Plantlife Scotland

Waxcaps and Grassland Fungi

A guide to identification and management

This guide aims to raise awareness of a group of fungi for which Scotland is globally important - the waxcaps and other fungi that appear in grasslands and lawns in the late summer and autumn.

Known as 'grassland fungi', this group is characterised by the colourful waxcaps, but includes other charismatic species like the coral fungi, pinkgills and earthtongues. Any grassland with fungi appearing in late summer and autumn is likely to be of interest and worth investigating further with the use of this guide. It will help you to:

- **Identify some of the more distinctive waxcap grassland fungi.**
- **Identify a waxcap grassland and assess whether rare or unique indicator species are present.**
- **Manage a waxcap grassland by giving guidance on the practices that should be encouraged or avoided.**

What is a fungus?

Fungi form a biological kingdom of their own, separate from plants, animals and bacteria, and including familiar organisms like moulds, yeasts and mushrooms. The grassland fungi live mostly below ground forming intricate networks of fine threads, known as mycelium; it is only the fruiting body, the spore-producing 'mushroom' or 'toadstool', that is visible above ground at certain times of the year. To add further mystery, the fungus does not necessarily produce fruiting bodies each year, so finding fungi can sometimes be difficult.

What are waxcaps, grassland fungi and waxcap grasslands?

Waxcaps are familiar-shaped mushrooms that are often brightly-coloured and have a waxy or slippery-looking cap. They are found in short sward grasslands that are generally poor in nutrients - including old pasture, sand dunes, heathland, lawns and cemeteries - alongside other fungi, such as club and coral fungi, pinkgills and earthtongues. A 'waxcap grassland' is a pasture, meadow or grassy area where these fungi are found.

Why are waxcap grasslands important?

The grasslands of the UK are amongst the most important in the world for grassland fungi. Their preference for ancient pastures and grassland that have not been agriculturally 'improved' means that many species are rare and declining. 13 species of waxcaps, earthtongues, pinkgills, and corals are on the Scottish Biodiversity List, meaning they are a priority focus for conservation work. Two SSSI sites have recently been designated for protection in Scotland due in part to the high grassland fungi biodiversity they support.

Identifying grassland fungi with this guide

Identification of waxcaps is best carried out by examining a small number of specimens in good condition and at different stages of growth as their size, shape and colour often changes with age. Please avoid picking and collecting these rare fungi from the wild unless you are with an experienced surveyor.

Key features to look for are:

Colour of the **cap**, **stem** and **gills** of fruiting bodies.

The overall **shape** and **dimensions** of the fruiting body; what is the diameter of the cap, is it conical (pointed), **domed** (rounded), **convex** or **flattened**? Does it have any other features such as a distinct bump in the centre (known as an **umbo**)?

The method of attachment of the **gills** to the cap. Gills may be described as **narrowly** or **barely attached** to the stem, **broadly attached**, or **decurrent** (where the gills are fluted down the stem like a vaulted ceiling)

The **texture** of the cap and stem: fresh specimens observed in dry weather can be **slimy**, **sticky**, **moist** or **dry** and can appear **smooth**, break up into coarse **feather-like scales** or are made up of distinct, more or less, parallel fibres (termed **fibrillose**).

The **smell** of the specimen after gently warming a portion in the hand or placing in a closed container for a short while. Although only a few species have a distinctive smell, this can be an important clue. Particular smells relevant to waxcaps are **oil**, **honey** and **cedar**.

Photographs can be very helpful if submitting details to specialists or an internet forum for advice, but remember to include an object in the photograph for scale and attempt to capture as many features as possible including the underside of the cap.

Always wash your hands after handling fungi and please note that this guide is not intended to aid identification of edible species.

On the next pages pictures and identification notes have been included of a few common or interesting grassland fungi that may be found in Scotland. There are more than 50 species of waxcaps, corals, pinkgills, and earthtongues in the UK.

Red Waxcaps

Scarlet Waxcap *Hygrocybe coccinea*

Cap: Red, moist and domed at first, becoming flatter with age.

Diameter of cap: To 60mm.

Gills: Red or yellow, broadly attached to the stem.

Stem: Red or orange, dry and smooth.

Notes: A common species in unfertilised grassland often appearing in large troupes.

Crimson Waxcap *Hygrocybe punicea*

Cap: Blood-red, moist and domed or convex. Older weathered specimens develop a distinctly two-tone cap colour with a paler yellow-buff centre.

Diameter of cap: To 150mm.

Gills: Brownish-red to yellow, narrowly attached to the stem.

Stem: Yellow to orange, dry and fibrillose.

Notes: A robust and striking species mostly restricted to long-established nutrient-poor grassland where it can appear in good numbers. This is an important indicator of high quality sites and a flagship in the Cairngorms National Park for historical grassland fungi sites. *

Pink Waxcaps

Splendid Waxcap *Hygrocybe splendidissima*

Cap: Red and dry. Usually broadly conical at first, becoming flat or slightly convex with a broad umbo.

Diameter of cap: To 70mm.

Gills: Red or yellow, narrowly attached to the stem.

Stem: Red or orange, dry and smooth.

Notes: An uncommon species in long-established nutrient-poor grassland. Drying specimens have a distinctive smell of honey which helps distinguish from large specimens of *H. coccinea*. Another species indicating high quality historical sites. *

Pink or Ballerina Waxcap *Porpolomopsis calyptriformis*

Cap: Pink, moist and narrowly conical at first but the margin splits and turns upwards with age.

Diameter of cap: To 100mm.

Gills: Pale pink, free or narrowly attached to the stem.

Stem: White, dry and smooth.

Notes: Readily identified and widely reported from unfertilised grassland.

Yellow, Orange and Orange-Red Waxcaps

Golden Waxcap *Hygrocybe chlorophana*

Cap: Yellow or orange, wet and/or sticky, domed at first, becoming flatter with age.

Diameter of cap: To 70mm.

Gills: Narrowly or barely attached to the stem.

Stem: Yellow or orange, usually dry, but occasionally moist.

Notes: A common species in unfertilised grassland. A similar species, *H. ceracea* (Butter Waxcap), is usually smaller and has gills which are broadly attached to the stem.

Blackening Waxcap *Hygrocybe conica*

Cap: Yellow, red or orange then blackening with age or damage. Initially moist but becoming dry Distinctly conical at first, changing little with age.

Diameter of cap: To 100mm.

Gills: Greyish-white at first, narrowly attached to the stem.

Stem: Yellow or orange, initially moist, later dry, and turning black.

Notes: A common species in unfertilised grasslands and sand-dunes. Although treated as one species, it may actually represent a number of similar species.

Meadow Waxcap *Cuphophyllus pratensis*

Cap: Brownish-orange fading to a very pale buff colour, dry. Domed at first, becoming flatter with age.

Diameter of cap: To 120mm.

Gills: Cream to pale buff, decurrent.

Stem: White, dry, finely fibrillose.

Notes: A conspicuous and robust waxcap often persisting for several weeks. Common in unfertilised grassland, occasionally in large rings.

Oily Waxcap *Hygrocybe quieta*

Cap: Dull orange and dry or greasy. Convex then flattening with age, often distorted and cracking at the centre.

Diameter of cap: To 80mm.

Gills: Orange to salmon-coloured, and narrowly or broadly attached to the stem.

Stem: Orange, smooth and dry. Specimens usually have a faint oily smell.

Notes: An occasional species in unfertilised grassland.

Yellow, Orange and Orange-Red Waxcaps

Heath Waxcap *Gliophorus laetus*

Cap: Dull greenish-orange and slimy. Convex at first becoming flatter with age.

Diameter of cap: To 50mm.

Gills: Greyish-white with clear margin (best seen with a magnifying glass), decurrent.

Stem: Dull greenish-yellow and slimy.

Notes: Not uncommon on acidic soils and amongst moss in damp areas. Specimens are relatively tough when crushed and have a characteristic smell said to resemble burnt rubber.

Honey Waxcap *Hygrocybe reidii*

Cap: Orange and dry. Flattened or slightly convex, often with a wavy margin.

Diameter of cap: To 50mm.

Gills: Yellow to orange, and broadly attached or slightly decurrent.

Stem: Yellow to orange, dry and smooth.

Notes: Not uncommon in unimproved grassland. Specimens smell of honey when rubbed or when drying.

Brown or Grey Waxcaps

Date-coloured Waxcap *Hygrocybe spadicea*

Cap: Distinctive date brown colour over a yellow-fleshed fruiting body. The cap is broadly conical, becoming dry and split at the margin with age.

Diameter of stem: To 80mm.

Gills: Yellow or pale orange and narrowly or barely attached to the stem.

Stem: Yellow or pale orange and fibrillose.

Notes: Rarely found in the field except during occasional favourable years. A Scottish Biodiversity List Species. If seen please report to relevant recorders and local conservation organisations. *

Nitrous Waxcap *Neohygrocybe nitrata*

Cap: Greyish brown, dry, smooth at first but soon becoming fibrillose.

Diameter of cap: To 70mm.

Gills: Narrowly or broadly attached to the stem.

Stem: Coloured as cap, sometimes slightly paler particularly the top and bottom sections.

Notes: An occasional species of unfertilised grassland. This species smells distinctly of nitrous, a distinct sweet metallic smell. *

Green Waxcaps

Parrot Waxcap *Gliophorus psittacinus*

Cap: Usually predominantly green turning yellow-green or completely yellow with age, and very slimy. Domed at first, sometimes with a distinct bump on the top of the cap (known as an umbo), becoming flatter with age.

Diameter of cap: To 40mm.

Gills: Rather broad, but narrowly attached to the stem.

Stem: Colour as cap but almost always a trace of green present near the top, slimy.

Notes: A common and rather variable species in unfertilised grassland. Purple and brick-red examples are sometimes seen.

White Waxcaps

Snowy Waxcap *Cuphophyllus virgineus*

Cap: White, moist, and initially domed, becoming flatter with age.

Diameter of cap: Generally to 50mm, occasionally up to 70mm.

Gills: Decurrent.

Stem: White and moist.

Notes: One of the most widely recorded waxcaps in unfertilised grassland. A variable species which includes varieties having pale buff-brown colours on the cap. A similar species is Cedar Waxcap *Cuphophyllus russocoriaceus* which has a distinctive and pleasant cedar wood smell.

Coral and Club Fungi

Violet Coral *Clavaria zollingeri*

Fruiting body: Coral shaped and of a distinctive purple-violet colour.

Fruiting body size: 30-100mm tall and up to 80mm across. Individual stems are typically 4-7mm in diameter at the base, branching upwards and outwards.

Notes: A rare species of unimproved grassland. Very distinctive and unusual. If seen please report to relevant recorders and local conservation organisations. *

Apricot Club *Clavulinopsis luteoalba*

Fruiting body: Single apricot coloured clubs.

Fruiting body size: 20-80mm tall and up to 5mm across.

Notes: Commonly recorded, there are several yellowish species of club fungi in unimproved grassland.

Earthtongues

Barrelled Earthtongue *Geoglossum cookianum*

Fruiting body: Black clubs or 'tongues' emerging from the soil.

Fruiting body size: Up to 70mm in height.

Stem: Usually brownish black.

Notes: Earthtongues are difficult to distinguish without microscopic examination. They can grow singly, in clumps or in troops and are occasionally slimy. All earthtongues are a sign of old, unimproved grasslands.

Pinkgills

Big Blue Pinkgill *Entoloma bloxamii*

Cap: A distinctive blue-grey colour when fresh. Conical at first becoming convex and developing an umbo.

Diameter of cap: To 100mm.

Gills: White, becoming salmon pink, and broadly attached.

Stem: Colour as cap, sometimes paler at the base, and fibrillose.

Notes: Most likely in unfertilised, old, neutral or calcareous grasslands. A complex of five or six similar species. Pinkgills so called because they produce pink spores which colour their gills as they mature. Difficult to determine without microscopic examination. *

How do I know if I have a good waxcap grassland?

Certain species indicate high quality grassland fungi sites. Any species with a * at the end of the notes section is a very good sign if you are confident of the ID and worth noting and recording.

If you are able to take pictures of any species you see while surveying and record them, local county recorders and mycological groups will be glad to receive them. Download Plantlife's Waxcap Watch app to input your findings and contribute to our work conserving grassland fungi: plantlife.org.uk/waxcapwatch. Waxcaps and other grassland fungi are very under recorded globally and poorly understood.

If you have more than a few common species of waxcaps, e.g. Snowy Waxcap or Scarlet Waxcap, then the site may be of significant interest.

0-3 common species indicate more intensively managed grasslands with low grassland fungi interest. But be aware that this is not always the case, sometimes fungi do not fruit if the vegetation is too dense, or the weather too dry. **You should not dismiss a site with a low number of species straight away**, as sites are best visited over several years to assess their fungi interest.

More than 3 different species of grassland fungi may be of grassland fungi interest and worth further investigation (see below).

More than 6 different species of grassland fungi and/or with rare species (such as those * above) are indicated to be good for grassland fungi and worth further survey, especially by an expert (see below).

What to do if you find an interesting waxcap grassland

If you find an interesting site for grassland fungi, please record information about the site and species seen, take pictures, and inform one of the two fungi organisations mentioned in the 'Information and advice' section. The site may be worth further investigation and these organisations will be able to find a local expert to undertake a more comprehensive survey. Alternatively, if you are aware of the local county recorders or relevant conservation organisation, feel free to pass on information directly to them.

Management for grassland fungi

Habitats rich in grassland fungi, especially old, grasslands with low fertility, are susceptible to change, for example through the application of fertilisers, ploughing, cessation of grazing, scrub encroachment, tree planting and built development. The following guidelines are recommended:

On agricultural grasslands, including hillsides and banks:

Maintain grassland through livestock grazing and/or grass cropping as the removal of excess growth helps to maintain a low nutrient level. A short sward should be maintained where practicable.

Retain permanent grassland as cultivation of the soil disrupts or destroys the underground networks of the fungi - the 'mycelia'. Grassland fungi can take decades to recover from this.

Avoid the use of fertilisers, manures and herbicides as these are detrimental to grassland fungi.

Ensure existing drainage is not impaired as many species require free draining conditions.

Avoid activities that cause soil compaction which may affect the soil structure and damage the mycelia.

Avoid stock feeding in sensitive areas as this may damage soil structure and cause excessive enrichment of the soil.

Prevent the encroachment and establishment of trees and scrub which will render the habitat less suitable for grassland fungi.

On lawns, cemeteries and amenity grasslands:

Keep the grass short through regular mowing.

Remove all cut grass. This is really important in ensuring nutrients do not build up and damage the grassland fungi interest.

Avoid the use of pesticides, fungicides, or proprietary lawn treatments. Mosses may not be very welcome in lawns, but they are present in the best grassland fungi sites.

Do not reseed or carry out other actions which significantly damage the soil structure or affect drainage. Compaction by vehicles can be especially damaging to the soil structure and heavy trampling, especially in late summer/autumn, can damage young fungi and reduce fruiting.

Further information

Books

Grassland Fungi: A Field Guide
2nd edition (2020). Published by Monmouthshire Meadows Group and available from specialist natural history booksellers in the UK.

Websites

plantlife.org.uk/waxcapwatch
Plantlife's free online Waxcap course.

aber.ac.uk/waxcap
Aberystwyth University's 'Waxcap website' provides excellent information on waxcaps, including their ecology, conservation and identification.

first-nature.com/fungi/index.php
First Nature provides an excellent online resource for the identification of grassland (and other) fungi.

Information and advice

The study of fungi is called 'mycology'. There are two mycological organisations in the UK which promote the recording and conservation of fungi:

The British Mycological Society
britmycolsoc.org.uk

The Fungus Conservation Trust
fungustrust.org.uk

Both organisations support networks of groups and enthusiasts across the UK and can provide links to local groups and training opportunities.

Local Biological Records Centres and Wildlife Trusts can provide details of local fungus specialists and county recorders in your area.

Plantlife Scotland can help you in your quest for information and support.

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