

CONTRIBUTIONS TO THE FLORA AND VEGETATION OF THE LAKE BENCE-TÓ, NE HUNGARY

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Lake Bence-tó has been investigated by the authors since its discovery in 1980. Detailed vegetation map of the area has been prepared, with the indication of 11 associations currently existing in the area. Using former data and our own observation, a species list consisting of 130 plants has been prepared, 12 of these are protected. The number of the days, when open water covers the area, has been decreasing from year to year. By 1995 18 species became extinct from the lake, 4 of these were protected. Weeds from arable lands tend to intrude deeper and deeper into the area, while the average nature conservation values of the associations together with the number and the ratio of species requiring permanent water supply is decreasing. A long-term pre-reconstructional research is currently conducted by the authors in the area. This paper presents the results of the first phase of their project.

Key words: peat bog, transect, permanent plots, reconstruction, protected species

INTRODUCTION

Lake Bence-tó is a *ca* 1500 m long and 70 m wide, C-shaped, silted backwater on the Bereg Plain (NE Hungary) in the environs of Tákos, Csaroda and Fejércse villages (Fig. 1). It was first registered in the Hortobágy Natural Park in 1990 on the basis of ISTVÁN D. PETHE's report as a new locality for the occurrence of *Sphagnum* species in the Samicum.

Normally, such backwaters are surrounded by forests or meadows, but for the lake Bence-tó these had been turned into arable fields earlier. Only a small fragment of *Quercus robori*-*Carpinetum hungaricum* forest can be found at the lake's eastern corner. Open water was present only for one month (until the end of May) in 1995.

In the Holocene, alluvial clay and silt layers were deposited onto the Pleistocene river gravel sediment of the Bereg Plain. The bed of the Tisza River gradually shifted from the eastern part of the plain towards southwest leaving a laby-

rinth of oxbow lakes and channels behind. The river occupied its present place in the Neoholocene. This runs roughly along the border of the warm temperate and cold temperate climatic zones. The number of sunny hours is *ca* 1950, annual mean temperature is 9.4–9.5 °C. Yearly precipitation is 630–660 mm, out of that 370–380 mm falls during the vegetation period. The prevailing wind is northerly (MAROSI and SOMOGYI 1990).

Several papers dealt with the flora and vegetation of the Bereg Plain. The forests were studied by HARGITAI (1938, 1943), KOVÁCS (1958), NÉMETH (1980) and SIMON (1957), the grasslands by JUHÁSZ-NAGY (1959, 1960), and the peat bogs by SIMON (1953, 1954, 1960, 1968*a, b*, 1985*a*, 1992*a*), TÓTH and KALAPOS 1993 and VOZÁRY (1957). Data on the vegetation of Kaszonyi-hegy (Kas-

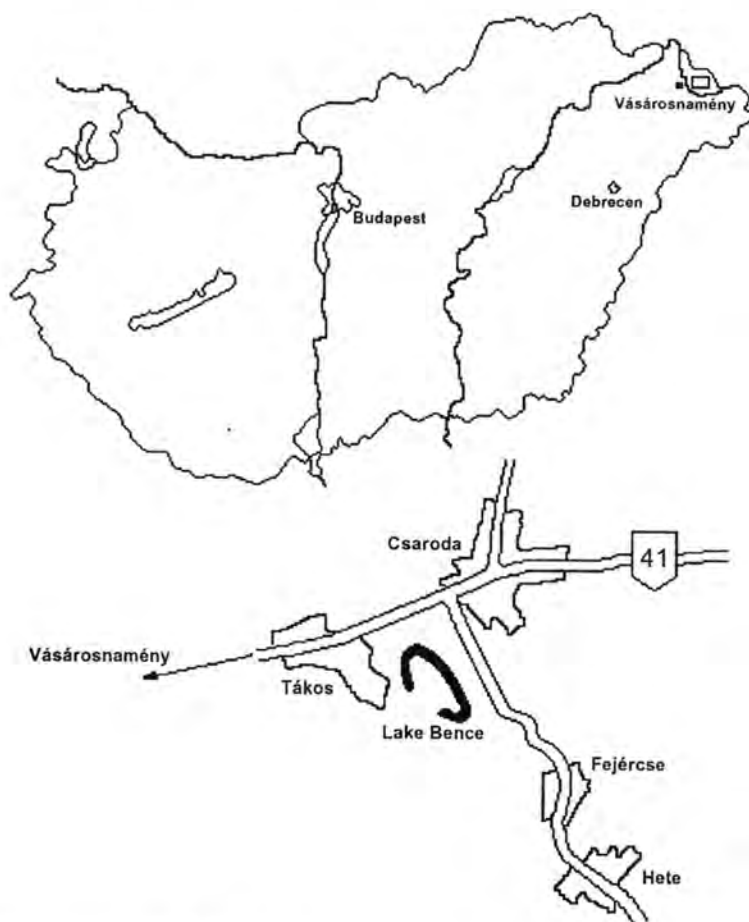


Fig. 1. The location of lake Bence-tó

zony hill) near Barabás were published by BARTHA and GENCSI (1991), on the vegetation of the Ecsedi-láp (Ecsed marsh) and the relicts of the Great Plain and other floristic data by BOROS (1938, 1954, 1962), on the geomorphology and the evolution of the water system of the Szatmár-Bereg Plain by BORSY (1954, 1959), on the region's biogeography by DÉVAI and FINTHA (1968), on the changes in the vegetation of the plains during the past centuries and the current reconstructional processes by FINTHA (1976), on the pollen records of the bog at Csaroda by CSINÁDY (1959), on the mountain elements of the flora and vegetation of the northern Great Plain by SIMON (1950, 1952, 1954, 1985b), and on the northern habitats of *Crocus heuffelianus* by SIMON and MOLNÁR (1972).

Floristic data on the Bereg Plain were presented by FINTHA (1984), HUSÁK and OTAHELOVÁ (1982), KEVEY (1978), KOVÁCS and PRISZTER (1977), KULCSÁR (1952) and MÁTHÉ (1959), SIMON (1965b), SOÓ (1937, 1939, 1947, 1948, 1964–80, 1965); SOÓ and MÁTHÉ (1959), SOÓ and BORSOS (1957) and THAISZ (1911). Until now, only one study (FINTHA 1994) was published on the lake Bence-tó.

Our paper presents the detailed vegetation map of the lake Bence-tó and the plant associations encountered here.

MATERIALS AND METHODS

The authors have been conducting field work in the area since 1990. This study is a summary of their work. Sample plots for the study of the vegetation were set up such in a way that most plant associations could be sampled. Coenological relevés were made at 7 different sites of the lake Bence-tó.

1) The first sampling site consists of 12 plots arranged in three transects running parallel to each other in a NE–SW direction. Each transect includes four 5 m × 5 m plots in a tall sedge community at the NE part of the lake. The easternmost plot is labelled as 1/1 and the westernmost as 3/4.

2) The second group of sample plots is close to the above site, at the south-eastern end of the willow marsh, where peat mosses do not occur. Four adjacent 5 m × 5 m size plots were set up, the sides of the obtained 10 m × 10 m square are directed toward NW–SE and SW–NE.

3) The third sampling site is in the peat bog, where instead of plots 25 permanent *Sphagnum* cushions were studied.

4) The fourth site is at the deepest part of the lake, covered by water for the longest time. Here 18 adjacent plots form a transect perpendicular to the edge of the lake. Plot 1 is at the most southern, plot 18 is at the most northern side of the lake. The sizes of the plots are: 1.–2.: 5 m × 5 m; 2.–18.: 2 m × 2 m.

5) The fifth sampling site is a transect that consists of ten $2\text{ m} \times 2\text{ m}$ plots. It is located west of the fourth sampling site and is parallel to that. This site was established to sample the *Sparganietum erecti* association.

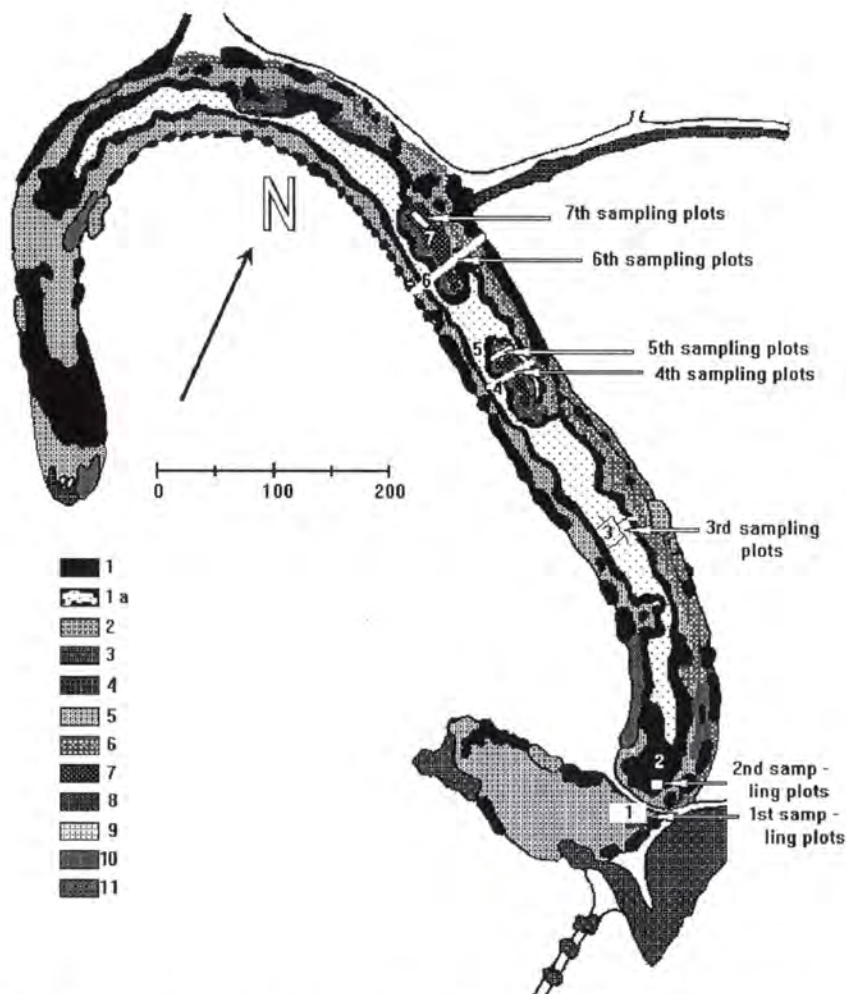


Fig. 2. The vegetation map of lake Bence-tó. 1. *Salici cinereae-Sphagnetum recurvi* Soó 1954, 1a. Occurrence of *Sphagna* in the *Salici cinereae-Sphagnetum recurvi* Soó 1954 association, 2. *Leucojo aestivo-Salicetum* Kevey 1993, 3. *Quercus robori-Carpinetum* Soó et Pócs 1957, 4. *Pruno spinosae-Crataegetum* Hueck 1931, 5. *Glycerietum maximae* Hueck 1931, 6. *Carici-Typhoidetum* Soó 1971, 7. *Polygono lapathifolio-Bidentetum* Klika 1935, 8. *Caricetum elatae* W. Koch 1926, 9. *Sparganietum erecti* Roll 1938, 10. *Scirpo-Phragmitetum* W. Koch 1926, 11. *Typhetum angustifoliae* Pignatti 1953

6) The sixth group of plots is situated between the fifth and the seventh sites. It is a transect along the whole width of the lake directed NE–SW, consisting of 33 plots. The sizes of the plots are: 3.–23. and 27.–33.: 2 m × 2 m; 1.–2. and 24.–26: 5 m × 5 m. Plot 1 is at the northwestern shore of the lake.

7) The seventh sampling area is in the northwestern third of the lake, close to the road leading to the lake from Csaroda. 2 × 3 adjacent, 2 m × 2 m plots were marked here. The 6 m long side is directed NNE–SSW, the 4 m long is ESE–WNW.

For the permanent plots, total percentage cover and percentage cover for each species were estimated. The species were identified by using SIMON (1992b).

At the third sampling area the following data for the cushions were recorded: two characteristic, possibly perpendicular length and direction of the chosen *Sphagnum* cushions, the ratio of *Sphagnum* species to each other and to the vascular plants present on them.

The vegetation map (Fig. 2) was drawn using aerial photographs (JAKUCS 1966, BAGI 1987, LESS *et al.* 1991) following a former vegetation map draft (TÓTH and KALAIPOS 1993).

This study deals only with plant associations found within the lake Bence-tó. Other natural and anthropogenic areas nearby are not described, just marked on the map.

Nomenclature of plant names follows SIMON (1992b), names of the associations are used according to BARTHA *et al.* (1995) and KOVÁCS (1995). Nature conservation values were used according to BORHIDI (1993).

RESULTS

The detailed vegetation map of the area has been prepared. Eleven phytocoenosis currently existing in the area are indicated on it (Fig. 2). With the help of former data (FINTHA 1994, TÓTH and KALAIPOS 1992, 1993) a list of species consisting of 130 plants was compiled. Twelve of these are protected. By 1995 18 species became extinct from the lake, 4 of these are protected.

DISCUSSION

Flora

A total of 130 species have been recorded in the lake Bence-tó until now, 112 of these were found in 1995. Out of the remaining 18 species 6 plants are obligate hydrophytes (*Lemna minor*, *Hydrocharis morsus-ranae*, *Salvinia natans*,

Spirodela polyrhiza, *Utricularia vulgaris*, *Stratiotes aloides*), which disappeared from the area as the duration of open water cover shortened markedly. Thus these species can be considered extinct from the lake Bence-tó. In 1995 60% of the open water surface of the lake was covered by *Lemna minor*, 30% by *Spirodela polyrhiza* and 10% by *Hydrocharis morsus-ranae*. *Stratiotes aloides*, *Utricularia vulgaris* (FINTHA 1994) and *Salvinia natans*, recorded first in 1992–93, also occurred yet. Concerning fern species, *Thelypteris palustris*, which was recorded in large quantity in 1990 and was observed in 1992–93 as well, and *Gymnocarpium dryopteris* encountered only in the *Salici cinereae*-*Sphagnetum recurvi* association (SOÓ 1954) in 1990 with few specimens, were not found in 1995. *Sphagnum magellanicum*, a characteristic species of the *Oxycocco-Sphagnetum* association and occurring in a large population in 1990, has also disappeared from the area. Apart from these, *Salix pentandra*, *Carex acutiformis*, *C. pendula* (in 1990 a few hundreds recorded), *Glyceria fluitans*, *Pastinaca sativa*, *Bilderdykia convolvulus*, *Polygonum persicaria*, *Rorippa amphibia* and *Salix pentandra* were not found in 1994–95 either.

Twelve species found in the lake are protected. Four of these (*Salix pentandra*, *Salvinia natans*, *Sphagnum magellanicum*, *Thelypteris palustris*) probably became extinct from the area, while the survival of 1 species is uncertain. Out of the above 4 species *Salvinia natans* can also be found in the IUCN list and is protected by the convention of Bern as well. Eight protected species still occur in the area: *Carex pseudocyperus*, *Chrysanthemum serotinum*, *Cicuta virosa*, *Dryopteris carthusiana*, *Iris pseudacorus*, *Sphagnum fimbriatum*, *Sphagnum squarrosum*, *Urtica kioviensis*. In the Hungarian Red Data Book (RAKONCZAY 1990) *Cicuta virosa* is listed as currently endangered, *Chrysanthemum serotinum* as potentially endangered species.

Vegetation

Salici cinereae-*Sphagnetum recurvi* Soó 1954

This association covers the largest area extending along the lake bed. Its shrub layer consists almost exclusively of *Salix cinerea*, other shrub species (*Rosa canina*, *Rubus caesius* and *Frangula alnus*) occur only along the border of the association. Its herb layer is species poor with low cover values. *Lycopus europaeus* and *Solanum dulcamara*, creeping in the sunny clearings, occur in the highest amount. Out of ferns *Athyrium filix-femina* is present at a few places, *Thelypteris palustris* have not been found since 1993. The moss layer is dominated by peat mosses, but their cover decreased by 1/3 between the August of 1994 and 1995. The ratio of *Sphagnum fimbriatum* and *Sphagnum recurvum* is approximately 7:3. The shortage of water is also indicated by the change in the peat moss species: while *Sphagnum magellanicum* occurred abundantly in 1990,

it has completely disappeared by 1995, and *Sphagnum recurvum*, which was sporadic aerlier, is currently quite common in the studied area.

Leucojo aestivo-Salicetum Kevey 1993

This association is indicated only by a few *Salix fragilis* trees along the border of the lake.

Quercu robori-Carpinetum Soó et Pócs 1957

It is a forest stand in the eastern part and the eastern and western end of the lake. This must be the remnant of the former gallery forest.

Pruno spinosae-Crataegetum Hueck 1931

This is a degraded association formed during secondary succession along dirt roads, which is found at the western end of the oxbow lake and along the road leading to the lake. *Rosa canina* forms a facies frequently and at some places *Rosa gallica* as well.

Glycerietum maximae Hueck 1931

This association covers the second largest area throughout the lake and has a continuous transition toward the *Carici-Typhoidetum* association at the border of the lake and toward the *Polygono-Bidentetum* association at the deepest sites. At most places it is seriously degraded, as *Cirsium arvense* and *Chrysanthemum vulgare* are frequent, particularly at the steeper, drier sites adjacent to arable lands. Several stands in a better state have also been found, mainly at the deeper sites of the lake, where *Scutellaria galericulata*, *Lycopus europaeus* and *Lythrum salicaria* have a high frequency.

Carici-Typhoidetum Soó 1971

This association separates the lake from the arable lands at the northern and the northeastern parts. It covers relatively large area with high abundance of *Carex vulpina*.

Polygono hydropiperis-Bidentetum Klika 1935

This phytocoenosis also extends over a large area at the deepest point of the lake bed. It is formed at sites, covered by open water at the end of spring and at sites which have good water supply during these periods. Stands are characterized by *Polygonum lapathifolium*, *Cicuta virosa*, *Carex pseudocyperus* and *Lycopus europaeus*. Numerous dead *Typha latifolia* and *T. angustifolia* specimens were found indicating that some years ago whole year long open water surface were present there. Close to the shallow sites *Bidens cernua* has higher abundance.

Caricetum elatae W. Koch 1926

KOCH (1926) reports on *Glyceria maxima* as a **probable** facies forming element of this association. This phytocoenosis covers a **small** area and its transition to the *Glycerietum maximae* association is **continuous**. Apart from *Glyceria maxima*, the association is dominated by *Lysimachia vulgaris*, *Symphytum officinale*, *Chrysanthemum vulgare*, *Iris pseudacorus* and *Galium palustre*.

Sparganietum erecti Roll 1938

This association is found at much deeper sites in the middle of the lake with high cover of *Polygonum lapathifolium*, *Carex pseudocyperus*, *Glyceria maxima*, and some *Typha angustifolia* and *T. latifolia*. *Alisma plantago-aquatica* reaches the highest frequency in this association.

Scirpo-Phragmitetum W. Koch 1926

It is currently found in small patches along the **border** of the lake. Dominated by *Phragmites australis*, which is accompanied by several species of the *Carici-Typhoidetum* and the *Glycerietum maximae* associations.

Typhetum angustifoliae Pignatti 1953

This association is found at the deepest sites **next to** the *Salici cinereae-Sphagnetum* association and in the clearings of the **willow** marsh. At several places *Typha latifolia* forms facies of the association. It is a highly degraded stand in which characteristic species of the *Glycerietum maximae* and the *Polygono hydropiperi-Bidentetum* associations also **occur**. At some places of the clearings of the willow marsh cushions of *Sphagnum fimbriatum* and *Sphagnum recurvum* grow on the base of *Typha angustifolia* and *T. latifolia* shoots. The ca 180 cm tall specimens of *Chrysanthemum serotinum* **occur** only in this association.

REFERENCES

- BARTHA, D. and GENCSI, Z. (1991): A barabási Kaszonyi-hegy vegetációja. (Vegetation of the Kaszony hill near Barabás). – *Bot. Közlem.* **78**: 5–19.
- BARTHA, D., KEVEY, B., MORSCHHAUSER, T. and PÓCS, T. (1995): Hazai erdőállulásaink. (Forest communities of Hungary). – *Tilia* **1**: 8–85.
- BOROS, Á. (1938): Florisztikai közlemények. (Floristic reports). **II.** – *Bot. Közlem.* **35**: 310–320.
- BOROS, Á. (1954): Florisztikai közlemények. (Floristic reports). **IV.** – *Bot. Közlem.* **45**: 247–250.
- BOROS, Á. (1962): Az Ecsedi-láp lecsapolása előtti növényvilága és az alföldi reliktumok. (Vegetation of the Ecsed marsh before drainage and the relicts of the Great Hungarian Plain). – *Bot. Közlem.* **49**: 289–298.

- BORSY, Z. (1954): Geomorfológiai vizsgálatok a Bereg-Szatmári síkságon. (Geomorphological studies at the Bereg-Szatmár Plain). – *Földr. Ért.* 3: 270–280.
- BORSY, Z. (1959): A Bereg-Szatmári vízrendszer kialakulása. (Development of the Bereg-Szatmár water system). – *Acta Univ. Debr.* 4: 253–270. (1957)
- CSINÁDY, G. (1959): A csarodai láposodott folyómeder pollenanalitikai vizsgálata. (Pollen analytic studies at the boggy river bed near Csaroda). – *Acta. Univ. Debr.* 4: 271–277. (1957)
- DÉVAI, GY. and FINTHA, I. (1968): Adatok a Szatmár-Beregi síkság biogeográfiájához I. (Beiträge zur Kenntnis der Biogeographie der Szatmár-Bereger Ebene. Teil I). – *Acta Biol. Debrecina* 6: 33–51.
- FINTHA, I. (1976): A Szatmár-beregi síkság növénytakarójának változásai az utolsó évszázadok során és a vegetáció természetes rekonstrukciós folyamatai napjainkban. (Die Veränderungen der Pflanzendecke der Szatmár-Bereger Ebene in den letzten Jahr hundertern und die natürliche Rekonstruktion der Bewachsung in unseren Tagen). – *A Debreceni Déri Múzeum Évkönyve* 1975: 67–120.
- FINTHA, I. (1979): The revision of the home distribution of *Wolffia arrhiza* (L.). – *Tiscia*, Szeged, 14: 71–79.
- FINTHA, I. (1984): A vízdara (*Wolffia arrhiza*) európai elterjedési viszonyai, különös tekintettel újabb magyarországi adataira. (Die Verbreitungsverhältnisse der Zwerglinse (*Wolffia arrhiza*) in Europa unter Besonderer Berücksichtigung neuerer Angaben aus Ungarn). – *A Debreceni Déri Múzeum Évkönyve* 1981: 17–32.
- FINTHA, I. (1994): Az Észak-Alföld edényes flórája. (Vascular flora of the northern Great Plain). – Budapest, Természetbúvár Alapítvány Kiadó, pp. 314–315.
- HARGITAI, Z. (1938): A Long-erdő és vegetációja. (The Long forest and its vegetation). – *Acta Geobot. Hung.* 2: 142–149.
- HARGITAI, Z. (1943): Adatok a beregi sík erdeinek ismeretéhez. (Contribution to the data on the forests of the Bereg Plain). – *Debreceni Szemle* XVII/3: 64.
- HUSÁK, S. and OTAHELOVÁ, H. (1982): *Wolffia arrhiza* (L.) Horkel ex Wimmer na Slovensku. – *Biológia*, Bratislava, 37/9: 933–935.
- ICBP, Conf. 15th, 1985 Cambridge, UK. Riverine Forests in Europe, status and conservation.
- JUHÁSZ-NAGY, P. (1959): A beregi sík rét-legelőtársulásai. (Les associations des prairies et pâturages de la plaine "Beregi-sík"). – *Acta Univ. Debr.* 4: 195–228. (1957)
- JUHÁSZ-NAGY, P. (1960): A beregi-sík rét-legelőtársulásai II. Talajviszok. (Les associations des prairies et pâturages de la plaine "Beregi-sík". II. Les rapports edaphiques). – *Acta Univ. Debr.* 6/2: 175–188. (1959–60)
- KEVEY, B. (1978): Az *Allium ursinum* L. magyarországi elterjedése. (The home distribution of the *Allium ursinum* L.). – *Bot. Közlem.* 65(3): 165–175.
- KOVÁCS, J. (1958): A beregi síkság erdei. (Forests of the Bereg Plain). – *Az Erdő* pp. 356–359.
- KOVÁCS, J. A. (1995): Lágyszárú növénytársulásaink rendszertani áttekintése. (Taxonomic studies on the herbaceous associations of Hungary). – *Tilia* 1: 86–144.
- KOVÁCS, M. and PRISZTER, SZ. (1977): Védelmet kívánó növényfajaink és növénytársulásaink. (Plant species and associations requiring protection in Hungary). – *MTA Biol. Oszk. Közlem.* 20: 161–192.
- KULCSÁR, G. (1952): A *Gagea spathacea* (Hayne) Salisb. Magyarországon. (*Gagea lutea* (Hayne) Salisb. in Hungary). – *Ann. Biol. Univ. Hung.* 2: 245–249.
- Magyar Közlöny, 1990. 64. szám
- Magyar Közlöny, 1993. 36. szám (12/1993). (III. 31) KTM rendelet 1. melléklete, pp. 2003–2013.
- MAROSI, S. and SOMOGYI, S. (szerk.) (1990): Magyarország kistájainak katasztere. (Cadaster of the small regions of Hungary). I–II. – MTA Földrajztudományi Kutató Intézete, Budapest.

- MÁTHÉ, I. (1959): Über die Standortverhältnisse von *Acorus calamus* L. und dessen Vorkommen in Ungarn. – *Acta Bot. Sci. Hung.* **5**(1–2): 79–86.
- NÉMETH, E. (1980): A *tarpai* "Téb-erdő" természetvédelmi alaptervének botanikai és ökológiai része. (Botanical and ecological part of the nature conservation project of the Téb forest near Tarpa). – Kézirat, Budapest.
- RAKONCZAY, Z. (1990): Vörös Könyv. [Hungarian Red Data Book]. – Akadémiai Kiadó, Budapest.
- SIMON, T. (1950): Montán elemek az Északi-Alföld flórájában és növénytakarójában. (Montane Elemente in der Flora und Vegetation im Norden des Ungarischen Tieflandes). – *Ann. Biol. Univ. Debreceniensis* **1**: 146–174.
- SIMON, T. (1952): Montán elemek az Északi-Alföld flórájában és növény takarójában. II. (Les éléments montagnards dans la flore et végétation de l'Alföld septentrional. II). – *Ann. Biol. Univ. Hung.* **1**: 303–310. (1951)
- SIMON, T. (1953): Torfmoore im Norden des Ungarischen Tieflandes. – *Acta Biol. Hung.* **4**: 249–252.
- SIMON, T. (1954): Montán elemek az Északi-Alföld flórájában és növénytakarójában. III. (Les éléments montagnards dans la flore et végétation de l'Alföld septentrional. III). – *Ann. Biol. Univ. Hung.* **2**: 279–286. (1952)
- SIMON, T. (1957): *Die Wälder des Nördlichen Alföld.* – Akadémiai Kiadó, Budapest.
- SIMON, T. (1960): Die Vegetation der Moore in den Naturschutz-gebieten des Nördlichen Alföld. – *Acta Botanica* **6**: 107–137.
- SIMON, T. (1968a): Die Verbreitung der *Heracleum sphondylium* Unterarten in der Ungarischen und Karpatischen Flora. – *Ann. Univ. Sci. Budapest.* **9–10**: 333–339.
- SIMON, T. (1968b): Die Torfmoor-Gesellschaften Ungars. – *Acta Geographica Debrecina* **7**(14): 201–206.
- SIMON, T. (1985a): A *Knautia dipsacifolia* Kretzer védett montán faj az Északi-Alföldön. (*Knautia dipsacifolia* Kretzer protected montane species at the northern Great Plain). – *Bot. Közlem.* **72**(1–2): 123–126.
- SIMON, T. (1985b): A *csarodai Nyírestő és Bábtava* növényzete 1960–1985. évi változása és természetvédelmi értékelése. (Changes and nature conservation evaluation of the Vegetation of the "Nyírestő" and "Bábtava" near Csaroda). In: Zárójelentés "A csarodai lápok (Nyírestő és Bábtava) környezeti állapotfelmérése és rekonstrukciós feladatai" c. kutatási szerződés keretében 1984–1985-ben végzett munkáról. – KLTE Ökológiai Tanszéke, Debrecen.
- SIMON, T. (1992a): Vegetation change and the protection of the Csaroda relic mires, Hungary. – *Acta Soc. Bot. Poloniae* **61**(1): 63–74.
- SIMON, T. (1992b): A magyarországi edényes flóra határozója. [The vascular flora of Hungary.] – Tankönyvkiadó, Budapest.
- SIMON, T. and MOLNÁR, A. (1972): A *Crocus heuffelianus* Herb. új észak-alföldi termőhelye. (Der neue Standort von *Crocus heuffelianus* im Nördlichen Alföld). – *Bot. Közlem.* **59**(3): 193–196.
- SOÓ, R. (1937): Pusztuló magyar tájak. (Degrading landscapes in Hungary). – *Bűvár.*
- SOÓ, R. (1939): Északi reliktum növények Magyarország flórájában. (Northern relict species in the flora of Hungary). – *Tisia* **3**: 151–200.
- SOÓ, R. (1947): Zur Systematik und Soziologie der Phanerogamen Vegetation der Ungarischen Binnengewässer. – *Nachtr. Arch. Biol. Hung.*, Tihany, **2**(17): 90–100.
- SOÓ, R. (1948): Tiszántúli flórakutatásaink újabb eredményei. (New results of floristic research at "Tiszántúl"). – *Borbásia* **8**: 48–57.
- SOÓ, R. (1964–80): *Synopsis systematico-geobotanica Florae vegetationisque Hungariae I–VI.* – Akadémiai Kiadó, Budapest.

- SOÓ, R. (1965): Die *Ranunculus auricomus* L. Emend. Korsch. Artengruppe in der Flora Ungarns und der Karpaten II. – *Acta Bot. Hung.* **11**: 396–404.
- SOÓ, R. (1978): *Bibliographia synecologica scientifica hungarica 1900–1972*. – Akadémiai Kiadó, Budapest.
- SOÓ, R. and BORSOS, O. (1957): Új adatok a Magyar növényvilág kézikönyvéhez. (New data to the handbook of the Hungarian flora). – *Bot. Közlem.* **47**(1–2): 95–98.
- SOÓ, R. and MÁTHÉ, I. (1938): *A Tiszántúl flórája*. (Flora of the “Tiszántúl”). Flora planitiei Hungariae Transtibiscensis. – Inst. Bot. Univ. Debrecen.
- THAISZ, L. (1911): Adatok Beregvármegye flórájához. (Contribution to the flora of Bereg county). – *Magyar Bot. Lapok* **10**: 38–64.
- TÓTH, Z. and KALÁPOS, T. (1992): *Jelentés a Bence tavi láp botanikai felméréséről*. (Report on the botanical surveillance of lake Bence). – ELTE Növényrendszertani és Ökológiai Tanszék, Budapest.
- TÓTH, Z. and KALÁPOS, T. (1993): *Jelentés a Beregi-sík 1993. évi botanikai felméréséről*. (Report on the botanical surveillance of the Bereg Plain in 1993). – ELTE Növényrendszertani és Ökológiai Tanszék, Budapest.
- VOZÁRY, E. (1957): Pollenanalytische Untersuchung des Torfmoores “Nyírestő” im Nordosten der Ungarischen Tiefebene (Alföld). – *Acta. Bot.* pp. 123–134.

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