



Waxcaps and Grassland Fungi

A guide to identification and management

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

Known as “waxcap-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 how important a site it may be by using a simple scorecard.
- 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, distinct from plants, animals, and bacteria, and including familiar organisms like moulds, yeasts and mushrooms. Grassland fungi live 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, and waxcap grasslands?

Waxcaps are familiar-shaped mushrooms that are often brightly-coloured and usually have a waxy or slippery-looking cap. They are found alongside other fungi such as club and coral fungi, pinkgills and earthtongues, in grazed or mown grasslands that are poor in nutrients, and long-established. This includes old pasture, sand dunes, heathlands, lawns and cemeteries. 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 grasslands that have not been agriculturally improved means that many species are rare and declining.

About 20 species of grassland fungi have been assessed as globally vulnerable (or rarer) by the IUCN. Grassland fungi also appear on the list of “Species of Principal Importance to the Conservation of Biodiversity in Wales” (Section 7, Environment [Wales] Act, 2016). Public bodies have a duty to take

due regard of their conservation. These species are indicated by “S7” in this guide.

Identifying grassland fungi with this guide

Identification of waxcaps is best carried out by examining a small number of fresh specimens in good condition and at different stages of growth, as their size, shape and colour often changes with age. Please minimise 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 be made up of distinct 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 internet forums for advice, but remember to include an object for scale and attempt to capture as many features as possible including the underside of the cap.

Most fungi are non-toxic; even toxic ones are safe to hold. However, always wash your hands after handling fungi. 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 Wales.

There are more than 40 species of waxcaps, and a similar diversity of 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. *

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 Waxcaps

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.

Glutinous Waxcap *Hygrocybe glutinipes*



Cap: Yellow, orange or red and very slimy. Domed at first, becoming bell-shaped and then more or less flat.

Diameter of cap: To 30mm.

Gills: Broadly attached to the stem.

Stem: Colour as cap, very slimy – sometimes with conspicuous blobs of slime.

Notes: A common species in unfertilised grassland, often appearing early in the season from mid-summer if conditions are suitably moist.

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. *

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.

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.

Earthtongues

Olive Earthtongue *Microglossum olivaceum* S7



Fruiting body: Dark reddish, brown or olive-green coloured clubs or 'tongues' emerging from the soil.

Fruiting body size: Up to 70mm in height.

Stem: Usually with shades of olive-green.

Notes: Best regarded as a species complex. Unlike the majority of the 12 dark-coloured earthtongue species, these can often be identified in the field without the need for microscopic examination.

Dark-purple Earthtongue *Geoglossum atropurpureum* S7



This is a rarely recorded earthtongue which superficially looks like several other related species and requires microscopic examination to be identified with confidence.

Blue-Grey Mushrooms

Big Blue Pinkgill *Entoloma bloxamii* S7



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 to be found in unfertilised, long-established grasslands, usually on neutral or calcareous soils. This is now known to be a complex of similar species that are tricky to differentiate. Their name comes from their pink spores, which turn their gills pink as they mature.

Coral Fungi

Violet Coral *Clavaria zollingeri* S7



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, most frequently found in Wales and England.

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

Look for the different coloured mushroom-like fungi and for each colour-group add the relevant points together.

Red (e.g. <i>H. coccinea</i> , <i>punicea</i> , <i>splendidissima</i>)	5 points
Pink (e.g. <i>P. calyptriformis</i>)	5 points
Orange (e.g. <i>H. reidii</i> , <i>quieta</i> , <i>G. laetus</i>)	2 points
Buff/brown (e.g. <i>C. pratensis</i>)	2 points
Yellow (e.g. <i>H. chlorophana</i> , <i>glutinipes</i>)	2 points
Orange/yellow turning black (e.g. <i>H. conica</i>)	1 point
Green (e.g. <i>G. psittacinus</i>)	1 point
White (e.g. <i>C. virgineus</i>)	1 point

Are there other grassland fungi? Add the points for the following groups.

Violet coral (<i>Clavaria zollingeri</i>)	5 points	Earthtongue (any)	2 points
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What is your final score?

Scores of 0-4 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 score straight away. Sites are best visited over several years to assess their fungal interest (at different times from late August to late November, late October often being best).

Scores of 5-11 would indicate sites that may be of grassland fungi interest and may be worth further investigation (see below).

Scores of 12-24 would indicate sites that are good for grassland fungi and worth further survey, especially by an expert (see below). Download Plantlife's Waxcap Watch app to input your findings and contribute to our work conserving grassland fungi: plantlife.org.uk/waxcapwatch

What to do if you find an interesting waxcap grassland

If you find an interesting site for grassland fungi scoring 5+ please inform the landowner, and 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 a 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, e.g. through the application of fertilisers, ploughing, cessation of grazing, scrub encroachment, tree planting and development. The following guidelines are recommended:

On agricultural grasslands:

Maintain grassland through livestock grazing and/or grass cropping as the removal of excess growth helps maintain a low nutrient level. Grass should be kept short in late summer / early autumn where practicable, but hay meadows often contain excellent fungal diversity.

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 localised 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 in late summer / autumn through regular mowing. Ideally July onwards.

Remove all cut grass. This is really important to ensure nutrients do not build up and damage the grassland fungi interest. Try to avoid dog fouling for the same reason.

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 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 UK specialist natural history booksellers.

A Guide to Waxcaps in West Wales. Published by the Pembrokeshire Fungus Recording Network.

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 Cymru

Plantlife, Brewery House
36 Milford Street, Salisbury
Wiltshire, SP1 2AP

enquiries@plantlife.org.uk

plantlife.org.uk/about-us/plantlife-cymru

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