

SPECIES TO THE LIMIT OF SPECIFIC SPREADING AREA IN ROMANIA: *Zingeria pisidica* (BOISS.) TUTIN

DIHORU Gheorghe, BORUZ Violeta

Abstract. *Zingeria pisidica*, of an uncertain origin in the Romanian flora, is considered to be an allochthonous plant, according to the occupied habitats and the increase of its spreading area in our flora, both in altitude and northward, in the last decades. From the eco-coenological point of view, it is a helophilic plant, sometimes found in undersalty micro-depressions, but which becomes dominant in habitats strongly influenced by human activity. It is present in different coenoses where the water factor is more or less in excess; therefore, the authors consider it to belong to *Potentillion anserinae*. The numerous and outstanding cohabitants are extracted from the phytocoenological tables in the specialty literature.

Keywords: *Zingeria pisidica*, chorology, eco-coenology, area, Romania.

Rezumat. Specii la limita de areal pe teritoriul României: *Zingeria pisidica* (BOISS.) TUTIN. *Z. pisidica*, de origine incertă în flora României, este apreciată a fi o specie alohtonă, după habitatele ocupate și după extinderea ariei de răspândire spre nord și altitudinal în flora noastră, în ultimele decenii. Ecocenologic este o specie helofilă de microdepresiuni, uneori subsărăturate, dar devine dominantă în habitate influențate puternic de activitatea umană. Este prezentă în diferite cenoze în care factorul hidric este ± în exces, de aceea autorii consideră că aparține de *Potentillion anserinae*. Coabitantele, numeroase și deosebite, sunt extrase din tabelele fitocenologice publicate în literatura de specialitate.

Cuvinte cheie: *Z. pisidica*, corologie, ecocenologie, areal, România.

INTRODUCTION

Zingeria pisidica (BOISS.) TUTIN (Poaceae) is a special plant in the flora of Romania, so this is maybe the reason why, at its characterization, there has been invoked more than once the term *endemit* and it has already been the object of detailed research (SORAN, 1951). The existence of this plant in the flora of the country reminds us of *Nitraria schoberi* L., as it occurs as an isolated island, only in Romania, at great distance westward from its original area, placed in Anatolia and the Caucasus. Until recently, it could be considered a *vulnerable plant* because it was present in a relatively small area in the southwestern part of the country, on the wet pasture land, including the Danube river meadow, so where human activity is intense. On the other hand, the plant has been recently reported in Moldova (RĂVĂRUȚ et al., 1960; MITITELU & BARABAȘ, 1975), in Dobrogea (ȘERBĂNESCU, 1965) and in Apuseni (RAȚIU, 1964). The fact that it has been recently noticed in the Romanian Flora, in areas more distant as compared to those of 90 years ago, when it was known only in Dâmbovița County (GRECESCU, 1898; PRODAN, 1923), makes us think that it could be an *adventive* plant, which expands its area, as it is the case of the recently discovered *Tragopogon graminifolius* DC. and some others, though it is not included in this category (SÎRBU & OPREA, 2011).

Its closest relative, *Zingeria biebersteiniana* (CLAUS) P. A. SMIRN. develops in Russia, on the lower courses of the Volga and the Don, and uncertain in Crimea (TZVELEV, 1976; RUBȚOV, 1972).

People in Oltenia would call it "short field grass" (PĂUN, 1967a, 1967b). GRECESCU (1898) used for this plant the vernacular name "small grass".

MATERIAL AND METHODS

From the list of species with a limited spreading area in Romania, one of them, *Zingeria pisidica*, raised a lot of questions; we do not know for sure what geographic element it is, what ecological preferences it has or what kind of coenologic alliance it fits in. In the specialty literature, it is indicated the legitimate binomial, but the eco-coenology, which is variable, is to be deduced after reviewing several situations, particularly from synthetic tables where it can be found alongside species ranging from slightly halophilic to swamp ones. The chorology, within counties, comes from the literature (including the phytocoenological tables) and from the major collections in the country. The counties are alphabetically ordered. For the localities transposition on the map, where the presence of the plant was indicated, the network system UTM (Universal Transverse Mercator) was used, with UTM indexes (LEHRER & LEHRER, 1990). The herbariums were abbreviated according to Index herbariorum (THIERS, 2011), the nomenclature follows the CIOCĂRLAN (2009), TUTIN (1980), TUTIN et al., (1964-1976), and other works of taxonomy.

RESULTS AND DISCUSSIONS

Taxonomy

Zingeria pisidica (BOISS.) TUTIN 1978, Bot. J. Linn. Soc. **76**: 365.

Syn.: *Agrostis pisidica* BOISS. 1854, Ann. Sci. Nat. ser 4(2): 255; Tarnavschi 1947, Bul. Grăd. Bot. Cluj, 27: 16; Soran 1951, Stud. Cerc. Biol. Cluj, 2(1-2): 152; Zahar. 1955, in Herb.; - *A. densior* HACK. 1898 ex GRECESCU, Consp. Fl. Rom.: 603; - *A. trichoclada* GRISEB. var. *pisidica* (BOISS.) BOISS. 1884, Fl. Or. 5: 516; - *Milium trichopodium* BOISS. var. *poaeforme* BOISS. 1884, Fl. Or. 5: 511 (BOISSIER, 1884); - *Zingeria pisidica* (BOISS.) TUTIN subsp. *poaeforme* (BOISS.) M. DOĞAN 1982, Notes R. B. G. Edinb. 40: 86 (DOĞAN, 1982); - *Z. densior* (HACK.) CHRTEK 1963, Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag.: 3.

Icon.: Nyárády 1931, Bul. Grăd. Bot. Cluj, 10: 197; Prodan 1939, Fl. Rom., 2: tab. 87; Beldie 1972, Fl. Rep. Soc. Rom., 12: Pl. 31.

Exs.: Fl. Rom. Exs. no. 924, 924b; Fl. Olt. Exs. no. 241.

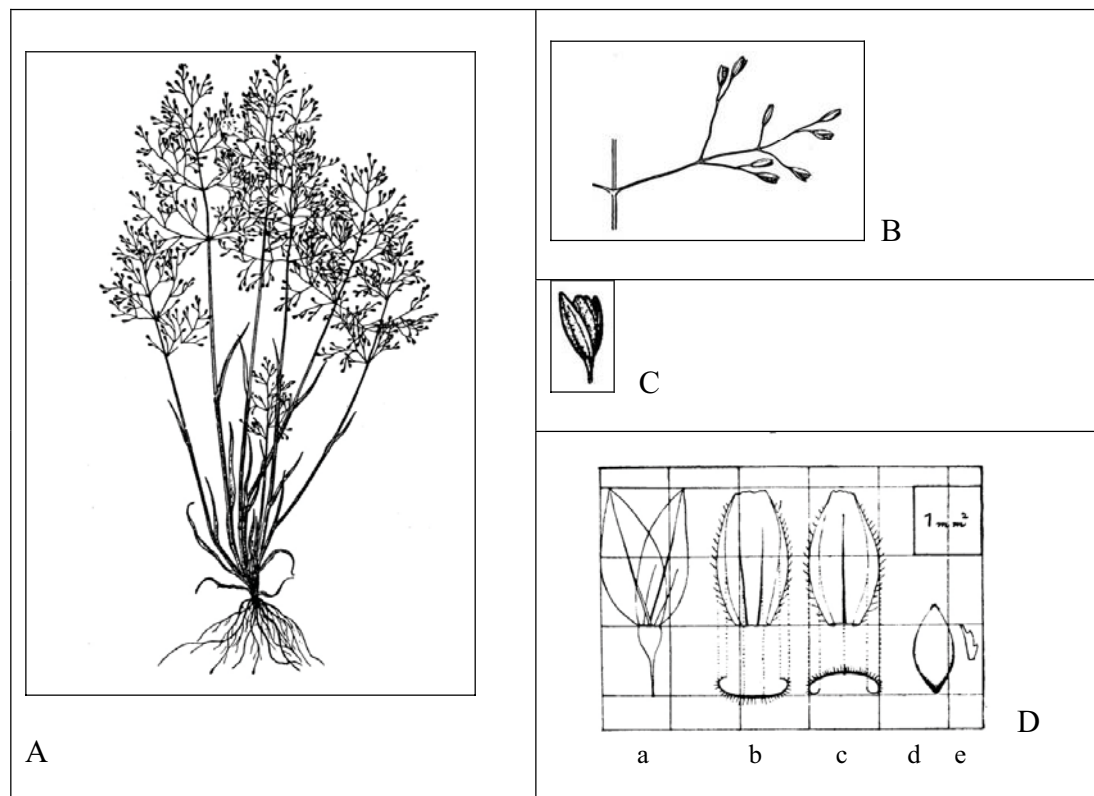


Figure 1. *Z. pisidica*: A - Habit, B - Tricuspid branch of panicle, C - Spikelet (after PRODAN, 1939), D - Spikelet analysis: a - clavate pedicel and glumes, b - palea, c - lemma, d - fruit, e - lodicule (after NYÁRÁDY, 1931).

Although GRECESCU (1898) was surprised to find about the presence of this plant, he correctly framed it for that time, but temporary, to *Agrostis* (*A. divaricatissima*) and appealed to A. Degen (Budapest), who did not decide upon the identity of the plant and sent it in Austria, to E. Hackel, who named it *A. biebersteiniana* CLAUS var. *densior* HACK. GRECESCU was not totally satisfied and considered it an endemic plant of the Romanian Plain, as *A. densior* (HACK.) GRECESCU. He was right in doing this because *A. biebersteiniana* has convolute leaves (not flat), the branches of the panicle are under an acute angle (not horizontal), spikelets are under 1.5 mm (not 1.8 mm) and it displays only hairy dorsally lemma (not hairy lemma and palea).

For a long time, the plant was classified under the genus *Agrostis*, according to uniflorous spikelets and the appearance of the panicle, although some characteristics differentiate it from the other species of the genus. First of all, it is an *annual* plant, with all the fertile shoots at flowering (the others are perennial), the glumes are *acute* (not acuminate), the palea is *subequal* with the lemma (not obvious shorter or more rudimentary), it has short *hairy* mature lemma and becomes *stiff and bright* as it is in *Milium*, separated by the quality of being hairy (not glabrous, herbaceous and dull), the branches of the panicle are *smooth* and regularly *trifurcate*, obviously *clavate* to the end (not \pm scabrous, irregularly divided and weak clavate) (Fig. 1). For these reasons, it was recently transferred to *Zingeria* (CHRTEK, 1963) with the specific epithet known in the Romanian literature and then unified with the one in Western Asia (TUTIN, 1978). However we should point out that TARNAVSCHI (1947) was the first Romanian botanist who assigned the material from Romania to that of Asia and the Caucasus, then SORAN (1951) and ZAHARIADI (1955, in herbarium, with some uncertainty).

Area

The first one who dealt with the presence of the species *Z. pisidica* in the Romanian flora was, as I said, GRECESCU (1898), if we refer to its identity, not to its origin, so maybe that is why PRODAN (1923) and later BUIA (1959) consider it *endemit*, SĂVULESCU (1933), *very rare endemit*, and BORZA (1947), *local sub-Charpatian endemit* in

Muntenia, since they did not connected it to its basic area. NYÁRÁDY (1931) argues the same thing, that “our plant is one of the most interesting and important *endemisms*”. At that time, it was indeed very rare. Other authors (SORAN, 1951) believe that it is an error to characterize this plant as an endemit.

We should emphasize that the plant lacks from the flora of the neighbouring countries. The fact that an annual plant was initially identified in the ditches, then in the cereal crops, so, in \pm anthropogenic habitats, that it appears only in Muntenia and then in Oltenia and that its basic area is in the Western Asia, convinces us to suspect it as being an **adventive** plant. The geographical type indicated in Turkish Flora (DOĞAN & MILL 1985) is Irano-Turanian. If the plant had been for a long time in our country, it could have spread, but it has spread only in the last 80-90 years. It might have been brought by the Turkish or by the birds, no one knows. We do not have solid evidences that the plant is adventitious, but an autochthonous plant does not spread so fast. This species is present in anthropogenic habitats, even if at first it was discovered in ditches. We are not sure about its mentioning in Moldova (RĂVĂRUȚ et al., 1960), if we do not have material for the herbarium, but it has been noticed again after 15 years (MITITELU & BARABAȘ, 1975), it is the same thing with the reference from Dobrogea (ȘERBĂNESCU, 1965) and especially from Stâna de Vale (RAȚIU, 1964). Nevertheless, we consider them to be valid information, as they come out in favour of the idea of being an adventive plant, which is gradually expanding nowadays in front of us in various eco-coenological conditions, which is not too notable to endemic species.

The habitat characterization of the species in Romanian literature is varied: **Pontic-Mediterranean, Therophyte, Beckmannion, Agrostion** (POPESCU & SANDA, 1998), **Romania, Anatolia, Caucasus, Therophyte** (CIOCĂRLAN, 2009), **Romania** (ALEXIU, 2011), **Dacian-Anatolia** (POPESCU et al., 2001). Therefore we launch the idea that *Z. pisidica* could be **adventive** in the flora of Romania, taking into account the reasons indicated in the previous paragraph.

Ecology

“In damp places that retain rain water, ditches, pits, near earth roads” (GRECESCU, 1898) or “Ditches which hold rain water” (PRODAN, 1923). It has been more recently noticed in the “micro-depressions in rye fields and on the road between parcels” (POPESCU, 1981), then in the marshy meadow of the Prut River (MITITELU & BARABAȘ, 1975). It is hardly found in the mountain lawns, 1100-1600 m altitude (RAȚIU, 1964, 1973). Therefore, we should conclude that it is a species that can be found in marshy places within meadows, on depression podzols, so a Helophilic Therophyte in expansion; being an annual plant, it develops predominantly in \pm anthropogenic habitats or with weak competition. Many samples in the herbarium are collected in the month of May, so one can draw the conclusion that the plant is vernal and does not seem to be a thermophilic one, as we assumed according to the old chorology in the southwestern part of Romania. For its extension, Transylvania seems to be the only place left, corresponding to its water requirements, but with slightly lower temperatures, taking into account its sub-thermophilic characteristic.

Coenology

First of all, we have to record the opinion of PRODAN (1939), “a particularity of the Danubian Plain can be considered the *Agrostis densior* gramineae, which has been found, so far, in the ditches that retain rainwater and in damp places: between Ionești, Morteni and Vultureanca (Dâmbovița County) and at Tâmburești in Dolj County”. He includes this plant within the steppe class.

From many other studies (SANDA et al., 2001; DOLTU et al., 1984; ȘERBĂNESCU, 1965, 1971, and others), we could extract numerous cohabitant species and some associations *Z. pisidica* is part of. This is an annual species, with habitats of excessive humidity, where it becomes dominant, being also present in various meadows of **Agrostion** (*Alopecuretum pratensis*, *Poetum sylvicolae*, *Agrostetum stoloniferae*) as well as in the light salty one of **Beckmannion** (*Beckmannietum eruciformis*, *Trifolietum angulati*) and more rarely in the acute salty ones of **Scorzonero-Juncion gerardi** (*Caricetum divisae*) and in the mountain meadows (**Cynosurion**) as a random plant.

Z. pisidica, in the association of *Beckmannia eruciformis*, cohabits with:

Agrostis stolonifera, *Aster tripolium*, *Carex melanostachya*, *Juncus gerardi*, *Lepidium latifolium*, *Puccinellia distans*, *Ranunculus sardous*, *Trifolium fragiferum* (POPESCU, 2003), although we do not consider it a typical halophilic plant, tolerant at the most. According to this author, one concludes that *Zingeria pisidica* would grow at Frasinu and Spătaru (Buzău County), which is not true, because no botanist who studied these forests has ever recorded that species (Dihoru, mns. 2012).

In the associations of *Poa sylvicola*, *Agrostis stolonifera*, *Alopecurus pratensis* and *Pholiurus pannonicus* (BUIA, 1959; BUIA et al., 1960; PUȘCARU-SOROCEANU et al., 1963) it cohabits with: *Agrostis stolonifera*, *Allium vineale*, *Alopecurus pratensis*, *Bromus commutatus*, *Carex spicata*, *C. distans*, *C. divisa*, *C. hirta*, *C. melanostachya*, *C. ovalis*, *C. vulpina*, *Centaurea calcitrapa*, *Cynodon dactylon*, *Daucus carota*, *Eleocharis palustris*, *Festuca arundinacea*, *F. pratensis*, *Holosteum umbellatum*, *Hordeum bulbosum*, *H. geniculatum*, *Lepidium ruderales*, *Lolium perenne*, *Lotus corniculatus*, *Matricaria recutita*, *Medicago arabica*, *M. hispida*, *M. lupulina*, *M. rigidula*, *Melilotus officinalis*, *Mentha pulegium*, *Myosurus minimus*, *Oenanthe banatica*, *Pholiurus pannonicus*, *Plantago lanceolata*, *P. major*, *P. media*, *Poa bulbosa*, *P. pratensis*, *P. sylvicola*, *Potentilla reptans*, *Ranunculus bulbosus*, *R. repens*, *R. sardous*, *R. sceleratus*, *Rorippa austriaca*, *R. sylvestris* subsp. *kernerii*, *Rumex crispus*, *Salvia nemorosa*, *Taraxacum officinale*, *Trifolium angulatum*, *T. campestre*, *T. fragiferum*, *T. hybridum*, *T. incarnatum* subsp. *molinarii*, *T. michelianum*, *T. montanum*, *T. pallidum*, *T. retusum*, *T. pratense*, *T. repens*, *T. resupinatum*, *T. squamosum*, *T. striatum*, *Ventenata dubia*.

Also present in the meadows of Oltenia, *Zingieria pisidica* is recorded as appearing in the company of the following species, without knowing whether they cohabit: *Agrostis capillaris*, *Alopecurus pratensis*, *Artemisia santonicum*, *Cyperus longus*, *C. serotinus*, *Goniolimon besserianum*, *Dasypyrum villosum*, *Crypsis alopecuroides*, *Hordeum geniculatum*, *Medicago arabica*, *M. hispida*, *Orchis elegans*, *O. militaris*, *Scorzonera laciniata*, *Polygala comosa*, *Trifolium dubium*, *T. incarnatum* subsp. *molinerii*, *T. ochroleucon*, *T. ornithopodioides*, *T. resupinatum*, *Ventenata dubia* (BUIA et al., 1961).

One can read about the detailed and actual coenotic relationships of the species *Zingieria pisidica* in the vast synthetic tables published by ȘERBĂNESCU (1965), from which we learn that it participates in the associations of *Beckmannia eruciformis*, *Pholiurus pannonicus*, *Trifolium angulatum* and *Carex divisa*, that is in light salty communities, with excessive humidity. We could have the following synthesis of the relationships of the species with the main cohabitants in these salty associations: *Agrostis stolonifera*, *Alopecurus pratensis*, *Artemisia santonicum*, *Eleocharis palustris*, *Hordeum marinum*, *Mentha pulegium*, *Poa sylvicola*, *Ranunculus repens*, *Rorippa sylvestris*, *Trifolium angulatum*, *T. fragiferum*, *Zingieria pisidica* and **more rarely**, with *Beckmannia eruciformis*, *Bromus commutatus*, *Carex divisa*, *C. melanostachya*, *Lolium perenne*, *Matricaria recutita*, *Myosurus minimus*, *Oenanthe fistulosa*, *Pholiurus pannonicus*, *Plantago lanceolata*, *P. major*, *P. tenuiflora*, *Poa bulbosa*, *P. pratensis*, *Potentilla reptans*, *Puccinellia distans*, *Ranunculus repens*.

If we confine to *Zingierietum pisidicae*, described according to the dominance of the species, at Tâmburești, Filiași, Desa, Nebuna (BUIA et al., 1960), Breasta (BUIA et al., 1960; CÎRȚU, 1971) and Calopăr, Radovan, Podari, Radovan - Podari (CÎRȚU, 1971) the cohabitants are also helophilic plants: *Alopecurus aequalis*, *Alisma gramineum*, *Lolium perenne*, *Lotus corniculatus*, *Lythrum hyssopifolia*, *Mentha pulegium*, *Pholiurus pannonicus*, *Plantago lanceolata*, *Poa sylvicola*, *P. pratensis*, *Ranunculus lateriflorus*, *Rorippa austriaca*, *R. sylvestris* subsp. *kernerii*, *Trifolium fragiferum*.

From the coenotic point of view, the species would belong, according to some authors, to Al. *Beckmannion*, to others to **Agrostion**, but as an annual species, growing on lands with temporarily excessive humidity; according to the presence of some non-halophilic cohabitants, one could frame it within **Nanocyperion** (possibly equivalent of *Myosuretum minimi* or of *Pholiuro-Plantaginetum tenuiflorae*). However, the cohabitants *Agrostis stolonifera*, *Carex hirta*, *Juncus tenuis*, *Plantago major*, *Poa annua*, *Potentilla reptans*, *Ranunculus repens*, *R. sardous*, *Rorippa sylvestris* subsp. *kernerii*, *Rumex crispus*, *Trifolium resupinatum*, *T. fragiferum* lead us to **Agropyro-Rumicion**, thus belonging to associations of perennial, hygrophilic plants, within light salty lands (*Beckmannion*) or not (*Agrostion*). The transfer made by POPESCU (1974, 1981) might seem successful but this alliance is no longer used, so in our view, this could have the following framing: **Potentillion anserinae** Tx. 1937 (*Potentillo-Polygonetalia* Tx. 1947, *Molinio-Arrhenatheretea* Tx. 1937). The closest view to ours belongs to CÂRȚU (1979) who includes *Zingierietum pisidicae* in *Molinio-Arrhenatheretea*, *Molinietalia*, *Agrostidion albae* and mentions the species in helophilic associations (*Poetum sylvicolae*, *Alopecuretum pratensis* and *Agrostetum caninae*) where there is a high frequency of the species: *Agrostis canina*, *A. stolonifera*, *Alopecurus aequalis*, *A. pratensis*, *Festuca pratensis*, *Galium palustre*, *Lotus corniculatus*, *Phleum pratense*, *Poa sylvicola*, *Ranunculus repens*, *Trifolium incarnatum*, *T. repens* (CÂRȚU, 1979).

A special situation is given by the Prut Meadow (MITITELU & BARABAȘ, 1975). The main co-dominants, *Alisma plantago-aquatica*, *Epilobium parviflorum*, *Galium palustre*, *Glyceria notata*, *Lycopus europaeus*, *Lythrum salicaria*, *Myosotis scorpioides*, *Berula erecta*, *Veronica anagallis-aquatica*, *V. beccabunga*, suggest other coenologic framing: **Sparganio-Glycerion fluitantis** BR.-BL. & SISS. 1942 (*Nasturtio-Glycerietalia* PIGN. 1953, *Phragmiti-Magnocaricetea* KLIKA 1941).

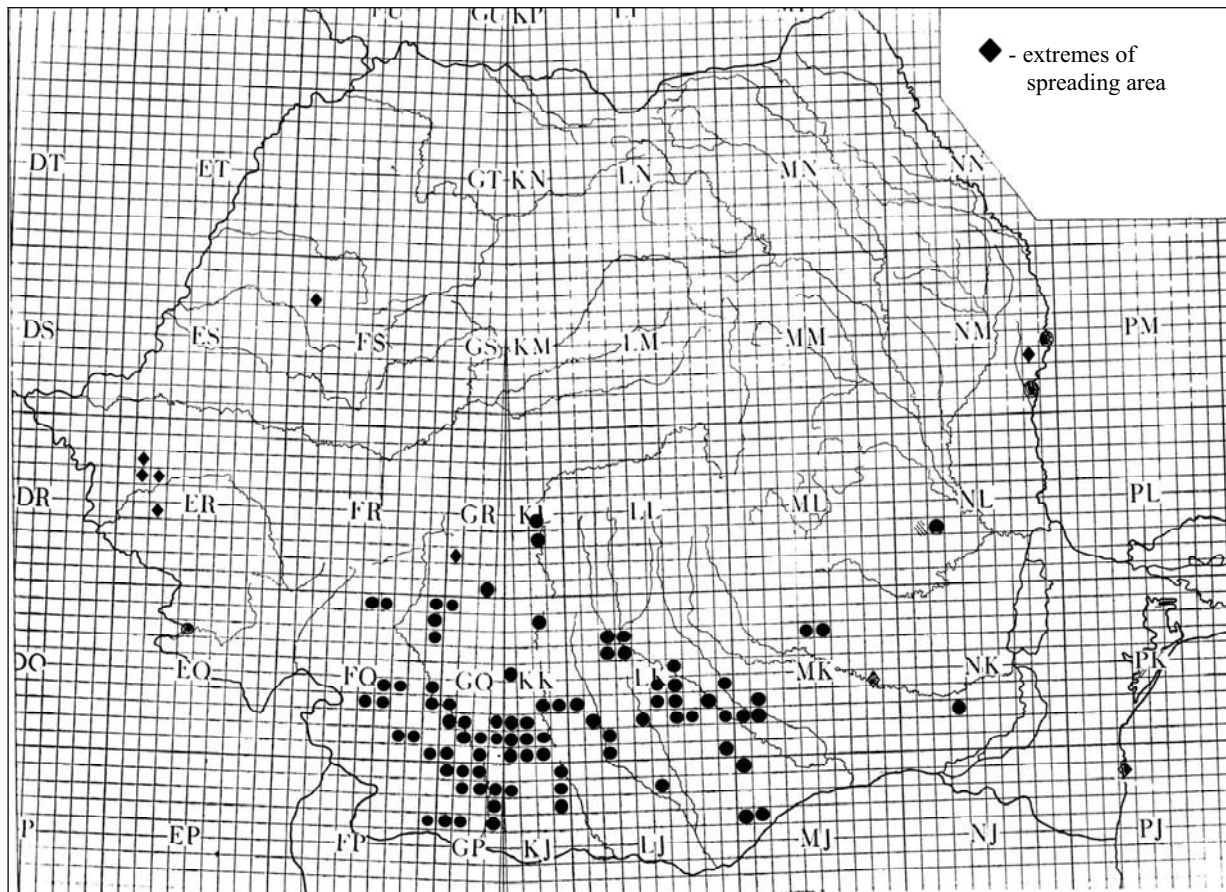
The most bizarre chorological and coenological state is to be found in *Festuco rubrae - Agrostetum capillaris* HORV. 1951 from Stâna de Vale, where it cohabits with *Festuca rubra*, *Deschampsia cespitosa*, *Alchemilla glaucescens*, *Potentilla erecta*, *Campanula abietina*, *Nardus stricta*, *Arnica montana*, *Achillea distans*, *Vaccinium myrtillus*, *Cynosurus cristatus* (RAȚIU, 1964), so **Cynosurion** Tx. 1947 (*Arrhenatherethalia* PAWL. 1928, *Molinio-Arrhenatheretea* Tx. 1937). This point is reinforced by the herbarium material collected in Parâng Mountains, at 1600 m alt. (Leg. M. Păun 1956) [CRAI].

The name was updated in *Zingierietum pisidicae* BUIA et al., 1959 em. Cîrțu 1971 from the As. *Agrostis densior* BUIA et al., 1959.

Distribution in Romania

The administrative reorganization changed the counties of many places given in the literature.

It was originally identified in Ionești-Morteni-Vultureanca, in Dâmbovița County (GRECESCU, 1898), a place also mentioned by different botanists, as in "Distr. Dâmbovița Rarity" (PRODAN, 1923) or "very rare" (SĂVULESCU, 1933). Much later, it received the same qualifier for Oltenia, "great rarity" (BUIA et al., 1961). In 1929, it was so rare that E. NYÁRÁDY hardly found at Tâmburești enough copies for exsiccata, and SORAN (1951) mentioned it in 4-5 places. Over the years, it has been identified throughout the southern part of the country, from Timiș up to Constanța, including two remote counties, but those choronyms do not appear anywhere, not even in the so-called Addenda (NEGREAN, 2011). *Z. pisidica* is now known in the flora of Romania in 115 places, transposed on the map (Fig. 2):

Figure 2. Distribution of *Z. pisidica* in Romania (original).

Argeș County: Mărgineni “At Canton” (M. Toma, June 10, 1966) [IAGB 2418]; Bucovu (BELDIE, 1972; ALEXIU, 2011); Dâmbovcicului Meadow at Negrași (NEGREAN, 1968); Albota in the rivulet meadow with the same name (June 7, 1955) [I 65197]; Pitești, edge of a swamp (June 11, 1955) [I 65198]; Ștefan cel Mare (Leg. P. Diaconu, Det. D. Parascan) [BVS].

Bihor County: Stâna de Vale (RĂȚIU, 1964, 1973).

Caraș-Severin County: Petrilova (“Petrila”) (SORAN, 1951; BELDIE, 1972).

Constanța County: West Eforie (ȘERBĂNESCU, 1965).

Dâmbovița County: between Ionești, Morteni and Vultureanca (SĂVULESCU, 1933; SORAN, 1951; ALEXIU, 2011); Conțești de Sus, Ionești (BELDIE, 1972); Cacova, pond in the Neajlov Meadow (June 19, 1963), [I 87372-3]; Corbii Mari at Corbii Ciungi (Leg. G. Dihoru, May 24, 1981) [BUCA 138359].

Dolj County: Obedin (BELDIE, 1972; CĂRȚU, 1973); Apele Vii, Bistrețu Nou, Cârcea, Raeți, Toceni (BELDIE, 1972); Mofleni (BUIA, 1959; BELDIE, 1972); Dobrești (BUIA, 1959; BELDIE, 1972); Sadova (BUIA, 1959; BELDIE, 1972; ȘERBĂNESCU, 1965); Preajba (BELDIE, 1972); the pond Craiovița, Breasta in the village Marioara, Coțofenii din Față (BUIA, 1959; BUIA et al., 1960, 1961; BELDIE, 1972); Filiași, Glod (BUIA et al., 1960, 1961); Lascăr Catargiu - Craiova (Leg. M. Răvăruf, May 15, 1958) [IASI 7842]; Craiova (SORAN, 1951); Livezi, Malu Mare (BUIA et al., 1959; BUIA et al., 1960, 1961; BELDIE, 1972); Murta (BUIA et al., 1960, 1961; BELDIE, 1972); Lișteava, Măceșul de Sus, Popânzălești (BUIA et al., 1960, 1961); Popoveni 80 m (Leg. M. Păun, M. Olaru, June 10, 1961, FOE 281) [IASI 7839; IAGB 6645; I 46625; BVS 1195; BUCA 60982, 156328] (BUIA, 1959; BELDIE, 1972); Răcari (BUIA, 1959; BUIA et al., 1960, 1961); Rojiște (BUIA et al., 1960, 1961; ȘERBĂNESCU, 1965); Tâmburești near the Jiu, 40 m (Leg. E. Nyárady, June 2, 1929, FRE 924) [I 46623; IASI 7843; BVS 1180; SIB 129362; BUCA 42990, 67657], (SĂVULESCU, 1933; SORAN, 1951; BUIA, 1959; BUIA et al., 1960; ȘERBĂNESCU, 1965; BELDIE, 1972; CĂRȚU, 1973); Tâmburești – Piscul Sadovei, Segarcea on Valea Rea (BUIA et al., 1961); Țântăreni, Vârâți (BUIA et al., 1960, 1961); Căciulești (ȘERBĂNESCU, 1965); Calopăr, Radovan, Radovan - Podari, Breasta (CÎRȚU, 1971); Podari (BUIA, 1959; BUIA et al., 1960, 1961; CÎRȚU, 1971; BELDIE, 1972); Bojoiu, Robănești and Drăgotesti in the meadow of the Teslui (PĂUN, 1967a); the area between the Jiu-the Desnățui-Craiova and the Danube (CĂRȚU, 1979); Ciutura (Leg. M. Păun 1957) [CRAI]; Țuglui (Leg. A. Buia, V. Năzdrăvan 1955) [CRAI]; Almăj (Leg. A. Buia, M. Păun 1956) [CRAI]; Pielești (Leg. I. Crețu 1969) [I 21095]; Sălcuța, Panaghia, Valea Rea (CĂRȚU, 1973); Bratovoiești (G. Dihoru!).

Gorj County: Săcelu, Gornovița, Arcanu (BELDIE, 1972); the Gilort Basin (ZAHARIA, 1972); Bengești-Ciocadia (G. Popescu, ined); Parâng Mountains (Peaks Cioara, Bălescu, Mușetoiu, 1600 m) (Leg. M. Păun 1956)

[CRAI]; Câmpul Mare close to Cărbunești (Leg. M. Păun, C. Maloș 1962) [CRAI]; the Sadu Valley, 600 m alt. (Leg. M. Păun & al. 1963) [CRAI].

Ialomița County: T. Vladimirescu, saucer in the Forest Stejeret (Leg. G. Babaca, May 22, 1963) [I 67143].

Ilfov County: Bălănoaia, Milcovățul, Stănești, Trestieni (BELDIE, 1972); Cartojani, southwest from the forest with the same name (Leg. N. & Ș. Roman, May 16, 1963) [I 39736-38]; Chiajna, in the Dâmbovița meadow (May 20, 1957) [I 65200]; Crevedia (Leg. E. Nyárady, June 1, 1929) [SIB 129361]; the forest Malu Spart (Leg. G. Negrean, July 19, 1971) [BUCA 139280].

Mehedinți County: between Ciochiuța (Strehaia) and Tâmba (BUA et al., 1961); Gvardinița, depression in a wheat crop (June 29, 1956) [I 65203]; Croica, in the Olt Meadow (Leg. N. & Ș. Roman, May 18, 1956) [I 66771-2 and 66793-95].

Olt County: Baldovinești, Pietrișu in the Geamărtăului Meadow (PĂUN, 1967a, 1967b; BELDIE, 1972); Bobicești in the Olteț meadow (PĂUN, 1967a); Bălți, Fărcașu, Găvănești, Ghimpați, Hotărani, Icoana in the Călugărească Forest, Olari, Romula, Valea Satului, Vlădila (BELDIE, 1972); Pârșcoveni (G. Popescu, ined.; BELDIE, 1972); Criva de Jos, in the Olt Meadow (May 16, 1958) [I 65204]; Piatra Olt, in meadows (Leg. V. Soran, May 20, 1958) [I 66777]; Văleni, northeast of Ciuperceanca Forest (Leg. G. Turcu, May 26, 1960) [I 66786-66788-91]; Slatina to Curtișoara (Leg. A. Popescu, V. Sanda, May 29, 1974) [BUCA 126191]; Romula (Reșca) (Leg. M. Păun, M. Pop 1955) [CRAI]; Saru forest (Leg. D. Răduțoiu, D. Dumitriu 2006) [CRAI].

Prahova County: Valea Tolii 3 km southwest of Fulga; Parepa (ȘERBĂNESCU, 1965).

Teleorman County: Rădoiești Station, low salty places near the railway (Leg. C. Zahariadi, June 10, 1955, under *Agrostis pisidica* an *A. densior*?) [BUCA 36437]; Tecuci (BELDIE, 1972; Leg. G. Turcu, May 26, 1960, [I 65201, 66787]).

Timiș County: Liebling, at "Pusta", 94-97 m (Leg. V. Soran, May 1, 1951) [I 46624; IAGB 6644; BVS 1194; SIB 103759; 119462, 122292] (SORAN, 1951; BELDIE, 1972); Timișoara (SORAN, 1951; BELDIE, 1972).

Vaslui County: Berezeni in the Prut Meadow (RĂVĂRUȚ et al., 1960; BELDIE, 1972), Cârja or more exactly Vetrișoia (MITITELU & BARABAȘ, 1975). These authors (MITITELU & BARABAȘ, 1975) indicate four phytocoenosis where *Zingeria pisidica* could grow (Cârja, Vetrișoia, Cristești and Trifești); we focused on the first two, more closely to Berezeni, where it was mentioned for the first time.

Vâlcea County: Slătioara (ȘERBĂNESCU, 1965); Băbeni in Romani Village (POPESCU, 1981); the lake Robești (June 11, 1954) [I 65202].

Vrancea County: - The forest Proca Mare - Ciorăști (ȘERBĂNESCU, 1965).

CONCLUSIONS

Z. pisidica, in the Romanian flora, is considered to be an allochthonous plant. Being an annual plant, it develops predominantly in \pm anthropogenic habitats or with weak competition. It is present in different coenoses where the water factor is more or less in excess; therefore, the authors consider it to belong to *As. Potentillion anserinae* Tx. 1937.

In this paper, there are also presented the chorology information from literature, collections, and personal observations; they are included in a map. *Z. pisidica* is now known in the flora of Romania in 115 places.

ACKNOWLEDGMENT

Thanks to our colleagues who have provided chorology information from different collections: A. Indreica (Herbarium of the Faculty of Forestry in Brașov), C. Drăgulescu ("Lucian Blaga" University of Sibiu), Ghizela Vonica (Botanical curator at Brukenthal National Museum, Sibiu), Irina Blaj (Curator of Herbarium, "Alexandru Ioan Cuza" University Iași), C. Sîrbu (University of Agricultural Sciences and Veterinary Medicine, Iași), A. Oprea ("Anastase Fătu" Botanical Garden, Iași), D. Răduțoiu, who surprised us with samples of herbarium (University of Craiova), Elena Oltu (General Herbarium of the Institute of Biology Bucharest), who also extracted choronyms from literature. We also thank to our colleague M. Pușcaș ("Al. Borza" Botanical Garden, Cluj-Napoca) for obtaining important information sources.

REFERENCES

- ALEXIU V. 2011. *Categorii zoologice din Cormoșflora Județului Argeș*. Edit. Paralela 45. Pitești. 225 pp.
- BELDIE A. 1972. *Agrostis L.* In: T. Săvulescu (Ed.). *Flora Republicii Socialiste România*. Edit. Academiei Republicii Socialiste România. București. 12: 147-164.
- BOISSIER P. E. 1884. *Flora Orientalis*. H. Georg Bibliopolam. 65, Rue de la République. Basel, Geneva. 5: 511-516.
- BORZA A. 1947. *Cospectus florae Romaniae. Regionumque affinium*. Tipogr. Cartea Românească. Cluj. 360 pp.
- BUA A. 1959. *Plante rare pentru flora R.P.R. existente în Oltenia*. Ocrotirea Naturii. Edit. Academiei Române. București. 4: 13-42.
- BUA A., PĂUN M., MALOȘ C. 1960. *Pajiștile naturale din regiunea Craiova și îmbunătățirea lor*. Probleme Agricole (II). Edit. Agro-Silvică. București. 12(12): 31-40.

- BUIA A., PĂUN M., MALOȘ C., OLARU MARIANA. 1961. *Ghid geobotanic pentru Oltenia*. Întreprinderea Poligrafică Craiova. 46 pp.
- BUIA A., PĂUN M., SAFTA I., POP M. 1959. *Contribuții geobotanice asupra pășunilor și fânețelor din Oltenia*. Lucrări Științifice. Institutul Agronomic Tudor Vladimirescu. Întreprinderea Poligrafică Oltenia. Craiova: 93-180.
- CĂRȚU D. 1973. *Vegetația ruderală de locuri bogate în materie organică din intervalul Jiu-Desnățui*. Analele Universității Craiova – Biologie, Științe Agricole, seria III. Edit. Ceres. București. **5**(15): 44-50.
- CĂRȚU D. 1979. *Studiul geobotanic și agroproductiv al pajiștilor naturale dintre Jiu-Desnățui-Craiova și Dunăre, Județul Dolj*. Rezumatul tezei de doctorat. Timișoara. 23 pp.
- CÎRȚU D. 1971. *Aspecte din vegetația ierboasă de luncă și locuri depresionare dintre Craiova - Jiu - Desnățui - Dunăre*. Studii și Cercetări. Subcomisia Monumentele Naturii Oltenia. Craiova: 99-108.
- CHRTEK J. 1963. *Bemerkungen zur Gattung Zingeria P. SMIRN*. Novitates Botanicae et Delectus Seminum Horti Botanici Universitatis Carolinae Pragensis. Prague: 1-3.
- CIOCĂRLAN V. 2009. *Flora ilustrată a României, Pteridophyta et Spermatophyta*. Edit. Ceres. București. 1143 pp.
- DOĞAN M. 1982. *Contributions to the study of Turkish grasses*. I. Notes. Royal Botanic Garden. Edinburgh. **40**: 75-87.
- DOĞAN M. & MILL R. R. 1985. *Zingeria P. SMIRNOV*. In: P. H. Davis (Ed.) *Flora of Turkey and the East Aegean Islands*. Edinburgh University Press. Edinburgh: 363-365.
- DOLTU M., POPESCU A., SANDA V., NEDELICU G. 1984. *Analiza Cormofitelor din Câmpia Munteniei*. Studii și comunicări - Științele Naturii Muzeul Brukenthal. Sibiu: **25**: 49-124.
- GRECESCU D. 1898. *Conspectul Florei României*. Tipogr. Dreptatea. București. 836 pp.
- LEHRER A. Z. & LEHRER MARIA. 1990. *Cartografierea faunei și florei României (coordonate arealografice)*. Edit. Ceres. București. 290 pp. + 5 hărți.
- MITITELU D. & BARABAȘ N. 1975. *Vegetația din Lunca Prutului*. Studii și comunicări. Muzeul Științele Naturii Bacău: 219-285.
- NEGREAN G. 1968. *Contribuții la flora României*. Studii și Cercetări de Biologie - Botanică. Edit. Academiei Române. București. **20**(4): 333-336.
- NEGREAN G. 2011. *Addenda to "Flora Romaniae" volumes 1-12. Newly published plants, nomenclature, taxonomy, chorology and commentaries (Part 1)*. Kanitzia, Szombathely. Hungary. **18**: 89-194.
- NYÁRÁDY E. I. 1931. *Adnotațiuni la Flora României*. V. *Cinci plante noi sau rare*. Buletinul Grădinii Botanice Cluj. Edit. Ardealul. Cluj. **10**(1-4): 197-203.
- PĂUN M. 1967a. *Contribuții la studiul vegetației pajiștilor de luncă din Raionul Balș, Regiunea Oltenia*. Contribuții Botanice. Cluj: 271-280.
- PĂUN M. 1967b. *Vegetația raionului Balș*. Comunicări de Botanică. Societatea de Științe Naturale și Geografie. București. **4**: 121-127.
- POPESCU A. 2003. *R1513-Pajiști vest-pontice de Beckmannia eruciformis și Zingeria pisidica*. In: Doniță N., Popescu A., Paucă-Comănescu Mihaela, Mihăilescu Simona, Biriș I. A. (Eds.). *Habitatele din România*. Edit. Tehnică Silvică. București: 41-42.
- POPESCU A. & SANDA V. 1998. *Conspectul florei Cormofitelor spontane din România*. Acta Botanici Horti Bucurestiensis. Edit. Univ. București. 336 pp.
- POPESCU G. 1974. *Studiul floristic și geobotanic al bazinului hidrografic al Bistriței-Vîlcii*. Rezumatul tezei de doctorat. Univ. București. 24 pp.
- POPESCU G. 1981. *Contribuții la cunoașterea vegetației ierboase din bazinul hidrografic al Bistriței (de Olt)*. Studii și Cercetări de Biologie - Biologie Vegetală. Edit. Academiei R. S. R. București. **33**(2): 123-132.
- POPESCU G., COSTACHE I., RĂDUȚOIU D., GĂMĂNECI G. 2001. *Flora pajiștilor din nordul Olteniei (cap. III). Vegetația pajiștilor (cap. IV)*. In: I. Ionescu (Ed.). *Pajiștile permanente din nordul Olteniei*. Edit. Universitaria. Craiova: 63-215.
- PRODAN I. 1923. *Flora pentru determinarea și descrierea plantelor ce cresc în România*. Edit. „Cartea Românească”, Cluj. **1**. 1152 pp.
- PRODAN I. 1939. *Flora pentru determinarea și descrierea plantelor ce cresc în România*. (Ediția a doua). Tipogr. „Cartea Românească”. Cluj: **1**. 1278 pp.; **2**. 744 pp.
- PUȘCARU-SOROCEANU EVDOCHIA, PUȘCARU D., BUIA A., BURDUJA C., CSÜRÖS ȘT., GRÎNEANU A., NIEDERMAYER K., POPESCU P., RĂVĂRUȚ M., RESMERIȚĂ I., SAMOILĂ Z., VASIU V., VELEA C. 1963. *Pășunile și fânețele din Republica Populară Română. Studiul geobotanic și agroproductiv*. Edit. Academiei Republicii Populare Române. București. 464 pp.
- RAȚIU O. 1964. *Vegetația ierboasă din bazinul Stîna de Vale*. Contribuții Botanice. Întreprinderea Poligrafică. Cluj Napoca: 189-204.
- RAȚIU O. 1973. *Considerații floristico-ecologice asupra unor Pteridofite și Spermatofite noi pentru vegetația bazinului Stîna de Vale*. Contribuții Botanice. Întreprinderea poligrafică. Cluj Napoca: 119-125.
- RĂVĂRUȚ M., MITITELU D., TURENSCHI E. 1960. *Plante noi sau rare pentru flora Moldovei și Bucovinei*. Studii și Cercetări de Biologie și Științe Agricole. Iași. **11**(1): 83-86.
- RUBȚOV I. I. 1972. *Opredelitelj vâșșikh rastenij Krâma*. Izd. “Nauka”. Leningrad. 560 pp.

- SANDA V., POPESCU A., STANCU DANIELA ILEANA 2001. *Structura cenotică și caracterizarea ecologică a fitocenozelor din România*. Edit. Conphis. Râmnicu-Vâlcea. 359 pp.
- SĂVULESCU T. 1933. *Graminaceae. Determinator pentru Gramineele din România* (Litogr.). Edit. Marvan. București. 2: 105-312.
- SÎRBU C. & OPREA A. 2011. *Plante adventive în flora României*. Edit. „Ion Ionescu de la Brad”. Iași. 736 pp.
- SORAN V. 1951. *Notițe despre două plante interesante și rare în Flora R.P.R.* Studii și Cercetări Științifice Filiala Cluj. Edit. Academia Republicii Populare Române. Cluj Napoca. 2(1-2): 152-158.
- ȘERBĂNESCU I. 1965. *Asociațiile halofite din Cîmpia Română*. Studii Tehnice și Economice, Seria C – Pedologie. Institutul Geologic București. 15. 149 pp.
- ȘERBĂNESCU I. 1971. *Privire generală asupra vegetației din Dobrogea și din Cîmpia Română cu rama de dealuri învecinate*. Studii Tehnice și Economice, Seria C- Pedologie. Institutul Geologic București. 19: 87-106.
- TARNAVSCHI I. 1947. *Die Chromosomenzahlen der Anthophyten-Flora von Rumänien mit einem Ausblick auf das Polyploidie Problem*. Buletinul Grădinii Botanice Cluj. Supplementum I. Tipografia Cartea Românească. Cluj Napoca. 27: 1-130.
- THIERS B. 2011. *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. New York. [<http://sweetgum.nybg.org/ih/>]. Accessed: March 10, 2013].
- TUTIN T. G. 1978. *Zingeria P. SMIRNOV*. In: Heywood V. H. (Ed.) *Flora europaea Notulae Systematicae ad Floram Europaeam spectantes*. No. 20. Bot. J. Linn. Soc. 76(4): 297-384.
- TUTIN T. G. 1980. *Zingeria P. SMIRNOV*. In: T. G. Tutin, Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M., Webb D. A., *Flora Europaea*. Cambridge University Press. Cambridge. 5: 246.
- TUTIN T. G., HEYWOOD V. H., BURGES N. A., MOORE D. M., VALENTINE D. H., WALTERS S. M., WEBB D. A. (Eds.) 1964-1976. *Flora Europaea*. Cambridge University Press. Cambridge. 1. 464 pp., maps 5; 2. 455 pp., maps 5; 3. 370 pp., maps 5; 4. 505 pp., maps 5.
- TZVELEV N. N. 1976. *Zlaki SSSR*. Izd. “Nauka”. Leningrad. 788 pp.
- ZAHARIA I. 1972. *Flora și vegetația bazinului Gilort de la limita superioară a pădurii pînă la confluența cu Jiul*. Rezumatul tezei de doctorat. (Litogr.). Universitatea București. 59 pp.

Dihoru Gheorghe

Institute of Biology, Romanian Academy, 296, Splaiul Independenței,
060031, District 6, Bucharest, Romania.
E-mail: ghe_dihoru@yahoo.com

Boruz Violeta

University of Craiova, “Al. Buia” Botanical Garden
26 Constantin Lecca Street, Craiova, Dolj County, Romania.
E-mail: violetaboruz@yahoo.com

Received: March 30, 2013
Accepted: April 17, 2013