

## *Potentilla argentea* L.

### Hoary Cinquefoil

*Potentilla argentea* has woolly-hairy stems and leaves that are silvery-white tomentose on the underside and have slightly inrolled margins. When in flower, the five yellow petals equal or barely exceed the sepals. It is associated with infertile free-draining sandy or gravelly soils, and occurs in a variety of habitats including verges and tracksides, open pasture, abandoned arable land and spoil heaps. Widespread in eastern England, it is more thinly scattered elsewhere, and is uncommon in Wales, northern England and Scotland. It is assessed as Near Threatened in Great Britain as a whole and Vulnerable in Wales due to the low number of extant individuals.



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#### IDENTIFICATION

The decumbent to ascending stems (15–50 cm) of *Potentilla argentea* arise from the leaf rosette and have greyish-woolly hairs. The palmate leaves each have two lanceolate and untoothed stipules and 5 (rarely 3) oblanceolate leaflets with narrowly oblong teeth. The upper surface of each leaflet has adpressed hairs, and the underside is silvery-white tomentose. Leaflets are very narrowly rolled back (Poland & Clement 2009), and when looked at from below the recurved green edge contrasts with the white-tomentose underside (Stace 2010).

Flowers (10–15 mm across) are in terminal cymes with five obovate-wedge shaped yellow petals (4–5 mm) that equal or barely exceed the ovate-lanceolate sepals.



Ride edge habitat with *Potentilla argentea* at Methwold Warren, part of the Breckland SAC, west Norfolk. ©Sarah Lambert.

#### SIMILAR SPECIES

In Britain the rare alien *Potentilla inclinata* has leaflets that are grey-tomentose on the underside with a flat margin (Stace 2010) and flowers with larger petals (5–7 mm). *P. argentea* can be separated from all other British cinquefoils by its narrow,  $\pm$ parallel-sided leaflets which are white-tomentose below (Crawley 2005).

#### HABITATS

*Potentilla argentea* is a plant of seasonally warm, dry, free-draining sandy or gravelly infertile soils. Its habitats include very short, open turf in pastures, on commons, verges, banks, abandoned arable land, pits, spoil heaps, tracks and waste ground (Trist 1979, 1994; McCosh 2002).

In Britain it is a characteristic species of U1 *Festuca ovina*-*Agrostis capillaris*-*Rumex acetosella* grassland, especially within the *Erodium cicutarium*-*Teesdalia nudicaulis* sub-community, which is found almost exclusively in the Brecklands of East Anglia and the *Anthoxanthum odoratum*-*Lotus corniculatus* sub-community that extends from the Brecklands to the Dorset coast (Rodwell 1992). *Potentilla argentea* is also an uncommon associate of the typical sub-community of U1 that is more widely scattered across England, Wales and southern Scotland.

Outside of Britain *P. argentea* is found in *Stipa capillata*-dominated semi-arid steppe grasslands of the Ukraine and Inner Mongolia (Kawada et al. 2005), and from the salt steppes of the western Black Sea and lower Danube plains with communities dominated by *Festuca pseudovina* and *Peucedanum latifolium* and accompanied by rare British species such as *Aster linosyris* and *Bupleurum tenuissimum*.

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## BIOGEOGRAPHY

*Potentilla argentea* is widespread in the east of England, becoming more thinly scattered across south-east, southern and central England, thinly distributed in Wales, rare in northern England and Scotland and absent from Ireland (as a native). It reaches the northern limit of its British range in East Perthshire (Robinson 2013). It has a Eurosiberian-Temperate distribution, attaining its absolute northern limit in Norway, occurring throughout most of northern and central Europe, and reaching its southern limits in Spain, Greece, Turkey and Iran. It is naturalised and widespread throughout North America and New Zealand.

## ECOLOGY

A perennial hemicryptophyte of infertile sandy or gravelly soils, flowering between June and September. The petals of *P. argentea* flowers rapidly wilt and then are shed following pollination, but unpollinated flowers retain the petals which preserve their structure even when they fall to the ground (van Doorn 1997). This pollinator-induced shortening of floral attraction has been shown to increase pollinator efficiency and assists in limiting inbreeding in self-compatible species (Harder & Johnson 2005).

*Potentilla argentea* reproduces by seed (Trist 1994), with lightly net-veined achenes 0.6-0.8 mm long. Although *P. argentea* seed can be dispersed endozoochorously by sheep (Wessels & Schwabe 2008) and is capable of producing viable offspring post-dispersal (Faust et al. 2011), in general terms plants do not readily colonise new sites (Trist 1994). In an

experiment to investigate trade-offs between seed number and seed size for fifty grassland species, *P. argentea* was one of only three sown species (along with *Antennaria dioica* and *Lychnis viscaria*) that failed to survive in either shallowly disturbed or undisturbed plots after more than one year (Jakobsson & Eriksson 2000).

Observations by Novák & Prach (2003) on the natural succession of recently abandoned basalt quarries in the Czech Republic found that *P. argentea* took c. 10 years to become established, long after the early establishment of annual species. Seed bank studies by Jutila (1996) found that *P. argentea* was abundant in the soil seed bank of ballast soils in western Finland, but was a rare component of the vegetation. The findings of these studies imply that *P. argentea* has morphological and physiological germination and establishment traits relating to very specific environmental conditions (e.g. degrees of disturbance, temperature and light). Once established at a site, populations can be very long-lived (Trist 1994), but the precise requirements for dispersal and establishment *in situ* are still not fully understood.

Analysis of *P. argentea* material collected across its European range identified two ploidy levels; diploid and hexaploid (Paule 2010). Diploid *P. argentea* (the cytotype that occurs in Britain) was thought to be self-pollinating with highly reduced genetic variability, with a Late-Quaternary migration route from the Iberian Peninsula through to western Europe and Scandinavia. These molecular results correlate with the taxonomic treatment and distribution of the species in *Flora Europaea* (Tutin et al. 1968), with the diploid cytotype corresponding to *P. argentea* s.str., and the hexaploid corresponding to *P. neglecta* (= *P. impolita*).

## THREATS

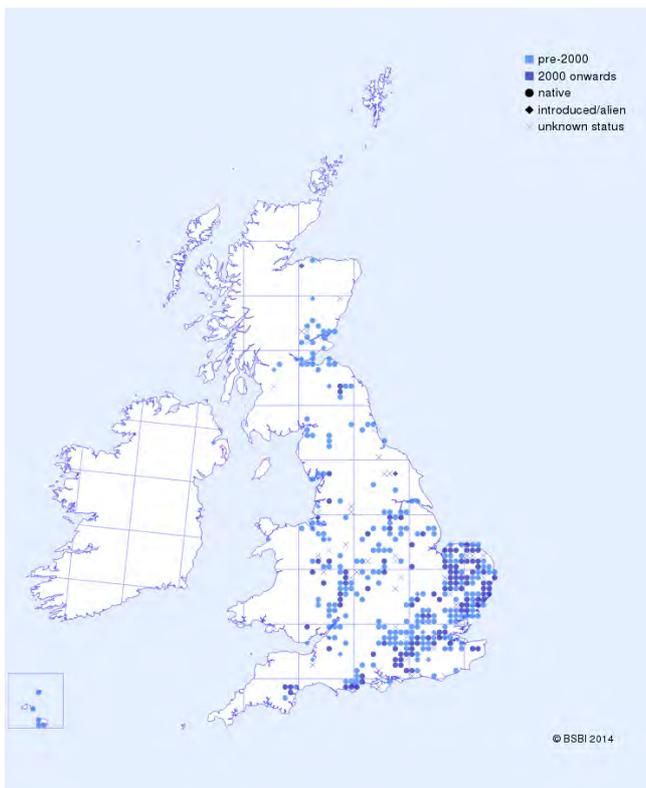
Plants require light and open areas (Hill et al. 2004) and consequently are susceptible to being smothered by the surrounding vegetation if open conditions are not maintained. Habitat loss is cited by Trist (1979) and McCosh (2002) as the main threat to extant populations.

## MANAGEMENT

Trist (1994) states that plants have a preference for uncultivated areas not subject to disturbance, although it may be that periodic small-scale disturbance helps to bring up buried seed and create conditions suitable for germination and eventual establishment. Grazing by sheep and rabbits at appropriate stocking densities will help to maintain an open, short sward to the benefit of mature populations.

## REFERENCES

- Crawley, M.J. 2005. *The Flora of Berkshire*. Brambleby Books, Somerset.
- Faust, C. Eichberg, C. Storm, C. & Schwabe, A. 2011. Post-dispersal impact on seed fate by livestock trampling – A gap of knowledge. *Basic and Applied Ecology* 12: 215-226.



Distribution of *Potentilla argentea* in Great Britain and Ireland.

## *Potentilla argentea* L.

- Harder, L.D. & Johnson, S.D. 2005. Adaptive plasticity of floral display size in animal-pollinated plants. *Proceedings of the Royal Society of Biological Sciences* 272: 2651-2657.
- Hill, M.O., Preston C.D. & Roy D.B. 2004. **PLANTATT. Attributes of British and Irish Plants: Status, Size, Life history, Geography and Habitats**. NERC Centre for Ecology and Hydrology, Huntingdon.
- Jakobsson, A. & Eriksson, O. 2000. A comparative study of seed number, seed size, seedling size and recruitment in grassland plants *Oikos* 88: 494–502.
- Jutila, H.M. 1996. Seed bank and emergent vascular flora of ballast areas in Reposaari, Finland. *Annales Botanica Fennici*. 33: 165-182.
- Kawada, K., Vovk, A.G., Filatova, O.V., Araki, M., Nakamura, T. & Hayashi, I. 2005. Floristic composition and plant biomass production of steppe communities in the vicinity of Kharkiv, Ukraine. *Japanese Society of Grassland Science* 51: 205-231.
- McCosh, D.J. 2002. *Potentilla argentea*. In: C.D. Preston, D.A. Pearman, & T.D. Dines (eds & comps) 2002. **New Atlas of the British and Irish Flora**, p.329. Oxford University Press, Oxford
- Novák, J. & Prach, K. 2003. Vegetation succession in basalt quarries: Pattern on a landscape scale. *Applied Vegetation Science* 6: 111-116.
- Paule, J. 2010. *Evolutionary patterns and processes in the genus Potentilla L. (Rosaceae)*. PhD dissertation, University of Heidelberg, Germany.
- Poland, J. & Clement, E. 2009. *The Vegetative Key to the British Flora*. Botanical Society of the British Isles (BSBI), London
- Robinson, M.C. 2013. East Perthshire Rare Plant Register. Accessed online: <http://bsbi.org.uk/VC89RPR2013.pdf>
- Rodwell, J.S. (ed.) 1992. **British Plant Communities. Volume 3. Grasslands and Montane Communities**. Cambridge University Press. Cambridge.
- Stace, C. A. 2010. **New Flora of the British Isles**, third edition. Cambridge University Press, Cambridge
- Trist, P.J.O. 1979. **An Ecological Flora of Breckland**. Wakefield, West Yorkshire.
- Trist, P.J.O. 1994. *Potentilla argentea* (L.). In: A. Stewart, D.A. Pearman & C.D. Preston (eds) **Scarce Plants in Britain**, p. 382. JNCC, Peterborough.
- Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. & Webb, D.A. 1968. **Flora Europaea, Volume 2. Rosaceae to Umbelliferae**. Cambridge University Press, Cambridge.
- van Doorn, W.G. 1997. Effects of pollination on flora attraction and longevity. *Journal of Experimental Botany* 48: 1615-1622.
- Wessels, S. & Schwabe, A. 2008. Testing the potential seed availability in dung samples: comparison of two seedling emergence methods. *Flora* 203: 429-436.

### AUTHOR VERSION

Peter Stroh. Version 1: 23 December 2014.

### SUGGESTED CITATION

Stroh, P.A. 2014. *Potentilla argentea* L.. Hoary Cinquefoil. Species Account. Botanical Society of Britain and Ireland.