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Further remarks on the narrow endemic *Centaurea pandataria* (*Asteraceae, Cardueae*)

Abstract

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Centaurea pandataria is a very narrow endemic with unclear taxonomy and some uncertainness even about its nomenclature. In this contribution, the correct authorship of the basionym *C. cineraria* var. *pandataria* Bég. & Fiori ex Fiori is clarified and, as a consequence, the recent lectotypification of the name is re-examined, resulting fully acceptable. Founding on the review of bibliographic data and on herbarium and field observations, a treatment at species-level is deemed the most consistent. Authors also report the first chromosome count of *C. pandataria*, which is diploid ($2n = 18$), as the close *C. aeolica*.

Key words: Mediterranean flora, Tyrrhenian islands, taxonomy.

Introduction

In the framework of our researches about the flora of the Tyrrhenian islands (e.g., Cennamo & al. 2013; De Castro & al. 2013; Vallariello & al. 2016; Iamonico & al. 2017; Del Guacchio & al. 2020), we refer here some issues on the controversial nomenclature and taxonomy of *Centaurea pandataria* (Bég. & Fiori ex Fiori) Bég., endemic to Ventotene island, anciently named Pandataria (Pontine archipelago, Latium, central Italy).

Béguinot (1902) first wrote about this plant, enlightening its peculiar morphological features by reporting it as "*Centaurea aplolepa* var.". Despite his opinion (Béguinot 1905: 443), however, he was not the first collector, as the plant had been already gathered on the island by G. Gussone (Fig. 1) in 1834 (Grande 1924: 115-116). This population was described as a new variety of *C. cineraria* L., i.e., *C. cineraria* var. *pandataria* Bég. & Fiori ex Fiori (1904a: 334), even if raising some doubts (Fiori 1904b). However, Béguinot (1905) himself raised it to the species rank and interpreted *C. pandataria* (Fiori) Bég. as a microspecies of the fragmented *C. cineraria* group. Later, Fiori (1927) fully included *C. cineraria* var. *pandataria* in *C. cineraria* var. *aeolica* (Guss. ex Lojac.) Fiori. Also Grande (1925), Béguinot (1931) himself and Zangheri (1976) included *C. cineraria* var. *pandataria* in *C. aeolica* Lojac., without recognizing any taxonomic distinction. The same opinion was expressed by Cela Renzoni & Viegi (1982) and Anzalone (1984: 126), while Dostál (1976) regarded the taxon as one of the several subspecies of *C. aplolepa* Moretti

Fig. 1. A specimen of the first gathering of *C. pandataria* (NAP-"Gussone Generale" collection).

(1826: 154). Anzalone (in Anzalone & Caputo 1976: 82-83) and Pignatti & Lausi (1982: 193) re-proposed the first treatment by Fiori (1904a). Nevertheless, later Anzalone (1995) preferred to employ the subspecific rank, but under *C. aeolica*. In the last years, his proposal has prevailed (Conti & al. 2005; Greuter 2006; Hilpold & al. 2011; Anzalone & al. 2010; Peruzzi & al. 2015; Pignatti 2018; WCSP 2021). However, Arrigoni (2003), Del Guacchio & al. (2019), and Brullo & al. (2021) treated again *C. pandataria* at the specific level. Therefore, the status remains uncertain; indeed, recent molecular analyses were not able to clarify the phylogenetic relationships of this taxon (Hilpold 2014). For this reason, we re-examined the question including further considerations from literature, clarifying the correct citation of the name and reporting the first chromosome count for this taxon.

Material and Methods

The present contribution is based on both analysis of the relevant literature (including protologues) and examination of specimens at CAT, FI, GDOR, GE, NAP, P, and PAD (herbarium codes according to Thiers 2021 onwards) and in field during 2017–2019. The articles cited throughout the text follow the *Shenzhen Code* (Turland *& al.* 2018, hereafter ICN).

The chromosomal observations were made on root tips obtained from the cypselae by germination. The root tips were pre-treated with 0.4% colchicine for 4 hours and then fixed in Carnoy fixative solution for 1 hour. After hydrolysis in 1N HCl at 60 ° C for 7 mins, the tips were stained with leukobasic fuchsin. Root tips were then soaked in 45% acetic acid, macerated and squashed. Metaphasic plates were observed for 3 different individuals, using a Nikon Eclipse Ci-L microscope.

Results and Discussion

Nomenclature and considerations on the lectotype

Despite the most widespread opinion (e.g., Greuter 2006; PFI 2021; Brullo & al. 2021), the name *C. cineraria* var. *pandataria* is to be attributed only to Fiori, who cured the treatment of *Compositae* in *Flora Analitica d'Italia* (Fiori 1904a: 193). In fact, even if Fiori (1904a) reports "Fiori et Bég." in the protologue, there is no evidence that the description of the variety was provided by others than Fiori himself. This statement is further supported by Fiori and Béguinot themselves in herbarium cards (FI, see below). Therefore, according to Art. 46.5 of ICN, the correct citation for the authorship is "Fiori & Bég. ex Fiori" or simply "Fiori", as already proposed for similar cases (e.g., Del Guacchio & al. 2021). The name has been recently typified (Brullo & al. 2021). Fiori (1904a) explicitly alluded in the protologue to the "Bég. hb.", i.e. the private herbarium of Augusto Béguinot. At PAD, where the main part of the collection by Béguinot is preserved, two pertinent sheets are kept. Other pertinent specimens of the Béguinot's herbarium were found at FI, and are filed with the following codes (the specimens in braces were attached on a single sheet when incorporated into the herbarium of Stéphen Sommier): {FI-051937, FI-051938}, FI-051939, {FI-051940, FI-051941}. The above-indicated specimens at PAD and FI (no other specimens were located at GE or GDOR), although belonging to different gatherings (between May 20, 1900 and September 20, 1901), and even if cited in the protologue only by a

generic reference to the herbarium of Béguinot, are syntypes according to Art. 9.5 of ICN. However, there is no proof that the specimens at PAD were ever examined by Fiori, whereas the label on FI-051938 adds a relevant detail: Fiori revised FI-051937, FI-051938, FI-051940, and FI-051941 only in 1912. On the contrary, FI-051939 was incorporated into the personal herbarium of Adriano Fiori. On the original label, Béguinot wrote "*Centaurea aplolepa* var. *meridionalis* Nobis?" (evidently an unpublished varietal name, not found elsewhere); while Fiori barred the word "*meridionalis*" and wrote "*pandataria*". Brullo & al. (2021) chosen FI-051939 as the lectotype. After the clarification about the authorship of the name, this is a very agreeable choice. In fact, even if Art. 9.4 (c) does not impose that the author had seen the lectotype, FI-051939 is the only specimen personally revised by Fiori before the publication of the protologue and moreover it includes representative material (a complete fruiting individual, a basal rosette, and a small plant with some flowers and cypselae).

Chromosome number

According to our results (Fig. 2), counts of three different individuals indicate that *C. pandataria* is diploid ($2n = 18$), as the other representatives of *C. cineraria* group, among which *C. aeolica* Guss. ex Lojac. (Cela-Renzoni & Viegi 1982; Bedini & Peruzzi 2021).

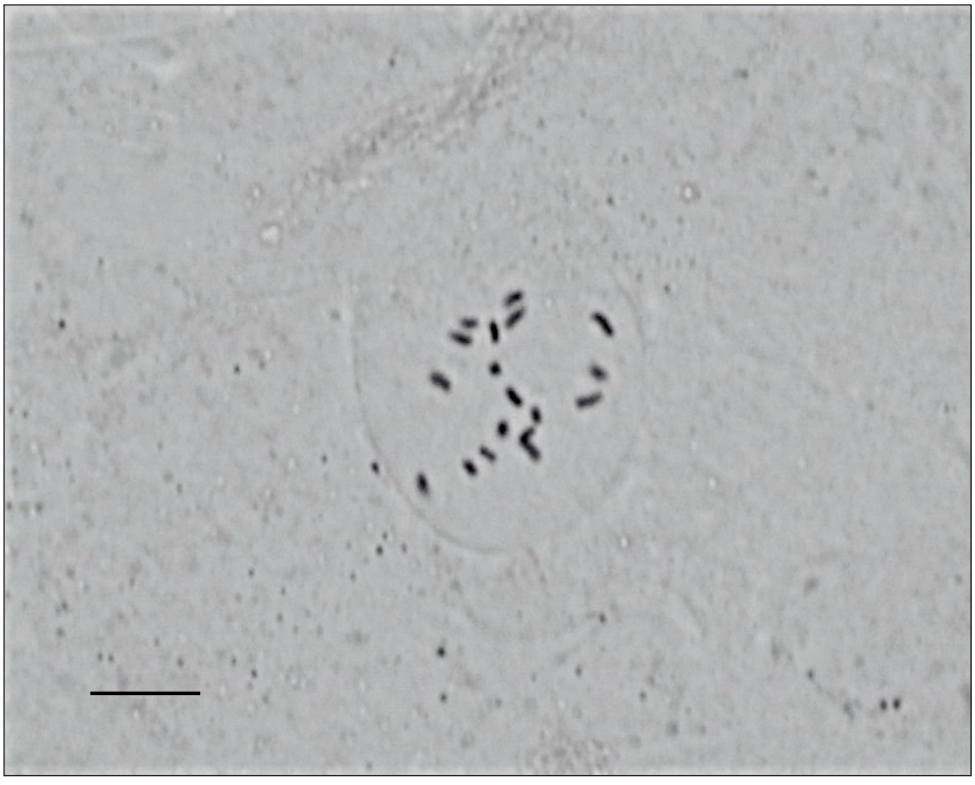

Fig. 2. Metaphase plate representative of three counts on three different individuals of *C. pandataria*. The bar equals 10 µm.

Phylogenetic hypotheses

As the indications of *C. aeolica* for Ischia island (Gulf of Naples, Campania, southern Italy) (e.g., Pignatti & Lausi 1982; Hilpold & al. 2011; Peruzzi & al. 2015; cf. Ricciardi & al. 2004) are to be referred to escaped plants (cf. Gussone 1855 sub *C. aplolepa*) (Del Guacchio & al. 2019), the geographical separation between the very local *C. pandataria* and the other taxa of the *C. aeolica* group is remarkable (Brullo & al. 2021). The most likely explanation for this fragmentation is probably a single long-distance dispersal event. It is to be noted that, within the southern Tyrrhenian Sea, the emerged portion of the earliest Aeolian islands appeared around 450,000-400,000 ya (Branca 2014), and Ventotene is even more ancient (Bergomi & al. 1967); while the volcanic Phlegrean Islands (which are geographically intermediate between the two archipelagos) are much more recent (Aiello & al. 2007).

In any case, *C. aeolica* is the closest relative of *C. pandataria*. According to a first and simpler hypothesis, *C. pandataria* could have originated as a local differentiation by dispersal from *C. aeolica* or its ancestor. However, as already noted for another controversial group in *Centaurea* (e.g., Santangelo & al. 2017), possibly hybridization may have played a role in differentiating local morphs. Also according to our molecular data (not shown), *C. aeolica* and *C. pandataria* are very close, in agreement with Hilpold (2011), and represent an outgroup to a clade including *C. cineraria*.

Conclusions and taxonomic treatment

Several considerations convinced us that, at the present status of knowledge, the specific rank for this taxon is probably the most correct: (1) a remarkable separation between the native ranges of the Aeolian and the Ventotene populations; (2) a trend towards geographical fragmentation of the genus along the Mediterranean coasts (e.g., Hilpold & al. 2014); (3) the perfect separation of the two taxa according to AFLP analysis (Hilpold 2011); (4) the constancy of differential characters which allow to discriminate between them (Anzalone 1995; Brullo & al. 2021).

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