

## *Spiranthes spiralis* (L.) Chevall

### Autumn Ladies-tresses

*Spiranthes spiralis* is a slender orchid with tiny white and green flowers arranged in a single spiral up the stem. Each plant forms a tight, winter green basal rosette adjacent to the flowering stem. It is absent from Scotland but widely distributed across the lowlands of Ireland, Wales, southern England and the Channel Islands. Plants flower from mid-August into early September, and can be found in infertile open grassland habitats, most commonly by the coast in the south and west. Decline due to habitat loss, eutrophication and reduced grazing has resulted in an assessment of Near Threatened in Great Britain.



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#### IDENTIFICATION

*Spiranthes spiralis* is a perennial herb with up to 25 sweet-scented white and green flowers (4-6 mm) arranged in a single row spiraling clockwise or anti-clockwise up the stem. The stems are glandular-hairy, pale-green, and can reach 15 (-20) cm in height (Stace 2010), with Turkish plants reported to reach 40 cm (Hartog 1999). Each stem has 3 (-7) pale-green, lanceolate-acuminate, adpressed bract-like leaves with membranous edges. Glossy blue-green obvate-elliptic basal leaves are arranged in a small, tight rosette next to the flowering stem. These leaves (2-6) are obvate-elliptic, 3-4 cm long and 0.5-1.5 cm wide (Willems & Dorland 2000).

The upper lip of the flower has white, slightly glandular-hairy, oblong-shaped outer perianth segments with a faint green nerve, whilst the slightly smaller white inner perianth segments are strap-shaped (Jacquemyn & Hutchings 2010).



Recording *Spiranthes spiralis* at Knocking Hoe NNR, Bedfordshire, where a population has been monitored annually since 1962.

The labellum forms a pale-green, trumpet-like tube with the outer and inner perianth segments, and has a broad crystalline jagged margin.

#### SIMILAR SPECIES

*Spiranthes romanzoffiana* occurs in sites with wet, acidic peaty soils and has flowers in three spiral rows. It is relatively widespread in Ireland and western Scotland, but has not been recorded from its sole English site near Yelverton, south Devon, since the mid-1990s. *S. aestivalis*, now considered extinct in the UK, has lanceolate basal leaves which rise a short way up the stem (Stace 2010).

The (largely) boreal orchid *Goodyera repens* is superficially similar, but the leaves are not set in a tight rosette, the flowers are arranged in a weak spiral or 1-sided spike, and the labellum has an entire (not jagged) distal edge (Stace 2010).

#### HABITATS

In the British Isles *S. spiralis* is found across a diverse range of unimproved habitats low in nitrogen and phosphorus e.g. cliff tops and stable coastal sand dunes, calcareous grassland, shingle banks, limestone pavement, closely-mown lawns by the coast, roadside verges, reservoir embankments and churchyards.

Commonly associated plant communities include well-grazed NVC CG2 *Festuca ovina-Avenula pratensis* and CG3 *Bromus erectus* grassland, and slightly acidophilous CG10 *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland often containing small quantities of *Calluna vulgaris* (Rodwell 1992). It has also been recorded from MG5 *Cynosurus*

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*cristatus-Centaurea nigra* meadows in Wales alongside *Anacamptis morio* and *Thymus pulegioides*.

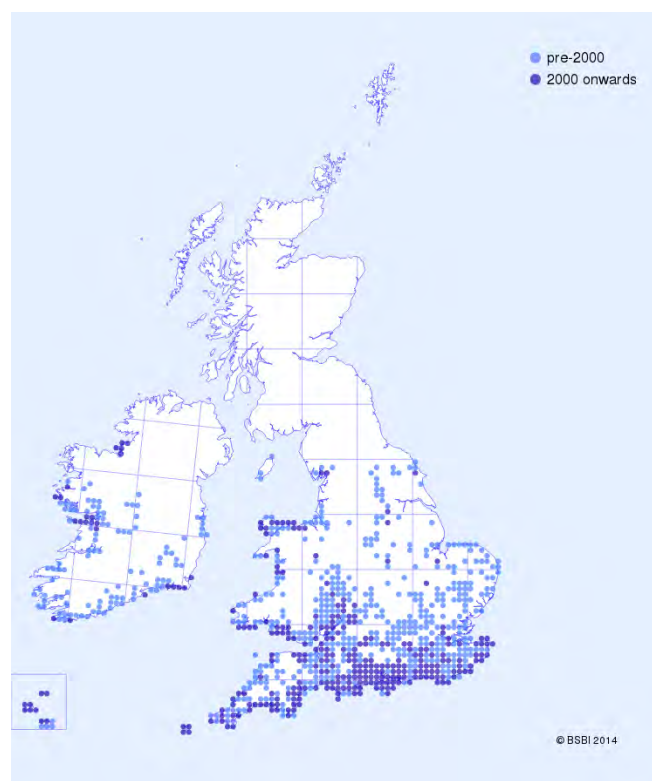
*Spiranthes spiralis* has a strong preference for open habitats across its European range, although plants can survive moderate shading (Willems et al. 2001) and occur in central Europe within open but scrubby woodland glades and at the edges of pinewoods. In southern Europe, where it is still quite common, *S. spiralis* can be found in grazed garrigues (soft-leaved scrubland) alongside *Cistus* spp., *Ficus carica*, *Olea europaea* and *Quercus* spp. (Tyteca 2000).

### BIOGEOGRAPHY

Primarily a sub-Mediterranean species, *S. spiralis* is described as having a European Southern-temperate distribution (Preston et al. 2002). In the British Isles it is absent from Scotland, but widely distributed across Ireland, Wales, southern England and the Channel Islands. Populations are most abundant in coastal regions of the south and west (Perring 1956), and reach their northern limits in North Yorkshire and the extreme south of Westmorland (Jacquemyn & Hutchings 2010).

*Spiranthes spiralis* is considered a lowland species in Britain and is not usually recorded above 180 m altitude (Wilson 1956), although it is present at much higher altitudes outside of Britain (e.g. 900 m near Bad Mitterndorf, Austria; Bohner et al. 2010).

It is relatively widespread throughout much of the Mediterranean, but is less common in central and eastern



Distribution of *Spiranthes spiralis* in Great Britain and Ireland.

Europe and is rare in northern France, Germany, Belgium, the Czech Republic, the Netherlands, Portugal, Slovakia and Switzerland (Jacquemyn & Hutchings 2010). Populations also occur in coastal regions of North Africa, Syria, the Caucasus, north-western Iran and Russia. It has recently been discovered new to Nepal (Acharya et al. 2010), extending its southern range to the western Himalayas.

### ECOLOGY

A rhizomatous perennial herb. Each flower has two cream-coloured pollinia attached to the back of the viscidium. Outcrossing is promoted by sequential flowering, by protandry (Pijl & Dodson 1966) and by the viscidium attaching to visiting bumblebees (Catling 1983). *S. spiralis* is not autogamous and so successful pollination and fruit set depends upon insect pollination. Each fruit contains many hundreds of tiny, dust-like seeds which are dispersed by wind in late summer or early autumn. However, as with many other wind-dispersed species, most seeds fall only a few meters from the parent plant.

The winter-green leaves of *S. spiralis* are produced in early September from lateral buds attached to short underground stems (Wells 1967), and have usually withered away by early June. Consequently, during the summer months the plant remains hidden underground. After flowering in late summer (August-September), new roots tubers are produced. These tubers store photosynthates for use in the production of the **following year's leaves and inflorescence (Wells 1967)**. However, individuals have to reach a threshold rosette area before flowering is possible (Willems 1989), and for the large majority of individuals flowering in one year is followed by a non-flowering phase in the next year (Willems & Dorland 2000).

Plants are able to achieve limited vegetative spread by forming lateral buds on the underground stem. The new plant forms its own tubers, and consequently one plant may consist of multiple rosettes, although eventually the connection between the mother plant and the new vegetatively produced plant is lost (Wells 1967). A prolonged symbiotic association with mycorrhizal and endophytic fungi is required before the first rosette appears about 11 years after seed germination, with the first flowering stalk produced 2-4 years after (Wells 1981; Tondello et al. 2012). Plants are long-lived, with Walker et al. (2010) reporting an average age of ca. 10 years for 1,946 individuals monitored at Knocking Hoe NNR, Bedfordshire, with a few of the plants first recorded in 1962 still present in 2014.

### THREATS

Substantial declines across its range have been attributed to agricultural improvement, the widespread use of herbicides, urban expansion, and a reduction in grazing resulting in a tall, rank sward and a dominance of competitive grasses to the detriment of *S. spiralis* and other shade-intolerant herbs.

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### MANAGEMENT

Management should aim to produce short open turf by the end of the growing season. This may be achieved by the maintenance or re-instatement of a grazing regime, ideally with a hardy breed of sheep, or via a suitable cutting regime, with arising removed. Timing of management should allow *S. spiralis* plants to flower and set seed.

### REFERENCES

- Acharya, K.P., Wood, J.J., Berwian, R. & Sharma, A. 2010. *Spiranthes spiralis* (Orchidaceae), A New Record for the Nepal Himalaya. *Harvard Papers in Botany* 15: 71-72.
- Bohner, A., Steiner, K.H. & Starlinger, F. 2010. A remarkable find of *Spiranthes spiralis* (Orchidaceae) in the Styrian Salzkammergut (Styria, Austria). *Joannea Botanik* 8: 5-18.
- Catling P.M. 1983. Pollination of northeastern North American *Spiranthes* (Orchidaceae). *Canadian Journal of Botany* 61: 1080–1093.
- Hartog, F. 1999. *Verschillen en overeenkomsten in verschijningsvorm en standplaats van Spiranthes spiralis in Europa en Nederland*. PhD Thesis, Utrecht University.
- Jacquemyn, H. & Hutchings, M. 2010. Biological Flora of the British Isles: *Spiranthes spiralis* (L.) Chevall. *Journal of Ecology* 98: 1253-1267
- Pijl, L.V. & Dodson, C.H. 1966. *Orchid flowers – their pollination and evolution*. University of Miami Press, Florida.
- Stace, C.A. 2010. *New Flora of the British Isles*, third edition. Cambridge University Press, Cambridge.
- Tondello, A., Vendramin, E., Villani, M., Baldan, B. & Squartini, A. 2012. Fungi associated with the southern Eurasian orchid *Spiranthes spiralis* (L.) Chevall. *Fungal Biology* 116: 543-549.
- Tyteca, D. 2000. The orchid flora of Portugal: addendum n.3. Remarks on *Spiranthes spiralis* (L.) Chevall and three new taxa to the Portuguese flora. *Journal Europäischer Orchideen* 32: 291-347.
- Walker, K.J., Farrell, L. & Stroh, P.A. 2011. *Long-term Monitoring of Spiranthes spiralis (L.) Chevall (Autumn Ladies Tresses) at Knocking Hoe, Bedfordshire, 1962-2010*. Unpublished Report to the Botanical Society of the British Isles (BSBI).
- Wells, T.C.E. 1967. Changes in a population of *Spiranthes spiralis* (L.) Chevall at Knocking Hoe National Nature Reserve, Bedfordshire, 1962-65. *Journal of Ecology* 55: 83-99.
- Wells T.C.E. 1981. The biological aspects of rare plant conservation. In: H. Synge (ed). *The Biological Aspects of Rare Plant Conservation*. pp. 281-295. John Wiley & Sons, London.
- Willems, J.H. 1989. Population dynamics of *Spiranthes spiralis* in South Limburg, The Netherlands. *Mémoires de la Societe Royale de Botanique de Belgique* 11: 115-121.
- Willems, J.H. & Dorland, E. 2000. Flowering frequency and plant performance and their relation to age in the perennial orchid *Spiranthes spiralis* (L.) Chevall. *Plant Biology* 2: 344-349.
- Willems, J.H., Balounova, Z. & Kindlmann, P. 2001. The effect of experimental shading on seed production and plant survival of *Spiranthes spiralis*. *Lindleyana* 16: 31-37.
- Wilson, A. 1956. *The Altitudinal Range of British Plants*, 2nd edition. T. Buncle & Co., Arbroath.

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