the species recovery trust

SPECIES HANDBOOK

Field Cow-wheat

(*Melampyrum arvense*)

Ecology, conservation, survey and management

Conservation Status

ENDANGERED

- **Facing a high risk of extinction in the wild**
- **Only three native sites remaining**
- **Plants respond well to management, with the Portsdown site quadrupling in size since taken into conservation management**
- **A further 3 re-introduction populations have now been created**

Field Cow-wheat was once a relatively common sight in arable fields in the south of England, and on the Isle of Wight was reported as ‘over-running’ fields of wheat and barley.

The name of the genus comes from the Greek words melas, meaning black, and pyros meaning wheat. This is a reference to when seeds were harvested with wheat and after milling turned entire batches of flour a blue-black colour whilst also making it distasteful. In the early 19th century plants used to be pulled by hand and taken off to be burnt.

Originally believed to be parasitic directly on crops, recent research has suggested that the plants were in fact parasitic on the dicotyledonous plants growing among crops, which partially explains the disappearance of Cow-wheat amongst modern monoculture crops.

Its recent dramatic decline is undoubtedly linked to improvements in seed-cleaning technology, which have prevented the seeds contaminating arable crops, coupled with an increased use of pesticides and a move towards spring sown crops.

Description

A herbaceous flowering plant, it is easily recognised by its showy purple and yellow spiked inflorescences. It has erect often-branching stems which can grow up to 60cm, although are usually around 30cm. The stems bear narrow, toothed leaves that grow on opposite sides of the stem, often turning red, or with striking red margins.

The flowers are borne on dense cylindrical terminal spikes, with a yellow corolla and two purple-pink lips. Much of the visible colour on the inflorescences comes from the vividly pink colour bracts forming between the flowers.

Each flower produces two seeds, which ripen and drop in sequence from the bottom of the spike from July onwards.

The seeds are large, with a small elaiosome gland at the tip.

Ecology

This species is an obligate hemiparasite, feeding on a range of other plants including grasses and dicotyledonous species. In the absence of host species it fails to flourish and only small plants will grow. Experimental evidence suggests that it can parasitise a wide mix of different species, but favours dicotyledonous species over grasses. It causes a small decrease of growth in its host species, but will not significantly harm or kill its host.

The seeds themselves are distasteful, containing the iridoid glycoside aucubin, but also posses a small fleshy structure called an elaiosome at their tip. This is rich in lipids and proteins and acts as a lure to ants, who collect the seeds, remove the elaiosome and discard the remainder.

Attempts to observe and film this behaviour in Melampyrum have not been successful, but population monitoring at Portsdown has revealed new plants becoming established several meters away from the main colony.

Lifecycle

The large seeds drop during July-September and sit on the ground, where some may be collected and dispersed by ants. There appears to be little herbivorous predation on the seeds at this time, due to their distasteful flavour. In the winter (from December although mainly in January) the seeds send out a long radicle root, which enters the ground and causes the seeds to be raised up. The radicles can grow to several centimetres, as they search out host plants to form haustoria connections with.

In April the first seedlings appear, initially characterised by long lanceolate leaves. These continue growing into the summer, and by June start to flower. Healthy plants have many branches and support around 8 inflorescences, although many plants remain unbranched with a single spike.

By August and into September the first seeds start ripening, with two seeds produced in each pod. These drop to the ground directly below the plant.

The weight and lack of mobility in the seeds shows the importance of ant-borne distribution of the species, and difficulties the plants have colonising new areas of ground, let alone new sites, once these become locally extinct. It also demonstrates the importance of managing the habitat for healthy invertebrate populations with species rich swards to sustain them.

September - seeds on ground

December - radicle forms and penetrates into ground, searching for host

March - first plumule forms

April - seedling grows

May - young plant forms

June - plant fully formed and flowering

Aug/Sept - seeds form

Brogborough

Habitat

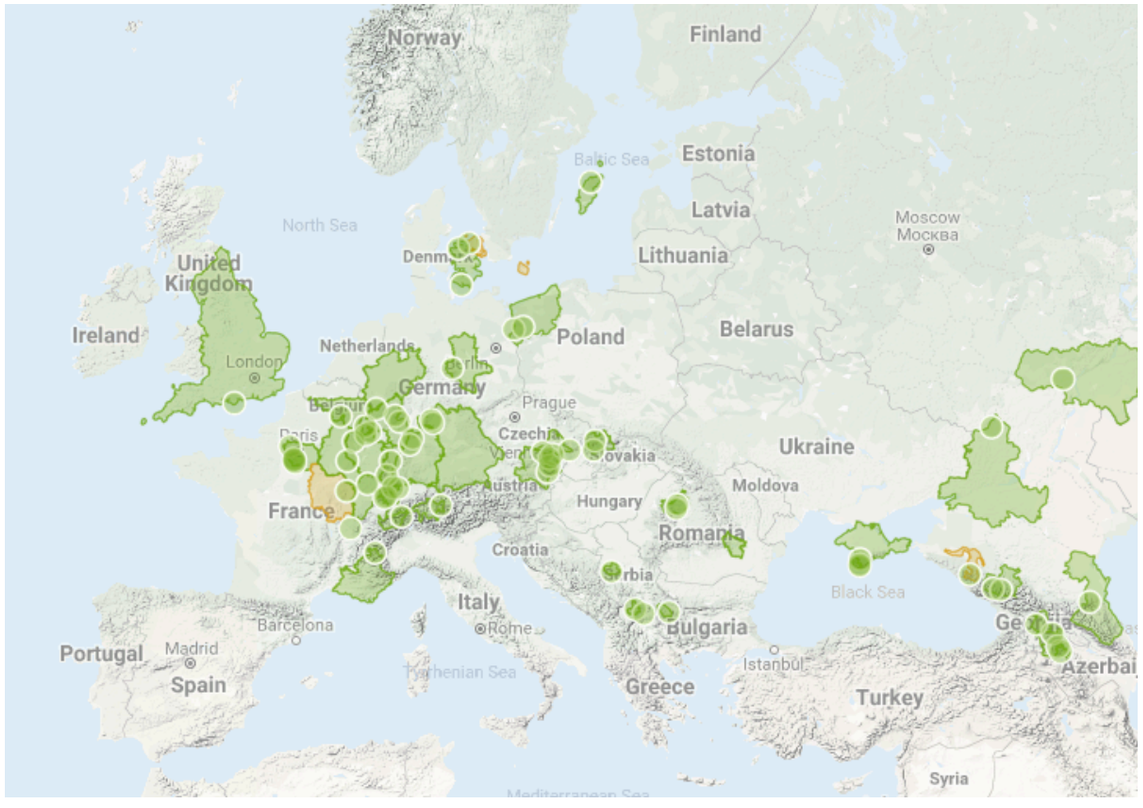
Formerly an arable weed, the species is now found in grassland and appears to favour dry chalky soils, and requires open conditions. At Brogborough and the College Lakes introduction site it still occurs in arable margins, but the largest colony at Portsdown is in chalk grassland and scrub.

European habitat

In continental Europe it occurs more widely in dry meadows, which are cut annually as a fodder crop (image below).

Portsdown

Romania



Distribution

UK

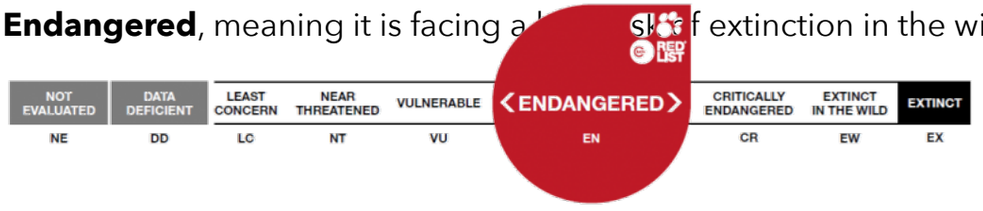
In Great Britain it only occurs in two native sites, in Wiltshire and the Isle of Wight.

Global

It is distributed throughout Western Europe except in central & southern Spain, southern Italy, Ireland, Iceland, Norway, central and northern Sweden, and northern Finland. Also its range extends east to the Ural Mountains and it is found in Turkey. It is becoming rarer, at least in Britain, France, Belgium, Germany, the Netherlands and Finland.

Status

Endangered, meaning it is facing a h[illegible] sk[illegible] f extinction in the wild.



Reasons for decline

Field Cow-wheat historically was a much more common site in arable fields, especially in south-east England, but due to the seeds making flour unpalatable, was never a welcome sight in crops. With improvement in seed-cleaning technology and the widespread increased use of pesticides in the late 20th century the plant was more or less eradicated as a crop weed, just remaining a few field margins.

Protection under the law

Protected under Schedule 8 of the Wildlife and Countryside Act 1981 which makes it an offence to intentionally pick, uproot or destroy any plants.

Listed as a species of Principal Importance in England and Wales under the NERC Act 2006 and is a UK Biodiversity Action Plan priority species.

Dense ruderal plants threatening the Brogborough population

SURVEY

Habitat

Plants can occur within fairly dense swards, so it is worth searching a range of vegetation types when looking for plants, although typically most plants will occur in more open conditions.

What to record

- Number of plants
- Area occupied
- Availability of suitable habitat

MANAGEMENT

Current management at all the British sites focuses on annual vegetation clearance to remove scrub and competing vegetation.

This management creates small areas of bare ground which are crucial for seed development, as well as allowing the plants to receive full sunlight.

This is is marked contrast to its management on the continent, where it survives within hay crops. These are cut shortly after the seeds drop, allowing them to germinate in the following autumn.

It is hoped that once some of the UK sites develop more we can restore this sort of management to larger populations.

OUR WORK

- Annual monitoring of all 5 extant sites
- Early stages to introduce plants to new Wiltshire population
- Habitat management coordinated at all sites

SUCCESS

- Portsdown population now increased fourfold since scrub clearance started

Clearance team at Portsdown in 2017

The Species Recovery Trust is a charity set up to tackle the loss of some of the rarest species in the UK.

There are over nine hundred native species in the UK that are classed as under threat, with several hundreds more currently widespread but known to be in significant decline. The countryside is now bereft of many species that were a familiar sight a mere generation ago.

A small number of these species are on the absolute brink of existence, poised to become extinct in our lifetimes; our goal is to stop them vanishing.

Our aim is to remove 50 species from the edge of extinction in the UK by the year 2050. In addition we are reconnecting people with wildlife and the natural world through training programmes and awareness raising.

the species recovery trust

www.speciesrecoverytrust.org.uk

Registered Charity 1146387