	59	1
Lactarius sp. 'creamy yellow'		2
Melenophyllum echinatum	2	
Mycena sanguinolenta	1	
Mycena sp. ' tan dome with v. long slender stem'	26	
Mycena spp. (unidentified)	6	
Paxillus sp.	2	
Peziza sp. 'hollow sphere'		1
Pisolithus sp.	1	
Psathyrella sp.	8	2
Psilocybe coprophila	4	3
Ramaria sp. 'grey-brown'		9
Rickinella fibula	32	
Russula floctoniae		1
Russula neerimea	5	2
Russula sp. 'white-white-white'		4
Stereum hirsutum		2
# species	**23**	**22**
# fruitbodies	**276**	**79**

Total species = 35
Species on both sites = 9

Conclusions

The fruiting of macrofungi occurs over a 2-3 month period, and the suite of species fruiting can vary dramatically over a period of 1-2 weeks. It is difficult to predict when the peak of the fruiting season will occur, therefore, I suggest that future monitoring be undertaken on at least 3 dates per year centred around the predicted peak. As yet the data are not sufficient to allow a meaningful analysis, however, some trends were observed.

The results suggest that fungal communities on sites sprayed with phosphite differ and that species on sprayed sites fruit more prolifically. However, the data represent only one monitoring date and the monitored sites are relatively small and do not offer the option for replication. Therefore, the data should be interpreted with caution. Hypogean (truffle-like) fungi were not included in the survey, as it would have necessitated major disturbance of the sites that may affect future monitoring.

At Gull Rock, differences in species recorded on the infested area compared to the 'healthy' area more likely reflect the effects of the disease. These effects being reflected in the plant species composition of each site, resulting in the high density of ground cover species in the 'healthy' area. On the Vancouver Peninsula the differences may be genuine, but a longer monitoring period is needed to confirm these observations at both sites.