

Dianthus gratianopolitanus Vill.

Cheddar Pink

Dianthus gratianopolitanus is a cushion-forming glabrous perennial with grey-green stems and leaves and sweet-smelling rose-pink flowers. Each petal has hairs at its base and is shallowly-toothed to less than one quarter of way to the base. It is a species of dry, open, species-rich limestone grassland and is most often found rooting in the thin soils of inaccessible crevices and ledges on steep Carboniferous limestone cliffs. *Dianthus gratianopolitanus* only occurs as a native in the Mendip Hills of north Somerset, with the largest population found in Cheddar Gorge. The species is assessed as Vulnerable in England.



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IDENTIFICATION

Dianthus gratianopolitanus is a cushion-forming, densely tufted glabrous perennial with delicate grey-green (glaucous) stems that rarely grow to more than 20 cm (Stace, 2010). Leaves (2–6 cm x 1–2 mm; Poland & Clement, 2009) are linear, glaucous and have a rough (scabrid-ciliate) margin.

Flowers are sweetly scented, range in colour from pale to deep pink and measure less than 30 mm across. They bear 'bearded' petals (i.e. with shaggy hairs on the upperside) and are shallowly-toothed to less than one quarter of way to the base. The calyx is less than 20 mm across (Stace *et al.*, 2015), and the epicalyx has 4–6 blunt glaucous scales (bracteoles) that are abruptly pointed (apiculate) and are *ca.* one quarter



Dianthus gratianopolitanus in full flower above Cheddar Gorge, Mendip Hills, Somerset. ©Fred Rumsey.

the length of the calyx (Rose, 2006; Stace, 2010).

SIMILAR SPECIES

Two other glabrous *Dianthus* species present in the UK (there are no records for southern Ireland) have fragrant flowers and may be confused with *D. gratianopolitanus*. *Dianthus caryophyllus* differs by having a larger calyx (more than 25 mm across) and petals that are not bearded, whilst *D. plumarius* has more deeply toothed petals (to at least one third of the way to the base) and a calyx measuring more than 20 mm across (Stace *et al.*, 2015). Both species have been recorded as hybridising with naturalised *D. gratianopolitanus* and display characters intermediate in either the degree of petal toothing, bearding, or calyx length. See Stace *et al.* (2015), pp. 215–216, for details.

A wide variety of 'garden pinks' are available to buy, many of them produced by hybridising *D. plumarius*, *D. chinensis* and *D. gratianopolitanus* (formerly *D. caesioides*), although these usually display obvious petal markings not present in pure *D. gratianopolitanus*.

HABITATS

Dianthus gratianopolitanus is a species of dry, open, tightly-grazed and species-rich limestone grassland, often found rooting in the thin soils of inaccessible crevices and ledges on steep Carboniferous limestone cliffs (McDonnell, 1994; Lusby, 2002).

In common with many rare or threatened plants in Britain and Ireland, *D. gratianopolitanus* is associated with unimproved *Festuco-Brometalia* habitat, most commonly with NVCCG2 *Festuca ovina* – *Avenula pratensis* grassland,

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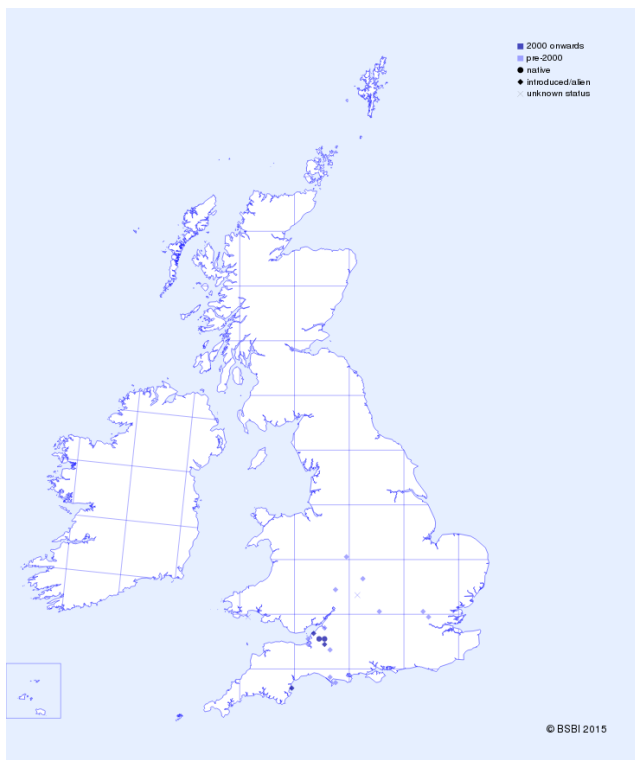
and growing with *Helianthemum nummularium*, *Koeleria macrantha*, *Thalictrum minus* and *Thymus polytrichus*. (McDonnell, 1994).

BIOGEOGRAPHY

Dianthus gratianopolitanus has a European Temperate floristic element with a Continental distribution in Western Europe (Preston & Hill, 1997) and has core areas of distribution in the French, Swiss and German Jura mountains. Populations are much more fragmented and thinly scattered across low-lying mountainous areas of middle and eastern France, and from southern Belgium to the Czech Republic, Poland and Ukraine in the East (Putz *et al.*, 2015).

It has its native Northern European range limit as an outlier in Britain (Preston, 2007) on the carboniferous limestone of Cheddar Gorge, where the largest populations are to be found, as well as a small number of locations nearby and within the Mendip Hills.

Although some authors have referred to *D. gratianopolitanus* as an historical introduction to the British Isles, Godwin (1975) published evidence of its pollen from the ice-free Middle Weichselian period, and recent molecular studies have determined that the Cheddar Gorge population shares two chloroplast DNA types common to mainland Europe, with the extant British populations representing isolated remnants of what was, before the last glaciation, probably a much more widespread species across the British Isles (Koch & Michling, in prep).



Distribution of *Dianthus gratianopolitanus* in Great Britain and Ireland.

Several introductions close to native localities in north Somerset have taken place over the years: it has been suggested that sites at Rookham, Draycott Sleights, The Perch and Shute Shelve Hill are possibly introductions (Green *et al.*, 1997), but there is no direct evidence and at least some of these may be outlying populations of a formerly more widespread species, or represent natural colonisation from other native localities. There is no doubt that plants found at Brean Down and Sand Point have been introduced within those SSSIs; however recently discovered plants at Middle Hope might conceivably have arisen from seed blown from the introduced population at Sand Point.

ECOLOGY

Dianthus gratianopolitanus is a tufted, light-loving, long-lived perennial forming dense cushions or mats consisting of numerous hemi-rosettes (Käsermann, 1999) and reproducing via stoloniferous shoots and by seed. The species usually occurs on shallow, humus-poor limestone soils, but in the north-east of its European distribution populations may be found on schistose gravel, sandstone, diabase or greenstone and serpentine (Koch & Michling, in prep).

The sweetly scented solitary flowers attract a wide range of pollinators including butterflies (e.g. *Aglais urticae* Small Tortoiseshell), diurnal and nocturnal noctuid moths and day-flying hawk-moths (e.g. *Macroglossum stellatarum* Hummingbird hawk-moth), with visitations by hawk-moths providing the potential for long-distance pollination (Erhardt, 1990).

The blackish-brown seeds are small (2.7-3.1 x 1.8-2.2 mm), oval, shield-formed and compressed with a distinct ridge on the concave ventral surface. Although they are reportedly dispersed by wind (Käsermann, 1999), no specific studies could be found on either seed dispersal or germination, although excessive herbivory often results in the loss of seeds pre-dispersal, and this together with dispersal into calcareous bedrock is thought to present difficulties for the establishment of new populations (F. Michling, pers. comm.).

No information could be found on seed bank longevity, although *D. caryophyllus* is reported to have short-term persistent (less than 2 years) seed based on a small number of samples (Thompson *et al.*, 1997), and its seed size and shape are very similar to *D. gratianopolitanus*.

In a study investigating *D. gratianopolitanus* at sites in Switzerland and Germany, Putz *et al.* (2015) found that, contrary to initial assumptions, naturally fragmented and isolated populations had higher densities and displayed greater genetic diversity between populations than those with lower magnitudes of isolation. The authors concluded that genetic variation between populations increases with geographic isolation due to restricted gene flow, and consequently, isolated populations (such as the Cheddar sites) could be of great importance for conserving the full evolutionary potential of *D. gratianopolitanus*.

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THREATS

Scrub encroachment/undergrazing is the main threat facing extant populations, tying in with results from the BSBI's Threatened Plants Project (Walker *et al.*, in prep) that clearly shows a lack of management as the main threat to much of our endangered flora.

Dianthus gratianopolitanus was once widely collected, although there is no recent evidence to suggest that this is still the case, perhaps partly due to the inaccessibility of surviving populations. The picking of *D. gratianopolitanus* is prohibited under Schedule 8 of the Wildlife and Countryside Act.

MANAGEMENT

Scrub management and conservation grazing are important in maintaining open grassland for light-loving rarities such as *D. gratianopolitanus*. However, at the Cheddar Gorge location this management has the potential to conflict with the requirements for endemic *Sorbus* which prefer the intermediate stages of scrub succession to woodland (Houston *et al.*, 2009), and so additional measures such as the protection of saplings and mature trees when livestock are on site may be desirable.

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AUTHOR VERSION

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