Centaurea jankae and *C. trinervia* (*Asteraceae*): new taxa for the Bulgarian flora

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Abstract. Two species of *Centaurea*, *C. jankae* and *C. trinervia,* are reported as new for Bulgaria. Both were found in Northeast Bulgaria, near Nevsha and Venchan villages, Varna district. A description of the habitats and data about the size and spatial structure of the populations are presented.

Key words: *Asteraceae*, Bulgarian flora, *Centaurea*

Introduction

Genus *Centaurea* L. s.l. is one of the largest genera in Bulgaria (Assyov & Petrova 2006) and with a great number of endemics (Bancheva & Greilhuber 2006). In 2007, during a field study in Northeast Bulgaria, an uncommon species at the stage of non-open inflorescences was collected. A check in the floras (Dostál 1976) has shown that the sample belonged to *C. jankae* Brandza, a species considered endemic to the Dobrodgea region of Romania (Prodan & Nyárády 1964; Oprea 2005). A second visit to the locality confirmed this suggestion. The locality and the adjacent area were surveyed so as to evaluate the population structure and numbers. During that survey, another new species for Bulgaria, *C. trinervia* Stephan ex Willd. (Klokov & al. 1963; Dostál 1976), was found as well as a second population of *C. jankae*.

The morphological description is based on Prodan & Nyárády (1964) and Dostál (1976), as well as on personal data.

Results and discussion

Centaurea jankae Brandza, Anal. Acad. Române ser. 2, 4: 446 (1884)

A perennial herb. Stems erect, stout, 30–100 (120) cm high, often corymbosely branched in the upper half (Fig. 1). Basal leaves 10–25 × 7–15 cm, 1(–2) irregularly pinnatisect, segments linear, 1.5–4 mm wide, with entire margins, patent (in different directions), dark-green, arachnoid-pubescent (Fig. 2) to subglabrous. Capitula singular, long pedunculate, ovoid to subglobose, 20–25 × 17–20 mm. Bracts appressed, veined, middle ones ovate, upper ones oblong, dark-green with a deep purple tint in the upper part. Appendages scarious-membranaceous, shining, those of the middle bracts wide (2–4 mm), semilunate, lacerate to entire. Florets purple (Fig. 3). Achenes 5–5.5 mm[1], pappus 5–6 mm.

[1] **Note:** According to Dostál (1976), achenes are circa 3 mm, but the sample from Probitiya Kamuk locality has achenes circa 5–5.5 mm, as given by Prodan & Nyárády (1964).

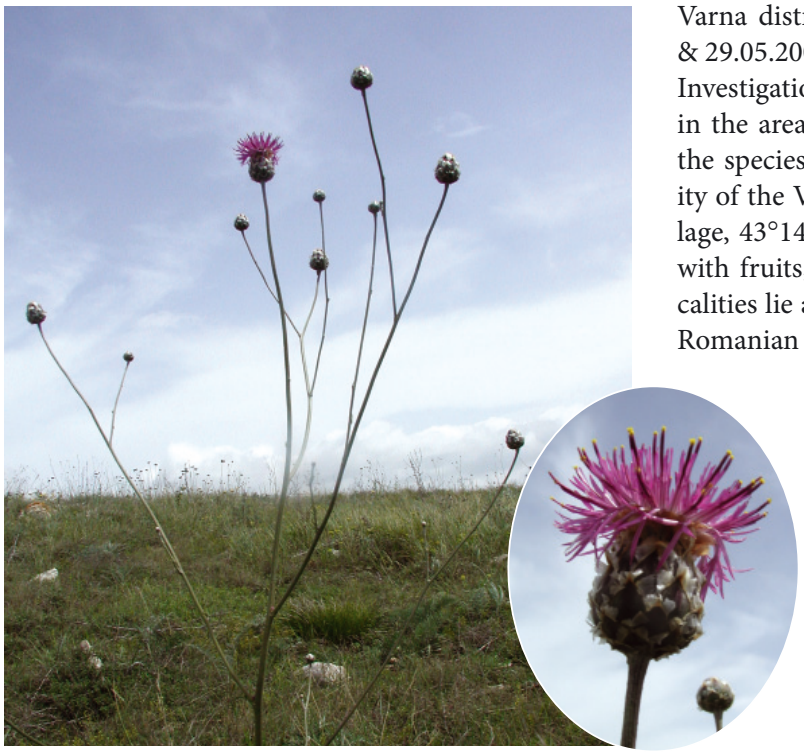

Fig. 1. *C. jankae* at the Taushan Tepe hill.

Fig. 3. Capitula of *C. jankae*.

Fig. 2. Leaves of *C. jankae* (the Taushan Tepe population).

The species is a single representative for Europe of sect. *Hyaleoloma* Dostál of the subgen. *Lopholoma* (Cass.) Dobrocz.

Phenology. Flowering May-June, fruiting June–July.

General distribution. Bulgaria, Romania.

Distribution in Bulgaria, habitat and population data. The species was found first in Northeast Bulgaria, at Taushan Tepe hill, N of Nevsha village, Varna district, 43°17'40" N, 027°18'31" E, NH-29, 09 & 29.05.2007, coll. *A. Petrova* (SOM 163573, 163574). Investigation of some hills with suitable habitats in the area was undertaken and a second locality of the species was found at the Probitiya Kamuk locality of the Venchanski Dyuz hill, west of Venchan village, 43°14.465 N, 027°20.457 E, NH-38, 04.06. 2007, with fruits, coll. *A. Petrova* (SOM 163643). Both localities lie about 90 km southwards of the Bulgarian–Romanian border (Fig. 4).

Taushan Tepe hill has an area of about 2.5 km^2 at the base. The altitude varies between 130 m and 320 m. The inclination of the slopes varies too: there are some steep parts and some gently sloping ones, with a plateau top area. The base rocks are Cretaceous limestones, with variation of marls, clayey marls and limestones, the uppermost zone of the hill is of Lower Aptian limestone (Milanova & Cheshitev 1992). The vegetation cover includes small *Carpinus orientalis* Mill. groves of offshoot origin; shrubs, mainly of *Paliurus spina-christi* Mill., but with two well-developed communities of *Caragana frutex* (L.) K. Koch. Grasslands are mostly dominated by *Stipa pulcherrima* K. Koch., *Chrysopogon gryllus* (L.) Trin., *Stipa capillata* L., *Festuca valesiaca* Schleich. ex Gaudin, and *Dichantium ischaemum* (L.) Roberty. Characteristic are some small and medium-sized landslips with spare vegetation (Fig. 5). The lower parts of the southern and southwestern slopes are grazed (formerly, a much larger area was grazed). A small part is covered with planted pines.

The population of *C. jankae* at Taushan Tepe hill numbers about 500 (550) individuals in grassland communities: with uneven spatial structure where the species is found. There are also two large spots. The largest portion of the population, 150 (170) plants, is on the west-facing slope of the hill, near the plateau area. Here *C. jankae* participates in a community strongly dominated by *Stipa pulcherrima*. The spot at the southeast edge of the plateau top area numbers about 110 (120) individuals. The vegetation is rich in species,

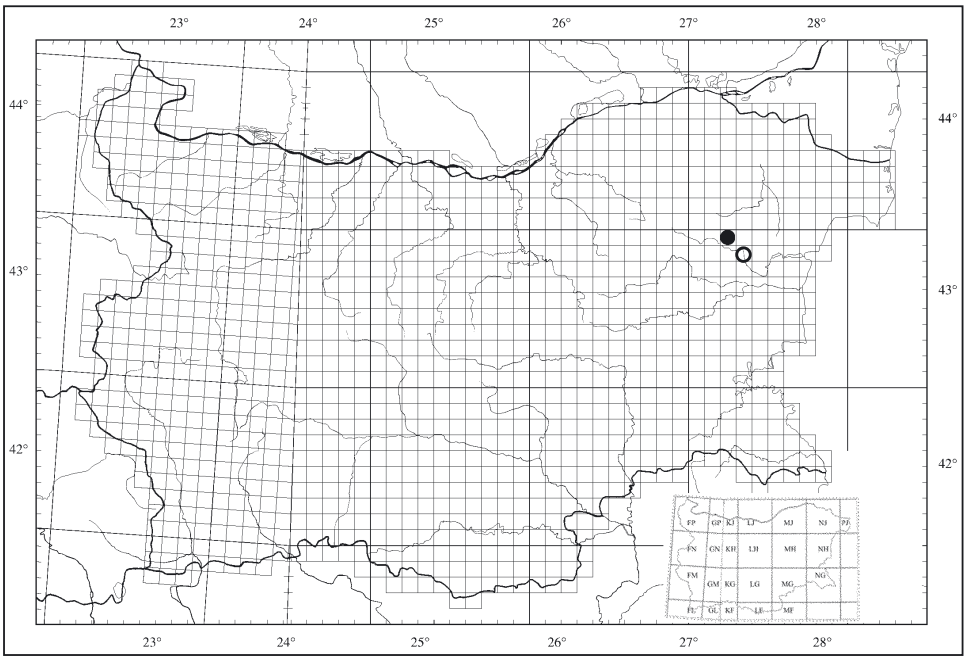

Fig. 4. Distribution map of *C. jankae* (●○) and *C. trinervia* (●).

Fig. 5. Landslip at the Taushan Tepe hill (habitat of *C. jankae*).

more abundant are *Stipa capillata*, *Carex humilis* Leyss., *Satureja coerulea* Janka, *Teucrium chamaedrys* L., and *Achillea clypeolata* Sm., with the participation of *Astragalus vesicarius* L., *Aster oleifolius* (Lam.) Wagenitz, *Gypsophylla glomerata* Pall. ex M. Bieb., *Campanula sibirica* L., *Salvia nutans* (L.) All., *Serratula radiata* (Waldst. & Kit.) M. Bieb., *Adonis vernalis* L., *Brassica elongata* Ehrh., and *Inula ensifolia* L., and occasionally *Jurinea stoechadifolia* (M. Bieb.) DC., *Echinops ritro* L., *Centaurea marschalliana* Spreng., etc.

About 80 (90) plants were found at the landslip on the southeast slope (Fig. 5). The rest of the population forms sparse smaller groups in the upper part of the hill, mostly near the edges of the plateau area. Density varies, reaching in the core areas of the population 3-5 plants per sq. m.

In 2007, only 12 plants with inflorescences were counted. All but one, were at the southeast edge of the plateau area. Remains of inflorescences from previous year(s) were counted: 150 (160). One possible explanation of such tremendous fluctuation relates to the extreme drought in the first months of 2007.

The second locality, Probitiya Kamuk, lies about 6 km to the southeast of the first one. About 700 plants were counted there altogether. The largest part of the observed population was on the steep south-to-southwest facing slope, downwards from the characteristic stone formation (Fig. 6). There, over 500 (550) plants were observed at an area of about 0.7

Fig. 6. Probitiya Kamuk locality at the Venchanski Dyuz hill.

ha. Fourteen of them flowered in 2007 and a similar number showed older remains of inflorescences. Occasionally, density of 3–5 (7) plants per sq. m. was observed, but more often there were 1–2 plants per sq. m. Owing to the fact that the slope was very steep and landslipping, only part of it was searched. Possibly, there were more plants on that slope. In the remaining area, 120 (130) plants were observed on the south-facing ridges of the hill, and some small groups of (1–3) 7–15 individuals, mostly young ones, were found on the southern slope (43°14.474 N, 027°20.502 E, etc.).

Venchanski Dyuz hill is build up of Lower and Upper Cretaceous limestones (marls, millstone grits and chalk), with some large outcrops on the southern slopes (Milanova & Cheshitev 1992). Compared to Taushan Tepe hill, the vegetation in the Probitiya Kamuk locality (the area with the population of *C. jankae*) was very sparse and open. The terrain was stony, dominated by *Satureja coerulea* and *Thymus zygioides* Griseb., with the participation of *Gypsophylla glomerata*, *Campanula sibirica*, *Carex humilis*, *Inula ensifolia*, *Echinops ritro*, *Aster oleifolius*, and *Koeleria brevis* Stev., and occasionally of *Jurinea stoechadifolia*, *Centaurea marschalliana*, *Astragalus vesicarius*, *Teucrium polium* L., etc.

As compared to the population at Taushan Tepe hill, there were numerous younger plants with 1–2 vegetative stems, with 2–3 leaves. Another difference observed there was that the leaves of the plants of Taushan Tepe population were hairy (Fig. 2), while at Pobitiya Kamuk they were subglabrous and only their bases were hairy.

The Probitiya Kamuk hill is one of the few known localities of the local endemic *Verbascum tzar-borisii* (Davidov) Stef.-Gat. (Petrova unpubl.). Close to the foot of the rock outcrop itself the populations of both species overlapped.

Centaurea trinervia Stephan ex Willd., Sp. Pl. 3: 2301 (1803)

A perennial species, with many straight to slightly patent stems, up to 30 cm high (Fig. 7). Plants sparsely floccose-tomentose. Leaves entire, linear-lanceolate, acute, 30–70 × 3–5 mm, the lower shortly petiolate, the upper sessile, 3-veined. The upper part of the flowering stems leafless, capitula singular. Involucre 6–10 × 12–15 mm; bracts pale-green, with a darker, brown apex; middle bracts oblong-ovate. Appendages not, or only very shortly decurent on the bracts, creamy, pectenate-laceratae. Florets pink, the outer longer than the inner, patent (Fig. 8). Achenes 4–6 mm; pappus 2–3 mm.

Fig. 7. *C. trinervia* at the Taushan Tepe hill.

According to Dostál (1976), *C. trinervia* belongs to subgenus *Odontolophus* (Cass.) Hayek, and is its unique representative in Europe.

Phenology. Flowering May–June, fruiting June–July.

General distribution. Romania, Moldova, the Ukraine, Bulgaria.

Distribution in Bulgaria, habitat and population data. Northeast Bulgaria, Taushan Tepe hill, N of Nevsha village, Varna district, NH-29, 29.05. 2007, coll. *A. Petrova* (SOM 163579) (Fig. 4).

A small population of seven plants was found on the edge of a small ravine. All plants were at an area of 2 m^2, around a *Paliurus spina-christi* shrub. Two of the plants had about 25–30 flowering stems, the rest were with 10–15 stems. After two days of botanizing at the hill, those were the only observed plants of this species, although not the entire ar-

Fig. 8. *C. trinervia* inflorescence.

ea has been searched out, especially the small ravines and landslips. The species was not found during two days of investigation of some neighboring hills, but still some suitable microhabitats remained unsearched.

Conclusion

Centaurea jankae is considered a Dobrogean paleoendemic taxon, which probably evolved at the end of the Tertiary (Sârbu & al. 2006). Data from Bulgaria – distribution on hills with geological structure and history showing them as ancient dry land – agree with this. The presence of steppe communities dominated by *Stipa pulcherrima, S. capillata, Caragana frutex* and a lot of Pontic and Pontic-Siberian floristic elements, such as, *Centaurea marschalliana*, *C. stereophylla* Besser, *Adonis volgensis* DC., *Galium volhynicum* Pobed., *Hedysarum tauricum* Pall. ex Willd., *Tanacetum millefolium* (L.) Tzvelev, *Aster oleifolius*, *Serratula radiata* (Waldst. & Kit.) M. Bieb., *Jurinea stoechadifolia*, *Phlomis tuberosa* L., *Cephalaria uralensis* (Murr.) Roem. & Schult., etc. present a strongly evidence of the refugee character of the plant life on those hills.

Centaurea jankae has a high conservation status. It is included in the IUCN Red Data List (Walter & Gillett 1998), Annexes IIb and IVb of the Directive 92/43 of the EC and Annex 1 of the Bern Convention. According to the recent accounts (Oprea 2005; Sârbu & al. 2006), the species is Critically endangered in Romania, with no more than 10 populations. The largest reported population from Romania (Babadag Plateu) numbers about 300 individuals (Sârbu & al. 2006). Those data show the importance of the two new localities for the global conservation of the species, as both populations are quite large, with good density characters.

Undoubtedly, both species have to be included in the List of Protected Species and to be evaluated for the Red Data List of Bulgaria. Considering the limited current data, according to IUCN criteria (IUCN 2001) they will receive the following regional (country) categories:

- *C. jankae* **EN [B2ab(iii)],** area of occupancy less than 500 km^2, known to exist at less than 5 localities and inferred decline of the quality of the habitat (abandonment at Taushan Tepe and expansion of shrubs and trees);
- *C. trinervia* **CR [D],** a population, which numbers less than 50 mature individuals.

There is actual possibility for more populations of both species to be found in the area, as it is not well investigated botanically. The searches have to be directed to the areas with similar geological history and structure.

The Venchanski Dyuz hill was recently declared a protected area. It is also included in the proposed NATURA 2000 site "Provadiysko-Royaksko Plateau". The Taushan Tepe hill has no conservation status for the moment. Considering the presence of *C. jankae* population (a species from the Annex IIb of the Directive 92/43), it definitely has to be included in NATURA 2000 net in Bulgaria. Such inclusion is supported also by the presence of another Annex IIb species, *Echium russicum* J.P. Gmel., and the existence of well-developed and preserved habitats, included as priority habitats in the Annex I of the Habitat Directive: **62C0 Ponto-Sarmatic Steppes** and **40C0 Ponto-Sarmatic Deciduous Shrubs**. Mention deserves the fact that both are better rep-

resented here than at Kabiyushka Mogila hill, which is a classical example of a steppe refuge in Bulgaria (Jordanov 1936).

The hills will be suggested as *Important Plant Areas* too, both for Criterion A (based on the presence of *C. jankae* and *Verbascum tzar-borisii*) and for Criterion **C** (the above-cited habitats).

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