

## Growth forms of *Euphrasia* sect. *Atlanticae* PUGSLEY (Orobanchaceae)

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### Abstract

The growth form of the Azorean species of *Euphrasia* sect. *Atlanticae* is evaluated. *Euphrasia grandiflora* is a semi-shrub, *E. azorica* an annual herb.

**Key Words:** *Euphrasia* sect. *Atlanticae*, *E. grandiflora*, *E. azorica*; growth form; flora of the Azores.

### Introduction

The Azorean species of *Euphrasia* have been treated extensively by YEO (1973). Based on recent field observations the growth form is re-evaluated.

### Material and Methods

Both species, *Euphrasia grandiflora* and *E. azorica*, have been visited at their localities in São Jorge and Flores. Photos, sketches and notes taken on site are the basis for this investigation. Being listed in the Berne convention and under the highest European protection level no specimen has been collected. The photo documentation can be found under the observation records in Virtual Herbaria.

Observations [exact data in Virtual herbaria (RAINER, 2014)] and seen specimens (scans in JSTOR Global Plants, 2014):

*Euphrasia grandiflora*: Portugal, Azores, São Jorge, Pico da Esperança, 2012-07-21, E. Vitek (four localities); – Ins. Azor., in praerupto humido montis Pico, alt. 3000–4000', 7.1838, C. Hochstetter 54 [isotypes W 00548256!, W 1889-0191088!, CAS 00123966 scan!, M 0188854 scan!, WAG 0003254 scan!; (Hochstetter s.n., but probably same collection:) K 000425547 scan!, STU 000013 scan!, STU 000014 scan!].

*Euphrasia azorica*: Portugal, Azores, Flores, W-part, 2.5 km ESE of Fajã Grande, NE slope of Rocha, road to Morro Alto, big bend WSW of Caldeira Branca, slope directly above road, 590 m s.m., 39°26'41"N 31°14'06"W, 2012-07-29, E. Vitek; – Azores, Flores, 1842, H.C. Watson 151 [isotypes K 000425546 scan!, K 000425545 scan!].

### History of growth forms

*Euphrasia grandiflora* was described in SEUBERT (1844) on the basis of specimens and the name assigned by HOCHSTETTER. No information on the growth form is given in the description, but the plate (SEUBERT 1844: tab. VIII fig. 2) shows exactly the growth form.

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Fig. 1: *Euphrasia grandiflora*. a) two plants with their dense bunches of inflorescence shoots; b) adventitious roots (arrows); c) innovation shoots at the woody base of an old branch; d) plant with bunch of annual shoots and dry stems of the year before (arrows).

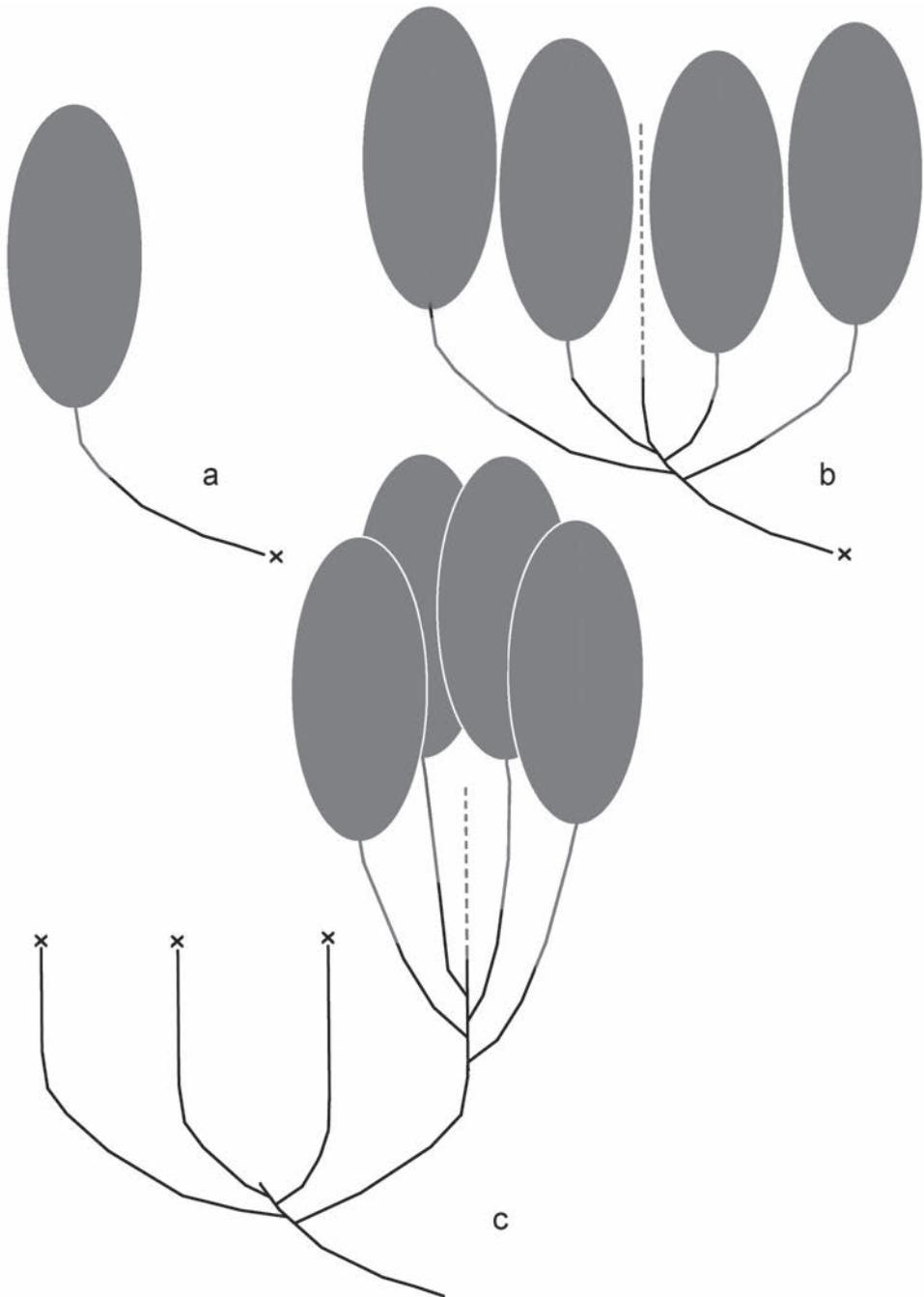


Fig. 2: *Euphrasia grandiflora*, schematic growth form. Black – woody axes, grey – inflorescences and herbaceous axes, broken lines – dry axes of previous year, X – continuation not drawn. a) single inflorescence; b) year two: several new inflorescence shoots, previous inflorescence axis remaining as dry skeleton; c) year three: branching process repeated, thus forming dense clusters of inflorescences.

WATSON (1844) in his description of *E. azorica* gives annual with question mark, not completely being sure of the distinctiveness of this new species from *E. grandiflora*.

BENTHAM in DC. (1866) unites the two species under *E. grandiflora*, but is not sure of the growth form and gives annual or perennial with question mark. WETTSTEIN (1896: 79) follows BENTHAM and gives annual vel perennes. PUGSLEY describes sect. *Atlanticae* (1936: 284) and decides, that these two species are perennial. YEO (1973) follows PUGSLEY and gives as description for the section "Perennial species of the Azores, branching from the base; ...."

## Results

*Euphrasia grandiflora* has been visited at its localities in São Jorge two times, May 1999 and July 2012. The analysis shows that after flowering the top of the shoot becomes dry – the rest can remain until next year (Fig. 1d). From axils below the inflorescence zone new shoots develop, which will bear an inflorescence in the following year. This process repeats every year, ending with numerous annual herbaceous shoots on a richly branched woody base (Fig. 2) – thus each plant forms a dense bunch of inflorescences (Fig. 1a, d). At the base of the woody stems innovation buds can start to grow to a new sequence of inflorescences (Fig. 1c). Adventitious roots can be formed (Fig. 1b). *E. grandiflora* is perennial and the growth form of this species has to be classified as semi-shrub. Similar growth forms can be found in some Australian species of *Euphrasia* (VITEK unpubl.). The adventitious roots are a very rare character in the genus.

*Euphrasia azorica* has been observed in July 2012 on the island of Flores. The inflorescences and the single shoots have a comparable structure as the ones of *E. grandiflora* (Fig. 3a), but the woody base is completely missing (Fig. 3b). Each shoot is solitary, no basal branching can be found. There is no remainder of the previous years. Therefore *E. azorica* has to be classified as an annual species.

## Discussion

Based on the results the description of Section *Atlanticae* PUGSLEY must be adapted to "Species of the Azores, suffrutex or annual."

There have been several problems for earlier authors when judging on the growth form of the Azorean species of *Euphrasia*. Firstly, all the type specimens are the uppermost parts of inflorescence branches of the plants, not allowing to judge on the growth form. Secondly, none of the authors except Watson has seen the species in the field. Therefore they went wrong in their descriptions and classifications of the growth form.

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Fig. 3: *Euphrasia azorica*. a).plant in its habitat; b) base of the stem.

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