



Grassland Information Note: Number 4

GRASSLAND FUNGI

Fungi form a rich and varied part of our natural history. Many species of grassland fungi are rare or endangered and require conservation action to ensure their survival.

Introduction

Many traditionally managed grasslands have a rich fungal flora. Grasslands that are important for their fungi have become very scarce on a European scale and the UK has a relatively rich resource. Some of the most striking fungi found in these habitats are the waxcaps *Hygrocybe* spp.. They are usually brightly coloured including species that are pink, green, violet and every shade from yellow through to deep crimson. They have thick waxy gills, moist brittle flesh and a waxy, sticky or slimy cap. For this reason these sites are commonly known as waxcap grasslands. Some other species that are characteristic of this important suit of fungi include the fairy clubs (clavarioid fungi); earth tongues (Geoglossaceae); the pink-spored agarics of the genus *Entoloma*; and mousseron-type fungi of the genera *Dermoloma* and *Porpoloma* (Rotheroe, 1997).

Unfortunately waxcap grasslands sometimes appear to be of low conservation value when looking at their associated plants and animals. Unless the importance of the fungi is known at these sites there is some danger that they may be lost as a result of misguided conservation management decisions. These sites often appear either rank or over-grazed and may be damaged in an attempt to improve their vascular plant diversity, their value as a nectar source for invertebrates or as a nesting site for birds. At worst, rich waxcap grassland sites may be considered as good potential sites for habitat creation schemes or may even be lost to development.

What to look for

Almost without exception the best waxcap grassland sites are well drained, have a short turf, a well-defined bryophyte layer and a low availability of nitrogen. Old unimproved pastures,

traditionally managed old lawns and churchyards can all be potentially good sites. Pastures are typically heavily grazed whilst the turf of old lawns, churchyards and parks may be kept short by regular mowing. So far very little correlation has been shown between any particular National Vegetation Community (NVC) and valuable waxcap grassland sites. Mesotrophic (MG), Calcifugous (U) and Calcicolous (CG) grasslands as well heaths (H), mires (M), sand dunes (SD) and maritime cliffs (MC) may all have a rich waxcap grassland mycota.

If there is reason to suspect that a site may be important for its waxcap grassland mycota the next step is to ensure that the fungi are properly recorded. The British Mycological Society (BMS) encourages the recording of fungi and maintains a national fungal database. It supports local recording groups in many parts of the country. Its members should be able to advise on whether records exist for your site or they may be able to organise a foray to assess what is there. A county Biological Records Centre may also be able to help. In a few counties such as Warwickshire there are published fungal floras which can be used as an information source.

There are now some excellent publications which can help in the identification of waxcaps. David Boertmann's monograph (Boertmann, 1996) has user friendly keys and excellent illustrations and the BMS has produced a useful field key for waxcaps which can be obtained from the BMS library at The Herbarium, The Royal Botanic Gardens, Kew. The best months to look for these fungi are September and October.

Box 1 Site Evaluation

Several different systems have been developed to help determine the relative mycological value of waxcap grasslands. The simplest of these is that of Rald (1985), which uses the number of *Hygrocybe* species recorded as an indication of site value. However this system was devised for use in Denmark and should be used with caution in the UK until more data are obtained. If the number of species found during one visit is to be used the timing of the visit is crucial.

Conservation value	Total number of <i>Hygrocybe</i> species
National importance	17-32 (11-20 during a single visit)
Regional importance	9-16 (6-20 during a single visit)
Local importance	4-8 (3-5 during a single visit)
No importance	1-3 (1-2 during a single visit)

Vesterholt *et al* (1999) further proposed that sites with 22 species of *Hygrocybe* or more are internationally important.

Additionally, the value of a site can be supported by the presence of rare or endangered species, belonging to the groups mentioned above, and some species that are likely to be good habitat quality indicators. Examples of these are listed in **Annex A** (modified for McHugh *et al*, in press).

Important sites can be further compared by using the 'waxcap profile' (Rotheroe *et al*, 1996). This system uses the total number of five different groups of fungi which can be expressed by using the following code letters; **C** (clavarioid fungi), **H** (*Hygrocybe* spp.), **E** (grassland species of Entolomataceae), **G** (Geoglossaceae) and **D** (*Dermoloma*).

Box 2

What are Fungi?

Fungi are living organisms in a kingdom of their own. Unlike plants they cannot use the energy from the sun to make food. They grow by absorbing food and water from their surroundings. Most fungi are made up of minute tubes called hyphae. Although individual hyphae are small, they can form large interconnected masses called mycelia. When conditions are right the mycelium produces a spore-bearing fruit body. The fruit bodies we most often notice are mushrooms or toadstools.

The role fungi play in nature

Fungi are not only important in their own right; plants and animals are dependent on fungi for their survival. Without fungi whole ecosystems would fail, leaving nothing to conserve. Fungi help to break down and recycle dead plants and animals into food for living plants and some animals. Many plants depend on fungi connected to their root system. The fungi extend the plants effective forage area and facilitate the uptake of mineral nutrients and water. Many insects and other animals, some of which are rare and endangered, depend on fungi during part of their life cycle.

Managing grasslands and conserving fungi

Unfortunately we know very little about the ecology, distribution and conservation status of most fungi. This is partly because fungi are usually identified by examining their fruit bodies and these may only appear sporadically. Many questions need to be answered before any definitive management guidelines can be provided. However, there are some basic principles that can be followed to maximise fungal biodiversity within most sites.

Best Practice

- **Try to find out if the site is important for its grassland fungi.** Advice on how this can be achieved is set out above in the second and third paragraph under the heading 'What to look for'
- **Maintain a short grassland sward.** Almost without exception the best waxcap grassland sites have a short turf and a well-defined bryophyte layer.
- **If the sward has been historically managed by grazing this practice should be continued.** Some important waxcap grassland fungi may require a degree of poaching caused by grazing animals. *Microglossum olivaceum*, a rare grassland fungi, is usually found in areas where the sward has been disturbed, for example as a result of disturbance by grazing animals. Removal of grazing animals, or changing the existing regime may also affect dung fungi.
- **If the sward has always been mown it is best to ensure that the clippings are removed.** Some important waxcap grasslands have been mown for many years and on some sites the clippings have not been removed. However, on most sites it is probably best to remove grass clippings to avoid unnecessary nutrient enrichment.

- **It is best not to apply artificial fertilisers or increase applications of farmyard manure.** A single application of nitrogen can have a severe and long-term impact on the diversity and quantity of fruit body production.
- **Avoid the use of fungicides wherever possible.** Many modern fungicides are very potent and some of them are broad spectrum, that is, they will kill all fungi. It is important to ensure that problems of spray drift and accidental spraying are avoided by discussions with adjoining farming or forestry landowners.
- **Applying lime to waxcap grasslands should be avoided.** Little is known about the effect of liming on waxcap grasslands and it is recommended that this practice be avoided until more is known about the likely effects.
- **As far as possible maintain existing drainage systems.** Most rich waxcap grasslands are well-drained and thus existing drainage systems should be maintained (but not improved).
- **Avoid soil compaction through excessive trampling.** On sites that are open for public access soil compaction of important areas may affect important grassland fungi.
- **Do not plough or re-seed.**
- **It is best to carefully manage the collection of fungus fruit bodies.** The collection of fungus fruit bodies may be necessary to ensure correct identification for recording purposes. Although there is no scientific evidence that collecting directly affects the fungus we urge a precautionary approach, especially where rare and threatened fungi are concerned. Try to ensure collecting is done in a responsible way so everyone, including the many animals that depend on fungi for their survival, can enjoy the fungus season. An advisory leaflet titled 'The Conservation of Wild Mushrooms', which includes 'The Wild Mushroom Pickers Code of Conduct' is available on request from English Nature's Enquiry Service Tel. 01733 455101.

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Annex A

Rare or endangered fungi and species that are likely to be good habitat quality indicators (modified from McHugh *et al* in press)

High	Medium	Low
<i>C. rosea</i>	<i>Clavaria fumosa</i>	<i>Clavulinopsis fusiformis</i>
<i>C. zollingeri</i>	<i>Clavulinopsis umbrinella</i>	<i>Hygrocybe</i> (all other spp.)
<i>Entoloma bloxamii</i>	<i>Dermoloma cuneifolium</i>	
<i>E. incanum</i>	<i>E. porphyrophaeum</i>	
<i>Hygrocybe ingrata</i>	<i>E. pratulense</i>	
<i>H. lacmus</i>	<i>E. prunuloides</i>	
<i>H. nitrata</i>	<i>E. roseum</i>	
<i>H. ovina</i>	<i>Geoglossaceae</i> (All species)	
<i>H. punicea</i>	<i>Hygrocybe aurantiosplendens</i>	
<i>H. spadicea</i>	<i>H. pratensis</i> var. <i>pallida</i>	
<i>H. splendidissima</i>	<i>H. calciphila</i>	
	<i>H. calyptriformis</i>	
	<i>H. citrinopallida</i>	
	<i>H. citrovirens</i>	
	<i>H. colemanniana</i>	
	<i>H. constrictospora</i>	
	<i>H. flavipes</i>	
	<i>H. fornicata</i>	
	<i>H. glutinipes</i>	
	<i>H. helobia</i>	
	<i>H. intermedia</i>	
	<i>H. irrigata</i>	
	<i>H. phaeococcinea</i>	
	<i>H. quieta</i>	
	<i>H. radiata</i>	
	<i>H. vitellina</i>	
	<i>H. xanthochroa</i>	