

Synanthropic occurrence of *Taraxacum bessarabicum* in Košice, Eastern Slovakia *

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ABSTRACT: *Taraxacum bessarabicum* is a species with wide area, limited to subhalophyte and halophyte plant communities from France to NW. China and NE. Mongolia. On the territory of Slovakia, its occurrence is concentrated to the southern part, which forms northern extension of its distribution in the Pannonian Basin. A new finding comes from the Košice Basin, where it grows as a synanthropic species. Its variability is briefly analysed and the karyology of the species studied as well. On its new habitat studied it behaves as an epikophyte growing always within the reach of magnesite pollution on antropogenous soils usually without vegetation or with loosen plant cover, which is represented by degradation stages of various synanthropic communities convergating under the influence of decisive factor - magnesite pollution. Its behaviour is compared with that of *Puccinellia distans*, very aggressive species, which belongs to the most expansive species on certain synanthropic habitats and with which *T. bessarabicum* often grows together.

KEYWORDS: *Taraxacum bessarabicum*, *Asteraceae*, synanthropic occurrence, variability, karyology, Eastern Slovakia.

Introduction

Taraxacum bessarabicum (HORNEM.) HAND. - MAZZ. belongs together with *T. anatolicum* VAN SOEST, *T. pachypodium* LINDB. and *T. gaditanum* TALavera to the sect. *Leptocephala* VAN SOEST. (Distribution map of the sect. cf. DOLL, 1982, p. 555, Fig. 3. and JÄGER in MEUSEL et JÄGER 1992). The species of the section are characterized by slender appearance, significant glabrescence, little capitula, yellow flowers, exterior ligules striped red-brown on their outer side and achenes with rostrum and reddish pappus. The taxonomy of the species of the

* paper is dedicated to the memory of RNDr. Peter ČERNAJ, CSc (1953-1993).

section is not solved completely. According to DOLL (op. cit., p. 560) *T. bessarabicum* subsp. *gumusanicum* VAN SOEST, described from NE. Anatolia can be of a hybrid origin, regarding red-brown colouring of achenes. *T. pachypodium* from W. Morocco and SW. Algeria is, according to the same author, close to *T. bessarabicum*, but differs by more divided leaves, lighter pappus and small achenes. The same author does not exclude its hybrid origin either. This species was separated from the area of *T. bessarabicum* in Pleistocene and it could have arisen as a result of hybridization of *T. fulvipile* HARV. in HARV. et SONDER and *T. bessarabicum*.

The section, regarding its specific ecology (halophytes), evolved probably in northern part of Asia Minor, where three of its taxa occur and from where the section members spread as far as W. Europe and NW. Africa. Later change of climate separated parts of the distribution range in NW. Africa (*T. pachypodium*), SW. Spain (*T. gaditanum*) and France (sometimes separated as an independent species *T. salsugineum* LAMOTTE), sometimes probably connected with hybridization, as discussed above. Autogamy, which has developed at *T. bessarabicum* may be connected with the accommodation of plants to expansive spreading in loosen (or uncovered, respectively) halophyte habitats.

General distribution of the species

The species is distributed from France, northwestern and central Bohemia (cf. distribution maps in TOMAN 1976, KUBÁT 1986), greater part of Pannonian Basin in Hungary (here the European distribution of the species is concentrated), reaching Lower Austria (FÜRNRANZ 1960, with map of the distribution), southern Moravia (GRULICH 1987, distrib. map), southern and southwestern Slovakia, SE. Poland (adventive occurrence) over southern and central parts of Ukraine, Romania, Moldavia, Bulgaria (KOTSCHIEV 1984, distrib. map) and Serbia (Voyvodina), Crimea, Asia Minor, southern and southeastern part of European Russia (it reaches Southern Ural), to northwestern, southwestern and northern Iran, northern Ciscaucasia, Transcaucasia, northern and northeastern Afghanistan, the adjacent part of Pakistan, northwesternmost part of India (Karakoram), in Siberia as far as Baycal, and northwards to about 57° of northern latitude, further it is scattered in the territories of former Soviet Central Asia (Turkmenistan, Uzbekistan, Kirghizstan, Tadjikistan, Kazakhstan; ORAZOVA 1975, map of distrib.), northwestern China (Xinjiang province) and northeastern Mongolia (as far as about 108° E. longitude). The occurrence in South Africa (since 1820) is secondary. [The distribution in this paragraph was set on the basis of following works: FÜRNRANZ 1960, GAJIĆ 1975, GEYDEMAN 1986, GRUBOV 1982, HUGHES et RICHARDS 1989, KIRSCHNER et ŠTĚPÁNEK 1983, KOTOV 1965, 1987, KOTSCHIEV 1984, MEUSEL et JÄGER 1992, NYARADY 1965, ORAZOVA 1975, PESHKOVA 1979, RICHARDS et SELL 1976, SHISHKIN 1964, SHUROVA 1989, SOÓ 1970, TACIK 1980, TAKHTADZAN, FEDOROV et al. 1972 and TZVELEV 1989].

Occurrence of the species in Slovakia

The distribution of the species in Slovakia is bound to the Podunajská nížina lowlands (the distribution is summarized in the work of KRIST{1940, map no. 8}), it is given altogether from 32 localities that are spread in the belt NW. of Nové Zámky (the northernmost reach Galanta), in eastern part of Žitný Ostrov (W. of Komárno) and W. and NW. of Štúrovo, one new locality is given in the work of SVOBODOVÁ (1972) - Poľný Kešov S. of Nitra. DOSTÁL (1989) mentions its occurrence in Záhorská nížina lowlands, but GRULICH (pers. comm.) has not confirmed it recently. The species is absent in halophyte localities of Spišská kotlina basin, too.

In E. Slovakia (cf. Fig. 1) the species occurs (or, in many cases, occurred, to be exact) predominantly on East-Slovakian Lowlands. The following survey has been compiled on the basis of papers of VICHEREK (1964, 1973), DOSTÁL (1989) and supplemented with one record from the paper of MAĽAŠ et MOCHNACKÝ (1983).

1) Košice, 2) Sol, 3) Kuzmice, 4) S. of Novosad, 5) W. of Šamudovce, 6) 2 km E. of Malčice, 7) 1 km NW. of Veľké Raškovce, 8) W. of Malé Raškovce, 9) NW. part of Slavkovce (Slavkov), 9a) NW. of Zemplínske Kopčany (absent on the map, very close to loc.9), 10) S. of Veľký Kamenec, 11) 3 km W. of Strážne, on the beach of a dead branch of Karč, 12) E. of Somotor.

The species is included among the critically endangered species of Slovak flora (category C I) (MAGLOCKÝ 1983).

Phytocoenology and ecology of the species in natural vegetation

According to SOÓ (1980) and JURKO (1990) it belongs among the species tolerant to the soils with high salt content, it is nitrophobic, xero- to mesophile, basoclinal and subtermophile. The nitrophoby given is doubtful, because the species is recorded from village green, often probably with nitrified soils and it is perhaps plastic enough in its relation to nitrogen content.

In Slovakia the species occurs in various halophyte and subhalophyte vegetation of the classes *Festuco - Puccinellietea*, *Isoëto-Nanojuncetea*, *Molinio-Arrhenatheretea*, and *Phragmiti-Magnocaricetea*. The richest occurrence is in *Festuco - Puccinellietea*, of which it is the characteristic species and where it can be found in communities of three orders: *Artemisio-Festucetalia pseudoovinae*, *Festuco-Puccinellietalia* and *Scorzonero-Juncetalia gerardii* in corresponding three alliances *Festucion pseudoovinae*, *Puccinellion limosae* and *Scorzonero-Juncion* and it grows in four associations here: *Statico gmelinii - Artemisietum monogynae*, *Plantagini tenuifoliae - Pholioretum pannonicum*, *Puccinellietum limosae* and *Scorzonero parviflorae - Juncetum gerardii*. In the classes *Phragmiti - Magnocaricetea* and *Isoëto - Nanojuncetea* it occurs in both in one

association: *Astero panonici* - *Bolboschoenetum compacti*, or *Cyperetum pannonici*, resp. In *Molinio* - *Arrhenatheretea* (*Agrostietalia stoloniferae*, *Loto* - *Trifolium*) it is present in three associations: *Loto* - *Potentilletum anserinae*, *Agrostio* - *Caricetum distantis* and *Trifolio* - *Caricetum divisae*.

In Hungary it is given from the same communities. In addition, it occurs in *Thero* - *Suedetalia*, *Nanocyperetalia*, *Molinietalia*, *Beckmannion eruciformis* and *Puccinellion peisonis*.

In Eastern Slovakia, its occurrence is limited to East-Slovakian Lowlands and four associations: *Puccinellietum limosae*, *Plantagini tenuifoliae* - *Pholioretum pannonici*, *Statico gmelinii* - *Artemisietum monogynae* and *Agrostio* - *Caricetum distantis* (*Festuco* - *Puccinellietalia* and *Molinio* - *Arrhenatheretea*). The occurrence of the species in smaller number of associations in E. Slovakia is connected with geographical position of East-Slovakian Lowlands, which represents the northernmost extremity of Great Hungarian Lowlands (Alföld), therefore the halophyte vegetation is, when compared with Hungarian (but also with west-Slovakian) rather impoverished and even this impoverished fragment of halophyte vegetation was mostly destroyed by large and ill-judged meliorations. The survey is according to Soó (1970, 1973), VICHÉREK (1973), nomenclature according to BALÁTOVÁ-TULÁČKOVÁ (1986), MUCINA (1986 B), MUCINA et MAGLOCKÝ (1986a,b), Soó (1964) and ŠPANIČOVÁ et al. (1986).

Synanthropic distribution of the species in Košice

Exclusively synanthropic occurrence of the species is not recorded in literature. TOMAN (1976), ŠTĚPÁNEK et KUBÁT (1990), GRULICH (1987) give it, in some cases, directly from villages, or railway stations, respectively. KUBÁT (1987, p. 14) points out that *Taraxacum bessarabicum* can survive in NW. Bohemia only on trampled and grazed areas in villages, and thus he confirms certain apofytization of the species. It is, however, the occurrence very close to natural localities of the species. The same case can be found in KOSTYLEV (1992), who gives the species from two ruderal associations: *Achilleo millefoliae* - *Grindelietum squarrosae* (invalidly published name) and *Hordetum murini* LIBBERT 1932 (syn. *Bromo* - *Hordeetum murini* (Allorge) Lohm. 1950). The occurrence is probably accidental, even if synanthropic here.

The presence in Košice is characteristic by the absence of the species in natural communities of the Košice Basin and thus by exclusively anthropic, abundant occurrence.

The species was collected for the first time by the first author in 1987. Neither KRIPPELOVÁ (1974, 1981), nor HAJDÚK (e.g. 1961) nor HOLUB (1956) give it from the territory, probably it was omitted and mistaken for *Taraxacum "officinale"* (*Taraxacum* sect. *Ruderalia*). Because the species is widespread in Košice at the present time, it can be supposed to grow here for quite a long period. The occurrence of the species in Košice is represented on the Fig. 2. The

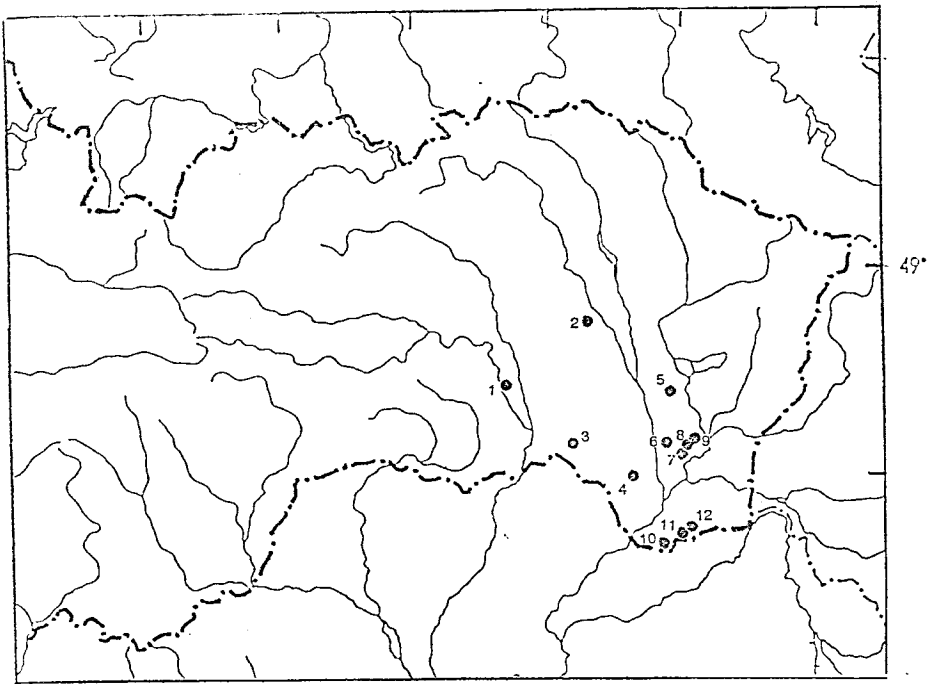


Fig. 1. Distribution of *Taraxacum bessarabicum* (HORNEM.) HAND. - MAZZ. in Eastern Slovakia.

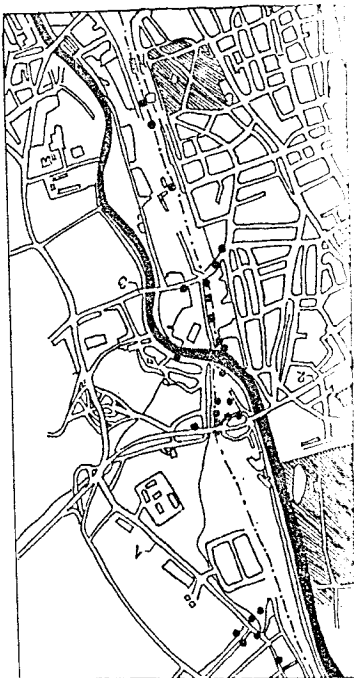


Fig. 2. Synanthropic distribution of *Taraxacum bessarabicum* (HORNEM.) HAND. - MAZZ. in Košice (1. Magnezitárska Street; 2. Hlinkova Street; 3. Rampová Street).

map shows that the occurrence of the species is concentrated to the belt between the post-office building (northwards from the main railway station in Košice) and Ťahanovce village (now part of Košice on its northeastern border), with the local centres of the occurrence between railway crossing about 1 km northwards from the main railway station and the Duklianských hrdinov (Hlinkova) street and between magnesite plant in Ťahanovce and Ťahanovce village. The occurrence of the species in this belt is connected partly with the influence of prevailing northern winds bringing magnesite pollution from magnesite plant situated in northern direction, partly with the presence of greater number of suitable habitats near railway track and on river embankments of Hornád. The research of the species distribution has not been detailed, so the occurrence can be supposed probably between Hlinkova street and magnesite plant, too.

The list of localities:

On account of better arrangement the occurrence of the species was divided in four parts:

1) between the post-office north of the main railway station in Košice and the crossing of Košíková (Alwinczyho) - Rampová streets: Košice, the post-office, near the railway line, 17. 9. 1989 (KO) (all leg. V. Mikoláš); along the railway track, about 100 m north of the above locality, ditto.

2) between the crossing Košíková (Alwinczyho) - Rampová streets and the river Hornád (railway crossing): near railway line behind railway crossing, by the right side of Hornád, plentiful, 3. 10. 1987 (KO); crossing Rampová - Košíková streets and above it, sandy gravel, 23. 10. 1988 (KO), 17. 9. 1989 (obs.), 10. 9. 1992 (KO); between Hornád and the previous locality, 17. 9. 1989 (obs.), 10. 9. 92 (obs.); the right side of the river Hornád, gravel embankment near railway crossing (Medzi mostami street), 17. 9. 1989, (KO), 20. 10. 1990 (obs.); Košíková Street, near the crossing, 10-15 blooming plants, 17. 9. 1989 (obs.); Košíkova Street, in front of the gate to the "Drobný tovar" enterprise stock, 17. 9. 1989 (KO), 20. 10. 1990 (obs.); Rampová street, near coal stock, 4 blooming plants, 17. 9. 1989 (obs.).

3) behind the railway crossing of the river Hornád (left side) to Hlinkova ulica street: left side of Hornád (Northern Embankment), outer bank of Hornád, 17. 9. 1989 (obs.); mouth of the spring Moňok to Hornád (Northern Embankment), 20. 10. 1990 (obs.); near the railway line of northern railway bridge over Hornád, 20. 10. 1990 (obs.); near the road to Prešov - opposite Magnesite Plant, 4 plants, 20. 10. 1990 (obs.), under the road bridge close to previous locality, ditto, (KO); near the brooklet under the road crossing (in the direction of Prešov) near the railway line, 20. 10. 1990 (obs.), not far from previous locality by the railway line, 1 plant, ditto; by the town bus stop behind railway viaduct (opposite previous locality in the direction of Prešov), 26. 10. 1991 (KO); in front of Poľnostav (southwards from Hlinkova street, between Hornád and railway crossing), 20. 10. 1990 (obs.); near petrol station (Hlinkova street, between Hornád and railway viaduct) - up to road viaduct over railway, 17. 9. 1989 (obs.), 20. 10. 1990 (obs.), 26. 10. 1991.

4) Ťahanovce area - village and in the surroundings of Magnesite Plant: in front of the Magnesite Plant gate, 17. 9. 1992 (obs.); along the road to Ťahanovce village, north of previous locality, ditto; railway crossing north of previous locality, plentifully on both sides of road, ditto, (KO); along the railway track to Magnesite Plant northwards, 14. 10. 1989 (KO), 17. 9. 1992, plentifully (obs.); between south border of Ťahanovce and railway track to Magnesite Plant, 14.

10. 1989 (obs.); Ľahanovce, SSE. part of the village, Pri Hrušove street, ruderalised lawns, 21. 9. 1989 (KO); dry brooklet near Pri Hrušove street in Ľahanovce, 14. 10. 1989, 30. 9. 1990 (KO); Ľahanovce, Zberné suroviny salvage, Magnezitárska street, 14. 10. 1989 (obs.); in the village along the street Magnezitárska, 21. 9. 1989 (obs.); Ľahanovce, Magnezitárska street near the crossing with the street Pri Hrušove, plentifully, 17. 9. 1992 (KO); Ľahanovce, 36, Želiarska Street, 13. 10. 1992 (KO), dtto along all the street.

Variability of the species

Literature data

The literature mentioned was used as the source of the data on distribution also to excerpt and summarize the data on variability of the species. They show significant variability of the species, especially as far as the fruit size and spinule density, transition of fruit body to the cone and the transition size, rostrum and the pappus colouring are concerned. In some cases it cannot be excluded that variability given in literature includes also other species.

Leaves: from almost entire to acutely dentate.

Inner bracts: more or less black-green, with narrow white margin, or, with wider margin as well; longitudinally linear, twice longer than outer bracts.

Outer bracts: narrower, lanceolate to linear-lanceolate; semi-patent to patent, with broad white margin; reddish coloured.

Exterior ligules: orange coloured.

Fruit colour: (light)grey-brown, brown - light grey, light grey, grey, grey - bronze.

Pappus colour: brownish to rosy, brownish-reddish-whitish, with reddish tinge, beige, grey-white, brownish, greyish tinge.

Fruit length (including pyramid): (4)5 - 5.5 mm

The transition of the body to cone: gradual; abrupt.

Cone length: (0 - 0.5) 0.8 - 1.1 - 1.4 - (1.6) mm

Rostrum length: (2) - 3 - 4 - 5.5 (6) mm

Pappus length: 4.5 - 5.5 mm

Fruit spinulosity: minute and acute below the cone; quite long, acute in the upper part of fruit; with scanty spinules in the upper part of fruit; finely spinulose in the upper part; with scanty, minute, thin and acute spinules in upper part; scantily spinulose to smooth fruits.

Our observation of plants from Košice

Leaves: from almost entire to abundantly dentate (cf. Fig. 3).

Inner bracts: black to black-green with marked narrow to wide white margin (up to 0.35 mm), 1.0 - 1.3 - 1.5 - 1.8 - (2.3) mm wide (Fig. 4c).

Outer bracts: very narrow, 0.5 - 0.7 - 1.0 - (1.2) mm wide, brown-grey coloured, often purplish, clasped semipatent to patent, with quite wide to wide, white,

sometimes brownish - membranous margin (margin wide up to 0.2 - (0.4 mm). (cf. Fig. 4b).

Exterior ligules: orange.

Scapes: sometimes violet coloured.

Fruit colour: grey-brown (yellowish).

Pappus colour: brownish-yellow coloured to yellow-brown-(red) coloured, usually red tinge is noticeable.

Fruit length (including cone): (3.7) - 4.5 - 4.7 - 5.5 - (6.5) - {7.0} mm.

The transition of body to cone: in some cases marked, in the other cases gradually narrowed.

Cone length: (0.1) - 1.0 - 1.2 - 1.5 - (1.8) - {2.5} mm.

Rostrum length: {1.7} - (2 - 2.5) - 2.8 - 3.2 - (3.5) - {4.2-5} mm.

Pappus length: (5) - 5.3 - 5.5 - 6 mm.

Fruit spinulosity: long and densely spinulose (spinules long up to 0.4 mm) to almost smooth.

The most of the characters observed and measured are in accordance with literature data. More significant differences were found in the rostrum length - shorter (2.8 - 3.2 mm) than in literature (3 - 5.5 mm) and in the pappus length - slightly longer (5.3 - 6 mm) in the populations from Košice city in comparison with literature data (4.5 - 5.5 mm).

Karyology of the species

Material and methods

For the analysis of both chromosome number and karyotype, seed samples from the specimens from three localities (under the road bridge on the road to Prešov, opposite to Magnesite Plant, Košice, 20. 10. 1990; Pri Hrušove street in Ťahanovce, 30. 9. 1990; Želiarska Str. 36, Ťahanovce, 13. 10. 1992; all leg. V. Mikoláš) were used. The specimens are deposited in KO. Meristems were obtained from root tips. As a pretreatment agent 0.05% colchicine was employed for 1.5 h, material was fixed in acetic ethanol (1:3) and acetic-orcein squashes were made. The slides were framed with Noyer's rosin - lanolin cement (cf. NĚMEC 1962), the best metaphase plates were chosen and photographed at the magnification 3.2 x 100. The photographs were compared with corresponding metaphase plates under the microscope and details were drawn, so that they could be used in further karyotype studies. 11 metaphase plates were chosen for detailed analysis - the chromosome length and arm index (the relation of longer arm to shorter) were employed to identify the chromosomes, to arrange homologous pairs according to the length and to construct a preliminary idiogram. Silver staining of nucleoli according to HOWELL and BLACK (1980) was employed to confirm the satellite number.



Fig. 3. Variability of leaves of *Taraxacum bessarabicum* (HORNEML.) HAND.
- MAZZ. in Košice.

