

## *Seseli libanotis* (L.) W.D.J. Koch

### Moon Carrot

*Seseli libanotis* is a plant of dry unimproved chalk grassland and more uncommonly chalky road verges and abandoned chalk quarries. It is most readily identified by its ovoid pubescent fruits, although other characters such as the fibrous remains of petioles at the base of the solid ridged stem, the numerous (eight or more) undivided bracts at the base of the umbel, and leaflets with mucronate tips are also helpful for a determination. *S. libanotis* has a very restricted distribution in the British Isles, present at a handful of sites across Cambridgeshire, Bedfordshire and East Sussex and reported as lost from the sole Hertfordshire location. It is assessed as Near Threatened in Great Britain.



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#### IDENTIFICATION

*Seseli libanotis* flowers quite late in the season, usually by early August, producing compound umbels (supposedly moon-shaped, hence the vernacular name) with eight or more simple, linear bracts and with white hermaphrodite flowers on rays that are shorter than the peduncles and covered in a fine down of hairs (Tutin, 1980).

Although the species can often be identified by the mass of fibrous remains at the base of the strongly ridged and solid stem, this character is not always apparent in British material (Cheffings, 2001) and consequently, like many species, a determination should be based on a range of characters if possible.

Identification is straightforward by early-mid September, as



*Seseli libanotis* flowering on the top of Knocking Hoe NNR, Bedfordshire. ©Pete Stroh

the ovoid fruits (2.5 – 3 mm long) are finely hairy, a unique character for a British umbellifer. Fruits also have a broad commissure (the face where the two carpels join together) and divergent styles.

#### SIMILAR SPECIES

The pubescent fruits, numerous undivided, linear bracts and associated habitat of *S. libanotis* should readily separate it from similar species such as the equally rare *Selinum carvifolia* or the widespread *Daucus carota*.

Berry (2013) notes that in the early stages of flowering, the umbels, seen from a distance, have a 'faint greenish-tinge' as opposed to the pure white of *D. carota* or *Pimpinella saxifraga* due to the presence of 'conspicuous' sepals. This difference is more difficult to pick up later in the season when the flowers fully open and the sepals either fall off or become hidden.

If not in flower or fruit, look at the base of the stem for the dense fibrous remains of previous season's petioles, examine the lanceolate-ovate leaflets which should have a mucronate tip (Poland & Clement, 2009), and note that the pinnae are sessile, meaning that the first pair of lobes is at the base of each pinna (Tutin, 1980), giving the leaves a very compact, crisp appearance.

#### HABITATS

*Seseli libanotis* is a rare plant of dry unimproved chalk grassland and more uncommonly a plant of chalky road verges and abandoned chalk quarries (Harmes, 1994). It is most commonly associated with NVC CG2 *Festuca ovina-Avenula pratensis* grassland, often persisting within fairly

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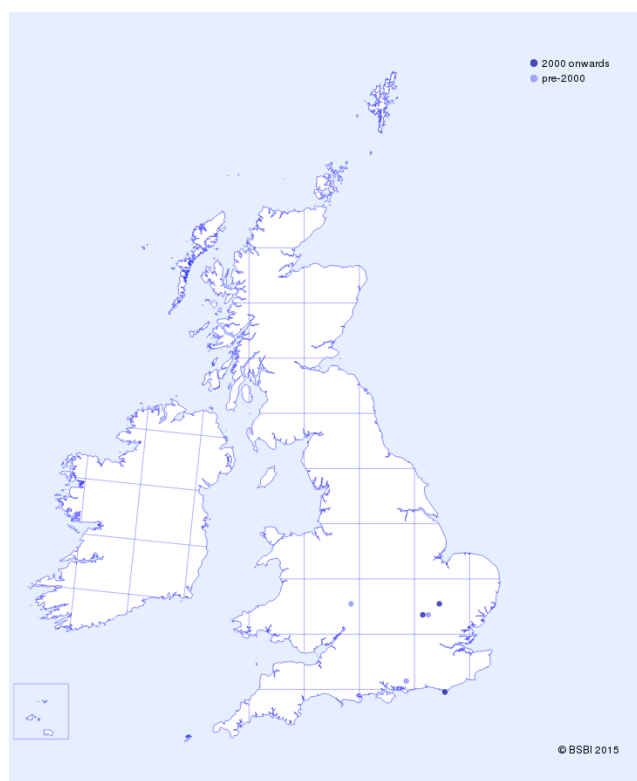
rank turf (Rodwell, 1992), although *S. libanotis* is not competitive in closed, tall vegetation (Jonsell, 2010).

In Britain it is usually found within grazed, species-rich turf with other threatened species; for example, at Knocking Hoe in Bedfordshire *S. libanotis* occurs alongside or close to *Hypochaeris maculata*, *Neotinea ustulata*, *Pulsatilla vulgaris*, *Spiranthes spiralis* and *Tephrosia integrifolia* subsp. *integrifolia*.

### BIOGEOGRAPHY

*Seseli libanotis* is a Eurasian Temperate species with a continental distribution in Western Europe, occurring from Spain to southern England and Fennoscandia, where it reaches its northern range limit in Sweden, and eastwards to Poland, Bulgaria and central Siberia. It is also found in North Africa and south-west Asia (Harmes, 1994; Preston & Hill, 1997).

In Britain *S. libanotis* has a very restricted distribution, now present in just three vice counties, having recently been lost from Hertfordshire (James, 2009). The sole Bedfordshire location at the top of Knocking Hoe currently boasts a very healthy population of thousands of plants, and similar numbers have recently been recorded from the two main localities at Beachy Head, East Sussex, with the largest population on the private nature reserve at Bullock Down (Berry, 2013). Although the Cambridgeshire population at Cherry Hinton Chalk Pits is considerably smaller than those of East Sussex and Bedfordshire, it has increased in size in



Distribution of *Seseli libanotis* in Great Britain and Ireland.

recent years, with over 400 plants recorded in 2009 compared with 23 in 1991. The population of *S. libanotis* at the second Cambridgeshire location on the Gog Magog Hills was down to one plant in 2002, although numbers here have also started to recover following scrub clearance.

### ECOLOGY

*Seseli libanotis* is a non-clonal biennial or short-lived perennial of infertile calcareous soils, flowering from August to September and reproducing by seed. It is tolerant of partial shade and so may persist within quite rank grassland (but see 'threats', below), and across its European range is often associated with woodland margins or at the edges of roadside verges as well as disused quarries and rock ledges.

Flowers are pollinated by a range of insects, including ants, although this is probably a rare event (Hagerup, 1943), and it is the larval foodplant for *Papilio machaon* (Wiklund, 1974) as well as a range of micro-moths and Diptera. Seeds are dispersed via wind (Jongejans & Telenius, 2001) and on the fur or feet of animals in late autumn and winter.

No direct studies could be found on the persistence of *S. libanotis* seed in the soil, and although one study (Baba, 2005) lists *S. libanotis* as having a transient seed bank (without reference to the source of this information), seeds of other *Seseli* species (e.g. *S. montanum*) are capable of persisting for more than five years (Reine *et al.*, 2006). The life-strategy of *S. libanotis* and anecdotal evidence of its reappearance following restorative management works would suggest long-term persistence.

Seeds of umbellifer species often require a period of chilling and/or alternating temperatures before they are capable of germination (Doust, 1982), although no specific information in the literature could be found regarding the requirements or timing of germination for *S. libanotis*.

*S. libanotis* is the sole host of an equally rare rust fungus *Puccinia libanotidis*, thought to be extinct in the British Isles since 1960 until it was re-found in Cambridgeshire and East Sussex in 2009 (Ainsworth *et al.*, 2011).

### THREATS

*Seseli libanotis* is typically a species of ungrazed and fairly rank chalky grassland (Rodwell, 1992), a habitat that can rapidly revert to scrub and the loss or decline of populations – the *Seseli* population at Arbury Banks in Hertfordshire was lost under just such circumstances (James, 2009). It is probably not coincidental that the three largest populations in Britain are found within grazed turf.

### MANAGEMENT

Livestock grazing outside of the summer and early autumn months is necessary both to maintain sward diversity and to retain numbers of *S. libanotis*. At locations where *S. libanotis* is present within species-rich turf, management should follow

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a winter grazing regime (i.e. post-seed fall), with an occasional early spring graze to suppress the spread of competitive grasses such as *Brachypodium pinnatum*, *B. rupestre* and *Bromopsis erecta*, ideally with hardy breeds of sheep. It may also be necessary for some periodic scrub and rabbit control if numbers are particularly high.

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