BACK FROM THE BRINK

SPECIES INFORMATION GUIDE

Knothole yoke-moss

Codonoblepharon forsteri (syn. *Zygodon forsteri)*

Knothole yoke-moss typically forms small, dark green cushions, about 10 mm diameter and 5 mm tall. It is globally rare and qualifies for inclusion on the world IUCN Red List, though isn't yet listed as such. It is included on the European Red List and the British Red List and is a s41 Priority Species in England. It is fully protected under Schedule 8 of the Wildlife & Countryside Act 1981.

Distribution

The species survives at only three sites in Britain, at Burnham Beeches (Buckinghamshire), Epping Forest (Essex) and the New Forest (South Hampshire). It is long-extinct in South Somerset and Worcestershire. Recent survey work suggests that it grows on about 115 trees at Burnham Beeches, of which the locations of 47 are presently known. This appears to be broadly similar to populations in Epping Forest and the New Forest, where about 47 and 30 trees are presently known to be occupied, respectively. Only nine sites globally have been confirmed as supporting over ten host trees, though detailed surveys have rarely been undertaken outside Britain. All three sites are Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC).

Habitat

Knothole yoke-moss is a habitat specialist, almost entirely limited to the vicinity of water-filled rot holes in living trees, including root knotholes and seepage zones on trunks. Why it is limited to this niche is unknown, though reasons are likely related to water-availability and perhaps also chemistry. All current host trees known in Britain

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are Beech, despite seemingly suitable habitat being provided frequently by other trees within woodlands where it occurs, for example Holly, birch and oak. There are only two confirmed records of its occurrence in Britain on trees other than Beech, both historic records on Field maple and birch. Mature to ancient trees, and especially pollards, are much more likely than young trees to provide suitable microhabitat for the moss. Recent work at Burnham Beeches suggests that about half of the population occurs on ancient pollards. The moss always occurs at low density within occupied woodlands, typically being found on about 1 tree per hectare.

Locations of Knothole yoke-moss illustrated

Life cycle

Knothole yoke-moss produces an alga-like filamentous felt from which it produces abundant asexual propagules, that are dispersed by wind and animals, likely including invertebrates, mammals and birds. Colonies of the moss can survive for many years at the same knothole or trunk seepage, as long as microhabitat conditions remain favourable. Fruiting capsules are produced commonly, which begin growth during the winter period and mature in spring to early summer. Many capsules are often predated, seemingly by slugs. However, many also usually survive, liberating many thousands of spores per capsules, allowing for long-distance dispersal by wind.

Reasons for decline

All three populations in Britain appear to be in decline. The main reason is the loss of ancient pollarded Beech, which provide especially good habitat for the moss. At Burnham Beeches it is feared that all of the ancient pollards will have died within the next 50 years, where they presently support about half of the population of the moss. Another frequent reason for losses is

competitive exclusion by other larger mosses, which can over-grow it. Concern has been raised that the rate of competitive exclusion has increased in recent decades because the decline in sulphur dioxide emissions and the increase in nitrogen deposition has favoured the growth of larger mosses, a matter that deserves further investigation. Growth of dense undergrowth, especially thick Holly cover, has also caused some losses, since the moss cannot survive in deep shade.

Habitat management

- The pollarding of new Beech trees is of key importance for the long-term survival of Knothole yoke-moss in Britain. This has already begun at Burnham Beeches, where >1300 new Beech trees are presently subject to such conservation management.
- Adequate grazing is also often important, to prevent the development of dense undergrowth.
- Targeted control of Holly and hand-clearance of undergrowth from around key trees can also be useful.
- Some ancient pollards occupied by the moss are supported by wooden framing to help prevent them from being blown over in high winds.

Survey methods

An occupied tree is considered to be an 'individual equivalent' of Knothole yoke-moss. Thus, population size is measured by the number of occupied trees. It is not practically possible to search all trees within a woodland for the moss, so sampling is needed. If certain types of trees have already been tagged within a woodland and their locations mapped, for example ancient pollards, a random sample of these can be searched for the moss to determine its rate of occupancy of such trees, plus an estimate of the total number occupied. To determine the density of occupied trees within a woodland, which can be used to produce an overall population estimate of the moss, sample compartment can be delimited and all trees within them can be searched for the moss. Abundance of the moss on individual trees can be measured by the number of occupied 10 cm grid cells.

Further reading

https://www.britishbryologicalsociety.org.uk/learning/species-finder/codonoblepharon-forsteri/

The Back from the Brink Ancients of the Future project is led by Buglife in partnership with Plantlife and the Bat Conservation Trust.

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