

Dianthus plumarius subsp. *blandus* – Distribution and Habitat Features

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Abstract

The pink carnation (*Dianthus plumarius* subsp. *blandus*) is a narrow endemic in the Northern Limestone Alps. The plant prefers dolomitic lime scree habitats. The pink carnation grows and performs best on open, sunny, but well water-supplied scree habitats. Within the Nationalpark Gesäuse populations were mapped in 2014 and 2015. Relevées were collected using the Braun-Blanquet method. The pink carnation is essentially associated with the plants of *Thlaspietea rotundifolii*, *Asplenietea trichomanis* and *Seslerietea albicantis*.

Keywords

Dianthus plumarius, population mapping, vegetation types, scree habitats

Introduction

Dianthus blandus is an endemic found only in the Northeastern Alps in Styria, reaching from Dachstein to the Gesäuse mountains. It appears on limestone and dolomite gravel slopes in various succession stages from almost open ground over mountain pine bushland to open red pine forests. The Gesäuse region itself is characterized by limestone mountains with steep, unstable gravel slopes with torrent creeks running down to the Enns river. Especially due to snow melting in spring and thunderstorms during the summer strong movement and shifting of sediments occurs. The habitats filled with scree, gravel and sand are very dynamic and instable. Only areas of low inclination on the side of the streams show more stable conditions, which enable plants to grow there for longer periods of time, ranging from weeks and months to years or even decades.

In the course of a master thesis (KÖPPL 2016) and additional field work (KÖPPL & OBERKLAMMER 2015) distribution and habitat choice of the endemic *Dianthus plumarius* subsp. *blandus* (in short: *Dianthus blandus*) were investigated in the National Park Gesäuse. To describe the phytosociology and the habitat choice of *Dianthus blandus* 53 Braun-Blanquet relevées were collected. Before this investigation knowledge of distribution and habitat features of *Dianthus blandus* was fragmentary. For the first time, a detailed distribution of populations was documented.

Methods

Distribution

To investigate the current distribution of *Dianthus blandus* in the National Park Gesäuse, an extensive search was carried out during the main flowering season in May and June 2015. As a means of documentation, two GPS-devices (Garmin 60CSx, Garmin eTrex) were used for setting waypoints at each location of *Dianthus blandus* individuals or clusters. For data transfer 'MapSource' (Garmin) was used. Afterwards all waypoints were transferred to 'ArcGis' (Version 10.3) and displayed on 'OpenStreetMap' and orthophotos of 'Digitaler Atlas Steiermark'. Due to occurring irregularities in terms of accuracy the method was adapted to drawing population borders on printed orthophotos during field work (KÖPPL & OBERKLAMMER 2015) and digitalizing them using ArcGis. Finally, the square measure of the distribution areas was calculated for subpopulations and populations.

Phytosociology

The phytosociology of vegetation types inhabited by *D. blandus* was determined by collecting and evaluating 53 relevées using the Braun-Blanquet method from 1964. In 48 of these areas *D. blandus* was present. Five of them were chosen without the plant to allow better comparison of vegetation compounds. All together the variability of 'carnation-habitats' was well documented. Vegetation data was entered in 'Turboveg' (HENNEKENS & SCHAMINEÉ 2001), then exported to 'Juice' (TICHY 2002) and data was processed with 'Twinspan-analysis' (HILL 1979).

Habitat features

Out of this data habitat features were worked out.

Results

Distribution

Dianthus blandus could be found ranging from 590 m a.s.l. close to the river Enns up to approximately 1200 m a.s.l. in Gseng. The main distribution was found in the montane zone between 600 and 800 m. It has settled within the National Park in 10 populations with at least 92 sub-populations. A population was defined by geographical extension and connectivity. Populations were separated by others by at least 200 meters. All pink carnations within such an area were considered as belonging to one population, however with some substructure resulting in several subpopulations.

Exceptions from this classification were made in Hinterwinkel and eastern Haindlkar, where populations were further outspread. See also Fig. 1 (Distribution: Populations of *Dianthus blandus* in the National Park Gesäuse).

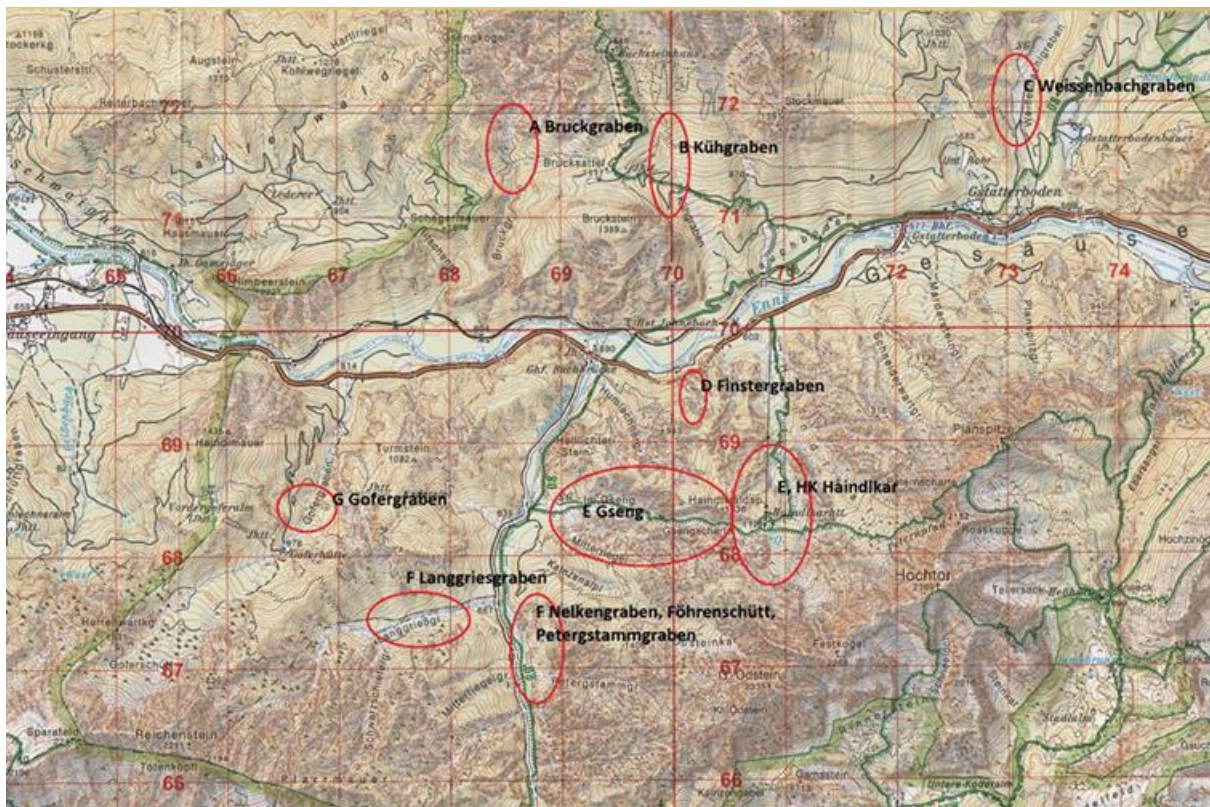


Figure 1: Distribution: Populations of *Dianthus blandus* in National Park Gesäuse

Areal extent

Population areas were calculated by summing sub-population areas (Tab. 1). Altogether Carnations inhabit 11,350 m² of area within the National Park borders (KÖPPL & OBERKLAMMER 2015).

Population	Sub-populations	Areas in m ²
A Bruckgraben	6	500
B Kühgraben	4	300
C Weißenbachgraben	5	800
D Finstergraben	10	400
E Gseng	24	3500
E HK Haindlkar	14	1000
F Langgries	12	1300
F Nelkengraben	6	1500
F Petergstammgraben	10	1600
G Gofergaben	1	450

Table 1: Populations, Sub-populations and Areas of *Dianthus blandus* in Gesäuse

Phytosociology

Dianthus blandus was found mainly in **Thlaspietalia rotundifolii** (*Petasitem niveii*) with *Petasites paradoxus*, *Rumex scutatus*, *Silene vulgaris* subsp. *glareosa*, *Linaria alpina* and *Campanula cespitosa*. In **Asplenietea trichomanis** (*Potentillion caulescentis*) and in **Seslerietea albicantis** (*Carietum firmae*) with *Carex firma*, *Dryas octopetala*, *Primula clusiana*. These scree habitats, montane to subalpine grasslands, and dry forest are species rich and tend to mix. Succession can change these habits to **Erico-Pinetum prostratae** and **Erico-Pinion sylvestris**.

Habitat features

Carnations were most abundant at the fringe from open scree slopes to more stable conditions. Germination seems to take place best on open habitats with good water supply. Most of germination and establishment seems to happen there. But within an observation period of three years many of these places were destroyed by floodings.

As to be seen in Langgriesgraben (Fig. 2), habitats can be some way off the open gravel fields and situated in more stable parts. Here we find all succession stages to pine forest.



Figure 2: Langgries: Sub-populations and habitat choice

Discussion

Especially the field mapping work has increased the knowledge about *Dianthus blandus* distribution and choice of habitats within the National Park Gesäuse. The already known spot occurrences could mostly be confirmed and have been investigated further. The populations have proven to be larger than expected and consist mostly of several subpopulations.

Some of the subpopulations could not be reached because of the steepness of some sites. Some may not have been found due to inaccessibility. At least one unknown population was found in Gofersgraben, south of the river Enns. During field work it became obvious that many seemingly suitable habitats were not populated by *Dianthus blandus*. Based on the observations we conclude that the meta population dynamics are small on the scale of populations and occur rather on the scale of subpopulations. Subpopulations could stay stable by local recruitment from seeds, and using offshoots, which can also result in local short distance migration.

Conclusion

Dianthus plumarius subsp. *blandus* has gained some attention during the past few years and knowing details on the distribution, habitat features and phytosociology of this flagship-endemic is important for its survival. An ongoing monitoring will hopefully provide further insight into its performance. Genetic research is recommended. At present the population is not endangered.

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