Cirsium tuberosum (L.) All

Tuberous Thistle

Cirsium tuberosum has tall stems covered with cottony hairs, softly spined leaves, rounded involucres and purple-pink flowers. It has a restricted range in Britain. In Wiltshire, where it readily hybridises with *C. acaule*, it is associated with tall, unimproved and often ungrazed calcareous grassland, whereas in Glamorganshire it is found in species-rich cliff-top grassland over Jurassic limestone. It is absent from the rest of Britain, but was historically present at single sites in Dorset and Cambridgeshire, where there has been an unsuccessful attempt to re-establish it near to the original locality. It is assessed as Near Threatened in Great Britain and England, but as Vulnerable in Wales.

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IDENTIFICATION

Cirsium tuberosum has tall stems (-100 cm) with cottony (arachnoid) hairs, especially near the apex, softly spiny unwinged and deeply lobed leaves which are green on both sides and not painful to grasp, and globular involucres with purple-pink flowers. Plants have tuberous roots, hence the species name.

SIMILAR SPECIES

Cirsium tuberosum is similar in appearance to *C. heterophyllum*, but their ranges do not overlap in the British Isles. Hybridisation with *C. acaule* is very common, especially in Wiltshire where the latter species is favoured by heavy grazing. The hybrid *C.* ×*medium* is usually intermediate in most characters (e.g. stem height, involucre size and shape, leaf spines) but backcrossing between hybrids and parents can make identification extremely difficult on some sites with introgressed individuals appearing more or less '*acaule* or *tuberosum*–like', depending on the direction of backcrossing (Grose 1949). The long-stemmed variety of *C. acaule*, var. *caulescens*, has been mistaken for *C. tuberosum* or the hybrid on ungrazed sites.

Hybrids with *C. palustre* are rare and persist at single sites in Glamorgan (Walker 2009) and Wiltshire (Sharon Pilkington, pers. comm.). These have much smaller flowers borne on branched infloresences and have short decurrent wings on the stems.

Cirsium tuberosum population in coastal turf at Cwm Nash, Glamorgan, where the hybrid with *C. palustre* is also found. ©Kevin Walker.

HABITATS

In Wiltshire, the majority of *C. tuberosum* populations are confined to rank, unmanaged NVC CG3d *Bromus erectus* grassland overlying chalk and less occasionally rank CG4 *Brachypodium pinnatum* grassland. It also occurs in shorter sub-communities of *B. erectus* grassland (e.g. CG3a), but there it is often replaced by *C.* ×*medium*.

In Wales, it is confined to species-rich cliff-top grassland overlying Jurassic limestone, which approaches MG5c *Cynosurus cristatus-Centurea nigra* grassland (see photo opposite). It has also occasionally been recorded as an arable crop weed, presumably because the roots can survive ploughing (Kay & John 1994).

On the continent *C. tuberosum* occurs in a greater range of habitats including wood-borders, damp meadows, ditches, shore margins and gravel pits. Here the most characteristic community is the calcareous purple moor-grass meadow (*Cirsio tuberosi-Molinietum*; Ellenberg 1988; Oberdorfer 2001), dry variants of which are related to mesotrophic grasslands of southern England and Wales.

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BIOGEOGRAPHY

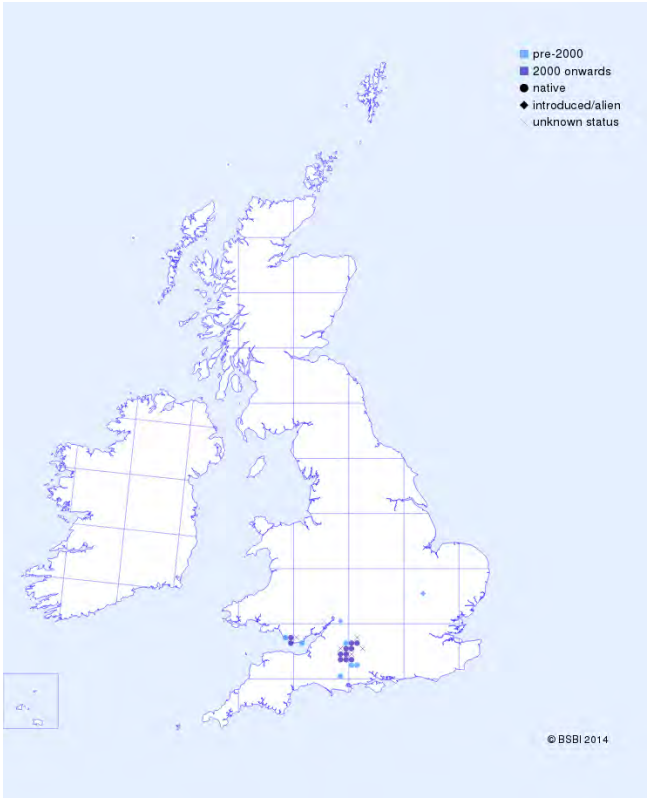
Cirsium tuberosum is confined to c. 40 locations across Wiltshire, mainly on Salisbury Plain where military activities have protected populations from agricultural improvement (Grose 1942; Everett 1993). Most of these populations are small, although a few large populations with many thousands of flowering stems survive (Walker et al. 2001). Six populations are known to survive in Glamorgan.

Cirsium tuberosum formerly occurred at single sites in Dorset, where it was last seen in the 1980s, and Cambridgeshire where the last surviving colony was ploughed-up in 1974. In 1987 plants originating from this site were re-introduced to a nearby site (Pigott 1988) but these have failed to survive (Kevin Walker, pers. obs.). A further introduction has recently taken place at the same location using plants retained in cultivation at Cambridge University Botanic Gardens (Peter Stroh, pers. comm.).

Cirsium tuberosum is a Southern-Temperate species with a Sub-oceanic distribution. On the continent, where it is much more common, it occurs throughout western and central Europe (Belgium, Luxembourg, Czech Republic, Slovakia, France, Germany, Switzerland, northern Spain, northern Italy) extending eastwards to northern Italy.

ECOLOGY

C. tuberosum is a long-lived herbaceous perennial that spreads very slowly by the production of axillary basal rosettes to form dense clonal patches, often a metre or more in diameter. In ungrazed or lightly grazed habitats it can dominate the vegetation but rapidly disappears under heavy grazing, often being replaced by the hybrid with *C. acaule*.



Distribution of *Cirsium tuberosum* in Great Britain and Ireland.

Flowering starts in July (exceptionally June) and continues into September. Wiltshire plants can reach 100 cm and often produce 2-3 flowers on a single stem, with hundreds of stems being produced by a single clonal patch. Welsh plants are less vigorous (50-60 cm) and only produce a single flower per stem, presumably due to greater exposure.

The long-tubed florets are all bisexual with stamens enclosed in the corolla. The florets are protandrous, promoting outcrossing. The sweet-smelling flowers produce considerable quantities of pollen and nectar and are visited by a variety of insects, including bumblebees, butterflies, day-flying moths, chrysomelid beetles and hoverflies. Geitonogamous self-pollination from florets on the same capitulum or from other capitula in the same clonal patch is likely to be the main mode of mode of pollination, and insect-pollinators have been observed to move systematically from capitulum to capitulum in a single patch (Kay & John 1994). Pollen fertility is high in 'pure' populations, and isolated plants are self-compatible.

The achenes of *C. tuberosum* are small (3-4 mm; 0.003 g) with a long pappus of plumose hairs which readily detach at maturity. Seeds have been observed to disperse over short distances (up to 50 m) before being 'caught' by the surrounding vegetation, but dispersal over much greater distances is likely to occur in strong winds (Kay & John 1994; Donath et al. 2003). Flowers can produce up to 200 seeds, although many are often aborted or predated by seed-boring insects. Seeds germinate rapidly in the greenhouse but overall viability is often variable and sometimes low. Genetic studies have shown that Welsh populations are relatively pure (due to the virtual absence of *C. acaule*) but Wiltshire populations have been affected to a greater or lesser extent by introgression (Kay & John 1994).

THREATS

The ploughing of unimproved grassland destroyed many populations in the past (Grose 1957) but today the main threat, at least in England, is heavy grazing, as this increases hybridization with *C. acaule*. This is less of a problem in Glamorgan, where *C. acaule* is very rare. However, in Wales rabbits have been observed to cause significant damage by digging-up the edible tubers, and it is possible that they have been responsible for at least some of the observed declines (Kay & John 1994).

MANAGEMENT

Management of Wiltshire sites should aim for a sward height of at least 15 cm, as *C. acaule* will tend to invade shorter swards. On Salisbury Plain, where most sites are rarely, if ever, grazed, fire and disturbance by military vehicles are important in reducing scrub cover and removing leaf litter. Most Welsh populations are either not grazed or only lightly

grazed by sheep and cattle with no apparent ill effect.

REFERENCES

Donath, T.W., Hölzel, N. & Otte, A. 2003. The impact of site conditions and seed dispersal on restoration success in alluvial meadows. *Applied Vegetation Science* 6: 13-22.

Ellenberg, H. 1988. *Vegetation ecology of Central Europe*. Second edition. Cambridge University Press, Cambridge.

Everett, S. 1993. *Cirsium tuberosum* (L.) All. Tuberous Thistle. In: *The Wiltshire Flora*, B. Gillam (ed.), pp.83-90. Pisces Publications, Newbury.

Grose, D. 1942. The tuberous thistle in Wiltshire. *Wiltshire Archaeological and Natural History Magazine* 49: 557-561.

Grose, D. 1949. A hybrid thistle from Wiltshire. *Watsonia* 1: 91.

Grose, D. 1957. *The Flora of Wiltshire*. Wiltshire Natural History and Archaeological Society, Devizes.

Kay, Q.O.N. & John, R. 1994. *Population genetics and demographic ecology of some scarce and declining vascular plants of Welsh lowland grassland and related habitats*. Countryside Council for Wales Science Report No. 93, Bangor.

Oberdorfer, E. 2001. *Pflanzensoziologische Exkursionsfl ora 8th edition*. Verlag Eugen Ulmer, Stuttgart.

Pigott, C.D. 1988. The reintroduction of *Cirsium tuberosum* (L.) All. in Cambridgeshire. *Watsonia* 17: 149-152.

Walker, K.J. 2009. *Cirsium x semidecurrens* H. Richter in Glamorgan. *Watsonia* 27, 253-257.

AUTHOR VERSION

Kevin Walker. Version 1: 26 November 2014.

SUGGESTED CITATION

Walker, K.J. 2014. *Cirsium tuberosum* (L.) All. Tuberous Thistle. Species Account. Botanical Society of Britain and Ireland.