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Joint Nature Conservation Committee

Guidelines for the selection of biological SSSI's
Part 2: Detailed guidelines for habitats and species groups

18 GRASSLAND FUNGI

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18 GRASSLAND FUNGI

1 Introduction

1.1 Context

1.1.1 In parts of northern Europe certain nutrient-poor unimproved and semi-improved grasslands are habitat for distinctive and often colourful communities of macrofungi. These are often referred to as "waxcap grasslands" since fungi of the genus *Hygrocybe* - waxcaps - are usually a major constituent. Other families and genera are usually also represented and sometimes may be of more significance at a particular site than the *Hygrocybe*. Often these types of grassland are botanically relatively poor and have been overlooked in the process of SSSI selection. In recent years their scientific interest and importance for biodiversity have become increasingly recognised at the national and international level. Good sites continue to be lost due to factors such as fertilisation, ploughing and re-seeding; insufficient grazing or mowing; and housing or other development.

1.1.2 Scant mention is made of fungi in the existing "Guidelines for selection of biological SSSI" (Ratcliffe, D.A., 1989; Hodgetts, N.G., 1992) due to the relatively poor state of knowledge (both of their taxonomy and their distribution) at the time these were written. The supplementary guidelines which follow are intended to remedy that deficiency for grassland fungal assemblages. In drawing them up we have taken account of relevant published research and survey work from the last 10 years or so - in particular: Rotheroe (1999), McHugh et al (2001); Newton et al (2003); Evans (2003) and Griffith et al (2006). We have also consulted with the wider mycological community both in Britain and abroad.

1.1.3 These supplementary guidelines are intended to form the first part of a new chapter to cover the fungi. Only assemblages of species that produce macroscopic above-ground structures are currently considered; exclusively subterranean species e.g. Glomeromycota may be included in the future, as detection methods that rely on molecular markers become more readily available. Such methods may also provide the potential for detecting in the soil species capable of producing fruiting bodies even in the absence of such bodies. Due to sampling limitations, molecular markers can be used to demonstrate the presence of a species but not to prove its absence. The authors of

these guidelines explicitly accept that species records made using such methods, when they are available, should be valid for the purposes of SSSI site selection.

1.1.4 Certain parts of the UK are particularly rich in high-quality grassland fungi sites, and thus it may be considered appropriate to vary threshold scores in the different constituent countries of the UK. We should be careful, however, not to view their relative abundance in the UK as lessening their conservation importance. Sites rich in grassland fungi are scarce and threatened on a world scale and are declining in extent; we therefore have an international responsibility to conserve them, especially in the face of continuing pressures on the remaining examples of such grasslands. Once damaged, these habitats are extremely difficult, if not impossible, to restore.

1.1.5 Assessing the conservation importance of grassland fungi sites presents particular problems in comparison with site assessments made on botanical grounds. Because of the unpredictability of the appearance of fruiting bodies it is virtually impossible to be sure when a comprehensive fungal species list for a site has been arrived at. Several recording visits over 3 or more years and at different times of the year are often necessary to obtain a full picture. When assessing a site on the basis of a single visit there is a high risk of a false negative - the site may appear to be of little importance since few species are recorded although subsequent visits and additional species records might alter this perception. On the other hand, experience has shown that it is often possible to determine with some confidence on a single visit that a site is a good one for grassland fungi, and for this to be confirmed by further visits.

1.1.6 As a general rule any information that indicates that a site is of good quality for grassland fungi should be taken into account.

1.2 Scope

1.2.1 These guidelines cover the distinctive species and assemblages of fungi associated with unimproved and semi-improved grasslands – i.e. grasslands which have been in general managed traditionally without recent ploughing, re-seeding or applications of inorganic fertilisers. These may include lowland meadows and pastures and upland grasslands. It should also be noted that ancient lawns and grasslands managed by regular

grazing and/or mowing and those on old mineral workings or, for example, on old reservoir embankments, may also be important. The key groups of fungi currently considered are the genera *Hygrocybe* (waxcaps) and *Entoloma* (pinkgills) and families *Clavariaceae* and *Geoglossaceae*. Other groups may also be considered e.g. the order *Glomeromycota* (arbuscular mycorrhizal fungi) and genera *Camarophyllopsis, Dermoloma* and *Porpoloma*. Further work is required to establish the significance of genera such as *Agaricus, Mycena, Lycoperdon and Bovista*.

1.3 Site selection – important issues

1.3.1 Many sites important for grassland fungi may be selected on the basis of habitats determined, predominantly, by their vascular plant communities. However, many mycologically important grasslands have low vascular plant diversity, and may therefore be overlooked in evaluations based on botanical survey data alone. These guidelines are intended to assist with site evaluations based on mycological grounds.

1.3.2 There are particular practical problems associated with the selection of important sites for grassland fungi:

1.3.3 Grassland fungi are primarily subterranean organisms detectable above ground only when they produce sporomes (spore-producing structures such as "toadstools").

1.3.4 The appearance of sporomes is erratic, somewhat unpredictable and of short-duration. They are not necessarily produced every year and when they are they may only remain for a few days.

1.3.5 Data on the distribution of many species is inadequate, so it is sometimes difficult to determine what is rare and what is not.

1.3.6 Many species are difficult or impossible to identify in the field, and microscopic examination is often required.

1.3.7 Compared to many species group specialists e.g. ornithologists and vascular plant botanists, there are few expert mycologists.

2. International Importance and threats

2.1 International Importance

2.1.1 Despite extensive loss of semi-natural grasslands in recent decades analysis of survey results to date (McHugh *et al*, 2001; Newton *et al*, 2003; Evans, 2003; Griffith et al, 2006) indicate that the U.K. is of exceptional importance for grassland fungi, compared to other countries in Europe. For example, the number of nationally important grassland fungus sites, according to the system devised by Rald (1995), is at least 150 in the U.K. This compares, for example, with 14 in the Netherlands, 20 in Denmark and 2 the Irish Republic. Survey coverage in the U.K. is not complete and more sites of this calibre probably remain to be discovered. On a world scale these types of grasslands are rare since *Hygrocybe* species are more often associated with woodlands elsewhere e.g. in North America (Boertmann, 1996).

2.1.2 The UK therefore has an international responsibility for these fungus-rich grasslands, and as many as possible of the best sites should be protected.

2.2 Threats

2.2.1 The extent of mycologically-rich, unimproved grasslands has declined dramatically in northern Europe over recent decades. Losses have been due to agricultural improvement, conversion of land to other uses such as forestry and development for housing or industry. Increased nitrogen deposition from the atmosphere may also be a factor. Agricultural practices that are damaging to fungi include the application of dung and inorganic fertilizers, ploughing, and reseeding with competitive and productive strains of grasses. The use of lawn fertilizers, moss killers and the increased use of lawns leading to soil compaction may also have had an adverse affect on the fungus flora of ancient lawns.

2.2.2 Insufficient grazing or mowing can also be a problem since these fungi may not thrive in rank swards and do best where there is fairly intense grazing or regular mowing. A change of management from regularly grazed pasture to hay meadow, often to favour the flowering plants may also be damaging. Poaching by larger livestock can also be a threat. Rabbit grazing has probably provided ideal conditions on some sites and the recent reduction of rabbits due to disease may also constitute a threat if substitute gazing stock cannot be arranged.

In many rural areas where churchyards are only partly filled with graves the undisturbed grassland can be rich in grassland fungi. The continued use of the churchyard for burials is gradually reducing the area of waxcap grassland.

2.2.3 Mycologically important grasslands have usually been under traditional non-intensive management for long periods - at least 20-30 years but often for centuries (Keizer, 1993). Once damaged they are very difficult if not impossible to restore (Evans, 2003; Griffith, 2002).

2.2.4 Many individual species of fungi associated with grasslands have undergone a rapid decline in several parts of Europe. An analysis of Red Lists for 11 European countries indicated that 89% of *Hygrocybe* and 97% of *Entoloma* species feature on one or more lists (Arnolds and de Vries, 1993).

3. Site Selection Requirements

3.1 Introduction

3.1.1 This supplement to the SSSI selection guidelines deals only with "assemblages" of grassland fungi. Site selection for individually-qualifying single species will be dealt with in future supplements, as part of a wider chapter dealing with fungi. Two basic approaches to site evaluation for grassland fungi assemblages have been developed in recent years – a) scoring systems based on weighted indicator species, and b) simple species counts. These are discussed below.

3.2 Weighted Indicator Species systems

3.2.1 Rotheroe (1999, 2001), McHugh *et al* (2001) and others have proposed scoring systems based on a series of readily identifiable indicator species. Species are weighted according to how good an indicator of quality they are thought to be.

3.2.2 Generally these types of systems are useful for identifying potentially good sites when it has been possible to make only one or a few visits. However, which species should be weighted and by how much is still a matter for discussion and is likely to vary for different regions of the U.K. Although such systems have proved to be good predictors of high-quality sites, for SSSI

selection they should be supplemented by all available species lists (subject to the proviso in 3.3.2 below).

3.3 Simple species counts

3.3.1 Accumulated species totals made over at least 3 (not necessarily consecutive) years are the most reliable evidence for identifying high quality sites. However, a relatively high count on a single visit can also indicate a site of high conservation value.

3.3.2 In accordance with recent practice for *Hygrocybe* species, we recommend different threshold values depending on whether counts are from a single site visit, or whether accumulated from several visits. Note that these counts are of taxa at the species-level. Sub-specific taxa should NOT be included to increase the count. Taxonomy should follow Legon and Henrici (2005), and only recognised grassland species should be included.

3.3.3 The *Hygrocybe* species are the most prominent and least difficult to identify group, and usually the most abundant in these types of sites. Very often a count of *Hygrocybe* species alone is sufficient to identify a good quality site. Based on previous research in the various countries of the U.K. (McHugh *et al*, 2001; Newton *et al*, 2003; Evans, 2003; Griffith et al, 2006) and our own experience, we suggest the following threshold values for *Hygrocybe* to indicate that a site should be considered for SSSI status.

Single visit - 12 species
Multiple visits - 18 species

3.3.4 Some sites may not meet the suggested thresholds for *Hygrocybe* but still be exceptional for other groups. For these other groups, the following thresholds for accumulated species counts are suggested. At this stage of our knowledge a site should not normally be selected solely on the basis of one of these generic/family thresholds being exceeded, and we cannot as yet recommend a single-visit threshold for these groups. However, the more genera/families in the list that exceed these thresholds the more confident one can be that a site is special.

Clavariaceae – 5
Entoloma – 12

Geoglossaceae – 3
Dermoloma – 2

3.3.5 These threshold values are not absolute: they are for guidance only, to indicate when a site should be *considered* for SSSI designation. In particular, account may need to be taken of regional variation and the actual species recorded in relation to their known distribution nationally and in the area of search. Expert judgement will thus still normally be required.

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