

Ajuga pyramidalis L.

Pyramidal Bugle

Ajuga pyramidalis is a hairy, erect perennial herb with short rhizomes and pale blue flowers. Only a small proportion of British and Irish plants produce flowers and so most reproduction is likely to be via vegetative spread. The majority of populations occur on the coasts of north and west Scotland and western Ireland where typical habitats include maritime grassland and heaths. It also occurs occasionally on rock ledges inland. Its distribution appears to be relatively stable although successional changes have led to localized losses in some areas. However, it is easily overlooked and so probably awaits discovery (or rediscovery) in many localities.



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IDENTIFICATION

Ajuga pyramidalis is a small, hairy perennial herb with pale blue flowers (rarely pink or white elsewhere in Europe) arranged in whorls. These are inserted in the leaf axils and are partly obscured by the leaves above.

The leaves are hairy on both surfaces, crenate and decrease markedly in size up the stem giving the whole plant its characteristic 'pyramidal' appearance. However, the majority of individuals are usually present as persistent vegetative rosettes with 2-3 pairs of obovate leaves growing very close to the ground (see photo in Pearman *et al.* 2008, page 21).

SIMILAR SPECIES

Ajuga pyramidalis differs from *A. reptans* in having short



The coastal limestone grassland habitat of *Ajuga pyramidalis* at Poulsallagh on the west coast of Ireland. ©Kevin Walker

rhizomes (not stolons), hairs all-round the stem and bracts that exceed the flowers. When in flower it is unlikely to be confused with any other British or Irish species except possibly the hybrid with *A. reptans* (*A. x pseudopyramidalis*) which has been recorded from County Clare (Scannell 1988) and Scotland, including most recently at Torr Achilty, Easter Ross (Ballinger & Ballinger 2007; Stace *et al.* 2015). The hybrid is sterile and intermediate between its parents in most characters including the hairiness of the stem, stigma and leaf, degree of crenation on the leaves, bract size and the extent to which the flowers are obscured by the leaves (Stace *et al.* 2015). The hybrid also produces stolons late in the season.

Vegetative rosettes of *A. pyramidalis* are superficially similar to *Hypochaeris radicata* and *Bellis perennis* but the leaves are hairier and more rounded with deeper crenations and more pronounced net-veination (Forbes 1989; K.J. Walker pers. obs.).

HABITATS

In Scotland *A. pyramidalis* is largely confined to exposed rocky banks close to the sea where typical vegetation types include *Calluna vulgaris*-*Scilla verna* coastal heath (NVC H7), *Calluna vulgaris*-*Erica cinerea* heath (NVC H10) and *Festuca ovina*-*Agrostis capillaris*-*Thymus praecox* grassland (NVC CG10) (Rich *et al.* 1999; Pearman *et al.* 2008). In the Burren, western Ireland, it grows on shallow soils on limestone (see opposite) in the *Antennaria dioica*-*Hieracium pilosella* Nodum of the *Brometalia erecti* Alliance of the *Festuco-Brometea* Association grassland (Ivimey-Cook & Proctor 1966) which is probably closest to CG10 grassland in terms of the NVC (Forbes 1989; Rich *et al.* 1999). *A. pyramidalis* also occurs inland, often at much higher altitudes, on grassy ledges and in crevices on basic rock outcrops, where associates are more limited, but where

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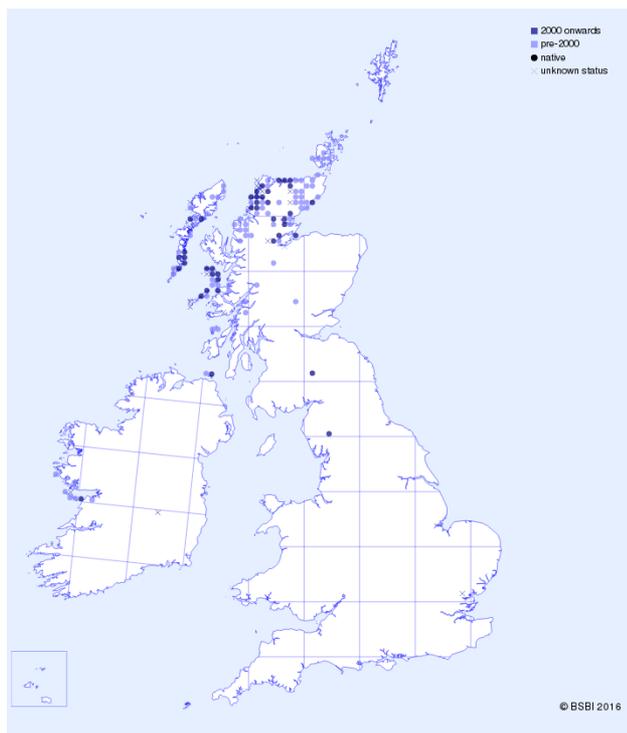
flowering is more frequent due to protection from grazing animals and wind (K.J. Walker, pers. obs.).

Ajuga pyramidalis appears to be neither strongly calcicole or calcifuge in the British Isles, occurring on free-draining circum-neutral soils (pH 5-7; Rich *et al.* 1999) derived from a wide range of rock types including basalt, gabbro, gneiss, limestone, old red sandstone and peridotite. Consequently its most frequent associates are fairly catholic in terms of soil reaction (e.g. *Anthoxanthum odoratum*, *Calluna vulgaris*, *Lotus corniculatus*, *Potentilla erecta*, *Teucrium scorodonia*, *Thymus polytrichus*, *Viola riviniana*) (Rich *et al.* 1999; K.J. Walker, unpublished data).

Ajuga pyramidalis occurs in similar habitats in the cooler, more Oceanic parts of western and northern Europe (e.g. Belgium, Denmark, Sweden) but is more strictly montane in continental parts of central and southern Europe where it ascends to 2700 m (Hegi 1935).

BIOGEOGRAPHY

Ajuga pyramidalis has a Boreal-montane distribution in Europe, occurring from north Norway south to the mountains of Iberia, northern Italy and Bulgaria (Wortham 1994). Its British strongholds are in the north and west of Scotland where it has been recorded from around 200 sites (Rich *et al.* 1999) extending from Orkney, Caithness and Sutherland in the north to Colonsay in the Inner Hebrides (McNeill 1910; Gulliver 1997), with a single outlier on an east-facing crag in the Moffatt Hills, Dumfriesshire. In England it occurs very sparingly on a north-facing crag in the English Lake District where it has been known since 1869 (Halliday 1997). In



Distribution of *Ajuga pyramidalis* in Great Britain and Ireland.

Ireland it has been recorded from nine sites around the coast of Galway Bay (Webb & Scannell 1983; Curtiss & McGough 1988), one site in Donegal where it was discovered in 2002 (Holy oak 2005) and on Rathlin Island off the coast of Antrim (discovered 1960s) where it may have been introduced with hay from Scotland (Forbes 1989). However, the discovery of at least three further populations (the largest with 175 flowering spikes) in more typical habitat suggests that it may have been overlooked there as a native species (Beesley 2006).

Although targeted fieldwork has resulted in the discovery of many new populations, there is little doubt that it is still overlooked, especially in remote areas that have not been surveyed systematically in recent decades (Rich *et al.* 1999; Rich & Sydes 2000).

Ajuga pyramidalis is largely a lowland species (< 300 m OD) in Britain and Ireland with the vast majority of sites located near the coast and/or near to sea-level. It tends to occur at higher altitudes inland ascending to 470 m on Beinn Eighe, 600 m in the Moffatt Hills and 650 m on Ill Bell in the English Lake District.

ECOLOGY

Ajuga pyramidalis is a polycarpic perennial herb that can grow to 30 cm but is usually dwarfed or non-flowering in British and Irish populations. A detailed population study in Ireland (Forbes 1989) has shown that *A. pyramidalis* can survive for at least eight years and flower in successive seasons. Forbes (1989) showed that plants took between 3 and 6 years to flower and only did so after the rosettes reached a minimum size of c. 70 mm diameter, though many plants did not flower even after they had reached that size. Rosette growth was very slow (12 mm per year), with rosettes reaching a plateau after which no further growth occurred.

The bluish-purple to reddish-violet bisexual flowers are arranged in whorls around the stem and are almost concealed below the leaves above. Flowering takes place from May to June (possibly July at higher altitudes) and the flowers are pollinated by bees with self-pollination also possible.

Ajuga pyramidalis flowers infrequently in the British Isles, with the bulk of populations comprising vegetative rosettes. For example, on average only 15% of individuals flowered across 12 Scottish populations surveyed in 1995 (Rich *et al.* 1999) whereas only 10% (14 out of 133) flowered over an eight year period at one site in Ireland with only four individuals flowering more than once (Forbes 1989). Similar figures have been reported elsewhere (e.g. 15% on Carnon Eion, Colonsay, in 2015; K.J. Walker, P.A. Stroh & J.O. Mountford, pers. obs.). The flower spikes are frequently eaten by sheep, cattle, rabbits and deer (McNeill 1910; Forbes 1989; Wortham 1994), thereby limiting seed production even further, although light grazing is probably essential to maintain the open conditions it requires (Rich *et al.* 1999).

Although Wortham (1994) states that regeneration is entirely from seed, recent investigations have shown that *A. pyramidalis* can also regenerate via rhizomes that extend up to 25 cm to form new rosettes (Evans & Evans 2001). These

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presumably allow the plant to colonise new microhabitats and form 'new' plants when the rhizomes become detached. Wortham (1994) states that seed of *A. pyramidalis* can survive for long periods in the soil, allowing it to regenerate following disturbance. However, the extent to which new rosettes have regenerated from seed (genets) or by rhizome fragmentation (ramets) is largely unknown and requires further investigation.

Seed dispersal is likely to be very limited with the bulk of seeds falling within a few centimeters of the parent plant. However, the seeds of *A. pyramidalis* possess an elaiosome (oil-containing appendage) which is likely to aid secondary dispersal by ants.

THREATS

The extent to which *A. pyramidalis* has declined is difficult to quantify due to under-recording in remote areas (Rich *et al.* 1999; Rich & Sydes 2000). Having said that, Rich & Sydes (2000) found that around a quarter of populations they surveyed had disappeared due to competition with grasses and scrub where grazing levels had been reduced. Lack of recruitment due to low flowering may be a much greater threat, especially where populations are over-grazed, although the survival of populations in the absence of flowering, often in very isolated locations, suggests that vegetative growth may be sufficient to maintain populations in the longer term.

MANAGEMENT

Grazing is essential for maintaining the short sward in which *A. pyramidalis* can survive (Forbes 1989; Rich *et al.* 1999). It also appears to benefit from burning (Bentham & Hooker 1900). Ideally management should only be carried out during the autumn and winter months to allow *A. pyramidalis* time to flower and set seed.

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AUTHOR VERSION

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