

SZENT ISTVÁN UNIVERSITY

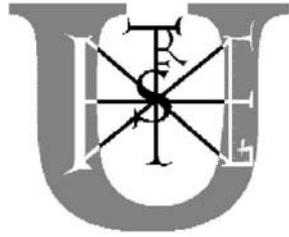
**INVESTIGATIONS OF SYN-DYNAMICAL PROCESSES FOR
CONSERVATION OF NATURAL VALUE OF A *SPHAGNUM-*
MIRE**

PhD THESIS

JÁNOS NAGY

Gödöllő

2002



SZENT ISTVÁN UNIVERSITY

**INVESTIGATIONS OF SYN-DYNAMICAL PROCESSES FOR
CONSERVATION OF NATURAL VALUE OF A *SPHAGNUM-*
MIRE**

PhD THESIS

JÁNOS NAGY

Gödöllő

2002

The Doctoral School

Name: Doctoral School of Biological Sciences

The science: Biological sciences

Director of the school: Prof. Dr. Zoltán, Tuba
Head of the department, DSc., Szent István University, Faculty of Agricultural and Environmental Sciences, Department of Botany and Plant Physiology

Tutor: Prof. Dr. Tamás, Pócs
Professor, MHAS

Dr. Tuba Zoltán
a Doktori Iskola vezetője

Dr. Pócs Tamás
témavezető

PRECEDENTS AND THE AIMS OF THE WORK

The mires have a great importance in the case of environmental- and nature-protection and look at an investigating narrowly in all over the world.

In the present days there are just a few mires in Hungary, and are *Sphagnum*s only on the small portions on our mires.

The five *Sphagnum* dominated mires of Bereg-plain (the Nyíres-lake, the Báb-lake, the peaty bed of Navad-brook, the Zsid-lake és a Bence-lake) lie in the south marginal zone of these associations in Europe, at least in the lowlands. These mires have dried out more often from the beginning of the sixties. Apart from at Nyíres-tó, the gallery forests (*Fraxino pannonicae-Ulmetum*, *Quercus robori-Carpinetum*) and the meadows (*Alopecuretum pratensis*) of the other four mires were cut off, and are now under cultivation. Except the Nyíres-tó all the mires were damaged by fire. In order to stop the degradation the Directorate of the Hortobágy National Park has been supplying water to Nyíres-tó and Báb-tava since 1987 (Simon 1992 b), and to Zsid-tó and Navad-patak since 1994. Out of them Bence-tó remained the only one where water had not been transferred for restoration purposes by the Directorate of the Hortobágy National Park by the time our observation was started. However they had a plan to supply the water quantity needed. (From 1999 there has been chance for artificial water supply on the Bence-lake too, but the it has not been necessary till now as the high amount of precipitation). As no comparative vegetation dynamic studies have been made on the other four mires, lake Bence is the only one where natural vegetation dynamic processes could be observed before and after artificial flooding. My investigations had been inspired firstly by this chance as well as nobody had been carried out systematic coenological measurement with permanent quadrats and with following up the change of quantity and quality of species composition of different *Sphagnum* cushions in our country. The study comprises the main results of research carried out between 1994 and 2000.

My aims were:

- The exact describing and documentation the vegetation of Bence-lake with vegetation-maps, photos and coenological records.
- The documentation of the natural processes before and after the flooding.
- To make a suggestion for the natural protection management to the natural values of Bence-lake.

MATERIALS AND METHODS

The object of investigation

- The Bence-lake is an approximately 1,5 km long and 70 m wide, C-shaped, silted backwater on the Bereg-plain (NE Hungary).
- It's *Sphagnum*-dominated willow-carr has been known since 1990.
- It's buffer zone is absent, it is surrounded by arable lands from all sides.
- During the study the distribution and amount of precipitation and the ground water level was very variable. Until 1997 open water surface was only temporarily observed. The draining of the lake accelerated from 1994 and continued until 1996. During the whole summer in 1997 some water (20-30 cm deep) was only found in the deepest part of the lake. In this year the caterpillars of *Lymantria dispar* have totally wasted the vascular vegetation of Bence-lake. Owing to the nearly 900 mm of precipitation in 1998 the lake was suddenly filled up with water and since that time its water level has been more or less permanently high.

Vizsgálati módszerek

- Permanent and occasional sampling quadrates were used for the description of status and change of vegetation.
- In the sample plots cover was estimated species by species on a percentage scale in the case of higher plants and peat-mosses.
- 25 cushions were selected for study of the dynamics of *Sphagnum* cushions. I recorded two typical lengths and directions of the selected *Sphagnum* cushions (perpendicular to each other), the proportion of the *Sphagnum* species making up the cushions, and the vascular plant species found in the cushions.
- The permanent sampling plots are situated 7 different points on the Bence-lake.
- Out of the above mentioned things the dissertation based mainly on the 659 permanent and 95 occasionally quadrates recorded, and on the other non metrical observations wrote down to the field diary between 1994-2000.
- The writing of the dissertation was helped by the 365 coenological records and observations has made on the other mires on the North-plain and by the information I has collected on another inland and foreign peaty areas.

- RESULTS

1. Most of the plant communities were characterised by the absolute dominance of a few species. The change of the water supply of Bence-lake has manifested in its vegetation too. During drying (transformation) the ratio of dominant species have decreased, and at the same time the ratio of accidental elements have risen. The moderately but lastingly damp of the environment (year 1997) effected reversely.
2. As the quick rising of the water-level the *Lemnetum minoris* Soó 1927, *Salvinio-Spirodeletum* SLAVNIC 1956, *Lemno-Utricularietum vulgaris* SOÓ 1928, *Hydrocharitetum morsus-ranae* VAN LANGENDONCK 1935, *Stratiotetum aloidis* NOWINSKI 1930 associations have appeared quasi in a same time. During the years the dominancy of the first two associations has decreased hardly, the third has change small, the last two especially the water-soldier dominated increased explosively.
3. The speed and the rate of change of vegetation has been decreased from the deepest part to the shores of the studied area.
4. The formation of floating mires started immediately.
5. The same plant species occur on bare peat surfaces (dried lake beds or new floating mire surfaces) as in the borderlines of larger, non-woody plant associations on the lakeshores. Such typical plants are *Cicuta virosa*, *Carex pseudocyperus*, *Lycopus europaeus*, *Bidens cernua*, *Scutellaria galericulata* and *Juncus effusus*. This is likely to be due to the lack of competing species. Competition for the first place is still very weak, for the second place is already very weak.
6. The vegetation maps of lake Bence has been drawn (1995, 2001), the associations have been described in detail, their succession processes have been discovered, their changes have been studied, attention has been called upon factors that threaten them and a proposal for a management plan has been elaborated.

The associations of Bence-lake:

7. *Lemnetum minoris* Soó 1927. Absolutely dominant, everywhere situated pioneer association in the beginning of flooding. It is repulsed by the competitor tangle associations quickly.
8. *Salvinio-Spirodeletum* Slavnic 1956. This is also pioneer association, characteristic mainly on the lakeshore. Most of the former territory of it was taken by *Lemno-Utricularietum vulgaris* in 2000.
9. *Lemno-Utricularietum vulgaris* Soó 1928. This association presents everywhere till 1,4 m deepness. The coverage of it is increasing to the shore. It propagates quickly. It made a thick matt on the shore side. On this matt the settling of pioneer plant species was typical.
10. *Hydrocharitetum morsus-ranae* van Langendonck 1935. It was appear as connected to the floating mires between the *Salix cinereas* and in the open zones of them. It was not made a dense matt on the Bence-lake so on this association were not typical the settling of plant species.
11. *Stratiotetum aloidis* Nowinski 1930. This association appeared dispersedly immediately. For 2000 it has taken most of the open water surface. In this time 2% of its surface was covered mainly by *Cicuta virosa* and smaller by *Glyceria maxima*, *Galium palustre*, *Oenanthe aquatica*, *Lycopus europaeus*, *Bidens cernua*, *Lyrhrum salicaria*, *Scutellaria galericulata*, *Carex pseudocyperus*, *Bidens tripartita*, *Stachys palustris* and by drifted water plants made smaller floating islands.

12. *Phragmitetum communis* Soó 1927. em. Schmale 1939. Some small patches on the shore.
13. *Glycerietum maximae* Hueck 1931. This is common, wide expanded, rapidly propagated and stable association on the deeper parts of the area. It moves to the clear mire-bed in a couple of years and be stable where the water moves back and it supplants those pioneer associations like *Polygono lapathifolio-Bidentetum*, *Cicuto virosae-Caricetum pseudocyperi*, and it's *Lycopus europaeus* dominated variant. It rarefies, if the deepness of water-level is constantly higher than 1 m. In this case the polychormons lift up and turn to floating islands. During this process it's rhizomes are growing continuously. Smaller and larger patches of *Sparganium erectum* appear often in it, wich seems to be more succesfull association under balanced wet and lower competitive pressured conditions. Where the humidity is more fluctuant and the competitive pressure is lower the *Glyceria maxima* seems to be more succesfull. The *Typha angustifolia* was more succesfull in deep water and the *Glyceria maxima* were more successful in more fluctuant water.
14. *Typhetum angustifoliae* Pignatti 1953. This association (frequently with all of the two peatmoss spcies in it's moss layer) was in the deepest part of the edges and openings of bays of *Sphagnum*-dominated willow-carr till 1998, and then it has appeared on the surface of young floating mires and it is extending quickly. It will permanently be on the edges of the floating mires. This association has been deputized only by *Typhetum latifoliae* on the other four mires. It could not survive the long lasting dryness. The *Cicuto-Caricetum pseudocyperi* and the *Polygono lapathifolio-Bidentetum* appear first on the former territory of it, and then they are given by stable place by the *Glycerietum maximae* and the *Sparganietum erecti* associations. It comes up again (in after years) collaterally with the re-wetting and the mentioned direction of succession turns back. It is a stable association in optimal water supply.
15. *Sparganietum erecti* Roll 1938. It was situated only in the central, very deep part of the lake between 1994-97 with high amount of *Polygonum lapathifolium*, *Carex pseudocyperus*, *Glyceria maxima* and with some *Typha angustifolia* and *T. latifolia*. It is frequent on the shores and on the floating mires between of the *Salix cinerea* branches since 1999. The expanse and the species composition of this association can change quickly.
16. *Caricetum elatae* W. Koch 1926. Some tussock on the Southern curve of the Lake. This is a small association, increasingly transforming into *Glycerietum maximae*. During the drying the *Glyceria maxima* supplants it gradually, in case of wetting the dominance of *Carex elata* increases.
17. *Cicuto-Caricetum pseudocyperi* Boer et Sissingh 1942. This is a plant-association of the virtually competition-less terrains. It appears on the borderline of associations (between of *Glycerietum maximae* and *Caricetum ripariae* and *Phalaridetum arundinaceae*), on the surfaces of young floating mires and on the trembling woods and on the dense floating *Hydrocharis morsus-ranae* and *Stratiotes aloides* as well as on the still wet matts of *Utricularia vulgaris* on the shore, on the still wet peat of the lake-bed after the extinction of open water and on the rewetted peat of the lake-bed (1997). It was change by the species of *Polygono lapathifolio – Bidentetum*, and then the species of the *Glycerietum maximae* during the rewetting process. It is in competition with the *Polygono lapathifolio – Bidentetum* association in the terrestrial state. Those subdominant, fast propagate species wich situated in both associations (eg. *Lycopus europaeus*, *Tanacetum vulgare*, *Lactuca serriola*) will be dominant for those short period while one association turns into another. It appears on the floating mires immediately, but it will be dominant only on the second and/or on the third years. Later this association loses ground to the edges of the elder floating mires. The criteria of remanence of this association are the appearance and the subsistence of competition poor, bare surfaces.

18. *Caricetum ripariae* Soó 1928. This association runs together with *Glycerietum maximae* for the bed, and for the periphery with *Phalaridetum arundinaceae*. This is a very stable, and one of the most distinctly strengthened association during the upswing of the water supply on the Bence-lake.
19. *Phalaridetum arundinaceae* Libbert 1932. This is a large and very stable association between the lake and the arable lands. A tavat a szántóktól elválasztó, nagy kiterjedésű, igen stabil társulás. There are three other associations: the *Juncetum effusi*, the *Cicuto virosae-Caricetum pseudocyperi* and the *Lycopus europaeus* dominated association can be find Along the touch-line with other associations (*Glycerietum maximae*, *Caricetum ripariae*).
20. *Alopecuretum pratensis* Nowinski 1928. It is a peripheral association in a small patches. It would be the typical association of the former pastures around the Bence-lake.
21. *Agrostetum albae* Újvárosi 1941. It is a peripheral association too, presents just in a patches as a narrow strips.
22. *Polygono lapathifolio-Bidentetum* Klika 1935. This association formed on the deepest bed of lake on the former areas of the spring-end open waters between 1994-1997. It exists on the surfaces of the young floating mires too. It is competing mainly with the *Cicuto-Caricetum pseudocyperi* and with *Glycerietum maximae* associations.
23. *Juncetum effusi* Soó 1933. This association is situated on the edge of Bence-lake, in side of the roads, on the margins of arable lands and on the borderlines of the herb associations. The great amount of dominant species of it exists from the humid cattle-pastures to the *Sphagnum fallax* dominated, puddled open areas of Nyíres-lake.
24. *Calamagrostetum epigei* Juraszek 1928. The association situated on the northern side of the lake.
25. *Pruno spinosae-Crataegetum* Soó 1931. This association is stable, surrounds the mire in a same line with *Calamagrosti-Salicetum cinereae*.
26. *Leucojo aestivo-Salicetum* KEVEY 1993. The association was represented by some scattered small clumps of tree at the lake sore. Spontaneous regeneration of it expectable just after some ten years long adequate treatment.
27. *Calamagrosti-Salicetum cinereae* Soó et Zólyomi in Soó 1955. It is a frondous association situated on the verge of the bed, which serves refuge for the species of the close-up associations during the driest time and blocked the invasion of the weeds from the arable. It is in competition with the *Pruno spinosae-Crataegetum* association, wich tolerates the disturbance and the dryness better.
28. *Salici cinereae-Sphagnaetum recurvi* SOÓ 1955 *sphagnetosum squarrosi* ASS. NOV.
This association has been divided into two new sub-associations due to significant differences in their moss layer.
 - The first is the *Salici cinereae-Sphagnetum recurvi* SOÓ 1955 *sphagnetosum fallacis* SUBASS. NOV., where the dominant species are the *Sphagnum fallax* and the *Sphagnum palustre* in the moss layer. This sub-association is absent from the Bence-lake.
 - The second one is the *Salici cinereae-Sphagnetum recurvi* SOÓ 1955 *sphagnetosum squarrosi* ASS. NOV., where the dominant species are the *Sphagnum fimbriatum* ssp. *fimbriatum* and/or the *Sphagnum squarrosum* in the moss layer. Among other mires the *Sphagnum* dominated willow carr of the Bence-lake belongs to here:
 - a) The sub-association rans along the centre of the bed of backwater till the drastic increase of water level. Typical peatmosses of it was the *Sphagnum squarrosum* and the *Sphagnum fimbriatum* ssp. *fimbriatum*. In the beginning of the examination period out of the 25 studied

cushions there were 7 cushions consisting purely of *Sphagnum fimbriatum subsp. fimbriatum* and there were 4 containing purely *Sphagnum squarrosum*, while 14 *Sphagnum* cushions were mixed. In the mixed cushions there were some where one *Sphagnum* species or another was absolutely dominant, but in most of the cushions they were in commensurable ratio. During the study the ratio of dominance could change in the individuals of cushions.

- b) The proportion of *Sphagnum fimbriatum subsp. fimbriatum* in the cushions decreased during the years of examination, while that of *S. squarrosum* increased.
- c) The two peatmoss species decayed approximately similar ratio. Between 8 September 1994 and 11 October 1997 44 percent of studied cushions died. Both of the peat-mosses died in 1998. They can not overgrow the quick increase of water level.
- d) The decay of peatmoss cushions is occurring by their splitting into smaller and smaller parts. Finally they frozen or dried out. The average size of the dead cushions was 660 cm², which means that those cushions which were larger than this size had been better chance for survive while the smaller ones died in most probability.
- e) I have seen only vegetative propagation of the two *Sphagnum* species on the Bence-lake, I have never seen capsule on them.
- f) The growing of the cushions were between October and April, when their environment was enough cool and humid. The extension of peatmoss carpet decreased year after year from 1994. till 1996. The little increasing in 1997. was caused by the cool and rainy summer and by the collaterally increased groundwater level. -ben tapasztalt kismértékű növekedés betudható a hűvös, csapadékos nyárnak és az ezzel is összefüggő talajvízszint emelkedésének.
- g) The richness and the cover value of species in the herb layer of association had grown continuously during the dry years especially on the margins of the association. The associations situated on the edges of the bed moved more and more inwards, as the environment was more humid under the canopy then out of it.
- h) The association has totally changed, caused by the quick and constant increases of water level just after the worm-eating in 1997. Among other types, formation of a new but frequent type of floating mire on Bereg-plain has started immediately. I named it after it's sape to *skirt-mire*.

29. *Quercus robori-Carpinaetum* Soó et Pócs 1957 em. Soó 1980. The former area was indicated by the forest on the south end of lake and some scattered *Quercus robur*.

30. *Rubo-Robiniaetum* Jurko 1963. Black locust plantation at the southern end of the bed.

31. *The skirt – mire: a new type of floating mires and other floating mires on the Bereg-plain:*

All the willow species are able to develop bushy hair shape adventitious roots from their shoots near the water surface after flooding. The dead broken fragments of plants floating in large quantities in the mire water are felting with each other, with willow's roots of stem origin and with the plant residues on the bottom of the lake. Thus a felted carpet forms, which make connection between of the willows and make belts around of them and falls as a 'skirt' from the water surface to the bottom of the lake. The most frequent colonists that can be found on the surface of the skirt-mire of Bence-lake are the *Oenanthe aquatica*, *Lycopus europaeus*, *Cicuta virosa*, *Bidens cernua*, *Carex pseudocyperus*, *Glyceria maxima* and the *Scutellaria galericulata* rarely the *Galium palustre*, *Poa palustris*, *Agrostis stolonifera*, *Polygonum lapathifolium*, *Bidens tripartita*, *Typha angustifolia*, *Typha latifolia* and the *Sparganium erectum* as well as drifted *Salvinia natans*, *Hydrocharis morsus-ranae*, *Lemna minor* and *Stratiotes aloides*. *Thelypteris palustris* is one of the first colonist on the Navad-brook and on the Zsid-lake, but it is absent from the Bence-lake now.

Later the skirt-mires fuse with floating mires formed other ways:

- with fragments of mire, turf and sod lifted up by the air-filled rhizomes
- with the turfs formed on trembling woods
- with the floating meadows a started from the shore.
- and with the associations formed on the dense floating mats of aquatic plants trembling on the surface

and finally they cover most of the former open surface. The tangle-associations extinct from the territories if the droughty period continues for years. In this time the flora of the skirt mires can be find on the bare surface of the peat has got dry. The phase of open water with floating mire and the phase of dry can follow each other repeatedly.

32. The largest selectional pressure is the drastic and arrhythmic change of water supply on the mires of Bereg-plain.
33. All of the phases of different aged and developed floating mires (from the forming till the raised bog) can be seen on the Bereg-plain during the study.

New scientific results

1. I have built a long-term coenological monitoring system on the Bence-lake.
2. I have prepared the vegetation maps of Bence-lake that show the vegetation of mire before and after the flooding.
3. I have particularly described the associations of Bence-lake and I have observed and analysed their dynamics in time and space.
4. I have divided the *Salici cinereae-Sphagnetum recurvi* (Zólyomi 1931) Soó 1955 association for two sub-association. They are: the *Salici cinereae-Sphagnetum recurvi* (Zólyomi 1931) Soó 1955 *sphagnetosum squarrosi* SUBASS. NOV. and the *Salici cinereae-Sphagnetum recurvi* (Zólyomi 1931) Soó 1955 *sphagnetosum fallacis* SUBASS. NOV.
5. I have described the process and rate of decay of peat-moss cushions.
6. I have diagnosed that the strongest natural selectional pressure is the drastic and arrhythmic change of water supply on the Hungarian *Sphagnum*-dominated mires.
7. I have diagnosed that there are same plant species can be found on the bare turf surfaces like on the borderlines of larger herbaceous associations.
8. I have described the processes of formation and developing of former peat-moss-dominant floating mires of Bereg-plain.
9. I have diagnosed that the formation and change of mire of Bence-lake (and lot of the other mire) is a really fast (ponderable in years) process.
10. I have made a model about the presumptive succession of vegetation of the studied area from the skirt-mire formation till the peatbogs.
11. I have drawn attention to endangering factors for mire and have made concrete suggestions for conservational management for natural value of the mire.

CONCLUSIONS AND SUGGESTIONS

Our measure of precautions are the more efficient the more knowledge we have about its object. The results of mire researching in last years show the new face of vegetation development of our *Sphagnum* dominated mires and possibility of protecting. The vegetation dynamic changes of whole Bence-lake very fast and depends on the measure and rhythm of water supply of area hardly.

This factor is the strongest natural selective pressure not only on *Sphagnum* flora of Bence-lake and of mires on Bereg-plain but also on all peat-moss flora of Hungarian *Sphagnum* dominated mires, because there are often drought periods followed by extremely wet years in Hungary.

The vegetation of mires are in perfect harmony with that.

The water protect peat forming process taking place on terrestrial mire in the dry periods and on floating mires in the wet periods. The adequate peat thickness can balance the fluctuations of watersupply as the plant communities can consolidate on it.

This process can be happened on the Bereg-plain from the floating mire formation to the appearance of the continental raised bog-association on recent climate at best about a few hundred years.

Achieving this we have to make the next protecting necessary arrangements at Bence-lake: - to plant *Quercus robur* forest belt the sooner and wider around the mire. In 10 metres belt around the waterbank tilling and using the insecticides on the surrounding plough-land are avoided. The water level have to keep at least 70 cm the deepest parts of the bed. This can give the floating mires a chance to remain, develop and for the primer communities living on the border to survive. The artificial flooding is have to avoid. *Robinia pseudo-acacia* gradually have to be substitute for *Quercus robur* and *Fraxinus angustifolia ssp. pannonica*, and *Fraxinus pennsylvanica* for *Salix alba* and *Salix fragilis*.

The possible research directions of the topic in the future

To know more exact the details and further directions of the mires vegetation developing the studying of the germinating and shooting power and mapping of surviving propagules in the soil are necessary. More paleobotanical researching could shows exciting results. The peat of mires is also suitable to measuring of environmental loading (heavy metals), and these data also could be very interesting.

There are researches into comparative desiccation tolerance of different peat-moss species in our department. We are planning to start the investigation of peat-moss production.

The comparative genetic study of the plant species are on the studied mires and the plant species of other mires in the Carpathian-basin can make answer for the origin and the ways of propagation of this species. The protection of the mires is more important than the hunger for science. The successful protection is unrealizable without some basic - vegetation dynamical, pedological and hydrological – studies. The professionals of nature protection's government should determine that which state of which mires have to conserve and than have to choose the adequate methods for it. There have optimize the parameters of quantity and quality of researches on every account. These depends on conservational stadium.

PUBLICATIONS IN THE TOPICS OF DISSERTATION

Journals cited by the SCI

- NAGY J., RÉTI K.:** The two sub-associations of the *Salici cinereae-Sphagnetum recurvi* (Zólyomi 1931) SOÓ 1954. In: *Acta Botanica Hungarica*, 2003. Vol. 45, No. 3-4. p. 355-364
- NAGY J., TUBA Z.:** A preliminary report about a new type of floating mires from Hungary. In: *Annales Ser. hist. nat.*, 2003. Vol. 13, No. 1. p. 77-82.
- NAGY J., NÉMETH N., FIGECZKY G., NASZRADI T., LAKNER G.:** Dynamics of *Sphagnum* cushions in the willow-carr of Bence-lake mire and its nature conservation connections. In: *Polish Botanical Journal* (formerly *Fragmenta Floristica et Geobotanica Polonica*) 2003. Vol. 48, No. 2. p. 163-169.

International journals

- NAGY J., FIGECZKY G., PENKSZA K., FINTHA I., MOLNÁR A., TÓTH Z., KALAIPOS T.:** Contribution to the flora and vegetation of lake Bence (Bence-lake) at the northern part of the Great Hungarian Plain. In: *Studia Botanica Hungarica*, 1998a. Vol. 27-28, p.151-161.
- NAGY J., FIGECZKY G., PENKSZA K.:** Decay of peat moss cushions on lake Bence (Bence-lake) in the northern part of the Great Hungarian Plain. In: *Studia botanica hungarica* 1998b. Vol. 27-28, p.163-167.
- SZURDOKI E., NAGY J.:** *Sphagnum* dominated mires and *Sphagnum* occurrences of North-Hungary. In: *Fol. Hist. -nat. Mus. Matr.* 2002. Vol. 26. p. 67-84.

National journals

- NAGY J., FIGECZKY G., MOLNÁR M., SELÉNYI M.:** Adatok a beregi tőzegmohás lápok vegetációjának változásaihoz In: *Kitaibelia*, 1999. IV. évf. 1 szám: p.193-195.
- NAGY J., MOLNÁR M., SZERDAHELYI T., FIGECZKY G., SELÉNYI M.** A *Dryopteris cristata* L. új magyarországi lelőhelye. In: *Kitaibelia*, 1998c. III. évf. 2 sz. p.219-221.

International conferences

- NAGY J.:** Research establishing the biomonitoring of Lake Bence (Bence-lake) at the northern part of the great hungarian plain. p.153-158. In: *Proceedings of the "Research, Conservation, Managemant" Conference. Aggtelek, Hungary, 1-5 May 1996.* Aggteleki Nemzeti Park Igazgatósága, Aggtelek, 1996b.
- NAGY J., FIGECZKY G., MOLNAR M, SELÉNYI M.:** Changes in the vegetation of two lowland raised bogs between 1952-and 1997. In: *Proceedings of the "VII International Congress of Ecology. New tasks for ecologists after Rio 1992, Florence 19-25 July 1998, Italy"*, 1998d. p.309.

National conferences

- NAGY J., FIGECZKY G., PENKSZA K.:** Tőzegmohapárnák pusztulása az északalföldi Bence-tavon. In: *Biológus vándorgyűlés, GATE, Előadás.* 1996a.

- NAGY J., FIGECZKY G., PENKSZA K.:** Tőzegmohapárnák pusztulása az északalföldi Bence-tavon. In: *MTA. Botanikai Szakosztály ülése*. Előadás 1996b.
- NAGY J., MOLNÁR A.:** Változások a Nyíres-lake vegetációjában. In: *IV. Magyar Ökológus Kongresszus. Előadások és posztterek összefoglalói*. p.148. Pécs.1997. június 26-27.
- NAGY J., PENKSZA K., FIGECZKY G.:** Adatok az észak-alföldi Bence-lake flórájához és vegetációjához. In: *Szegedi Tisza kutató ankét*,. Előadás 1995.
- NAGY J.:** A beregi tőzegmohás lápok növényzete In: *MTA. Botanikai Szakosztály ülése*, előadás 1999a.
- NAGY J.:** Úszólápképződés a Beregi-síkon. In: *MTA. Botanikai Szakosztály ülése*, előadás1999b.
- NAGY J.:** A Beregi-lápok vegetációfejlődése az úszólápképződéstől a tőzegmohák uralta lápokig. In: *Aktuális flóra- és vegetációkutatások a Kárpát-medencében V*. p. 45-46. Pécs 2002. március 8-10.

Belföldi posztterek

- NAGY J., FIGECZKY G., MOLNÁR M., SELÉNYI M., (1998):** Adatok a beregi tőzegmohás lápok flórájához és vegetációjához In: *Aktuális flóra- és vegetációkutatás Magyarországon*, poszter. Felsőtárkány, 1998e, október 23-25.
- NAGY J.:** Az úszóláp képződés legelső stádiumai a “Palást lápok”, és a lápfejlődés a Beregi-síkon In: *Aktuális flóra- és vegetációkutatás Magyarországon*, poszter, Jósvafő, 2000b, október 13-15.

Research reports

- NAGY J.:** Kutatási jelentés a Bence-lake botanikai felméréséről. - Kutatási jelentés, Hortobágyi Nemzetipark Igazgatósága, Debrecen Kézirat, 1999c.
- NAGY J.:** Kutatási jelentés a Bence-lake botanikai felméréséről. 1994-95. - Kutatási jelentés, Hortobágyi Nemzetipark Igazgatósága, Debrecen, Kézirat, 1996
- NAGY J.:** Kutatási jelentés a Nyíres-lake és a Báb-lake 1993 - 1998. közötti botanikai felméréséről. - Kutatási jelentés, Hortobágyi Nemzetipark Igazgatósága, Debrecen Kézirat, 1999.
- NAGY J.:** Kutatási jelentés a Zsid-lake, a Bence-lake és a Navad-patak láposodott medrének botanikai felméréséről. 1996-2000. - Kutatási jelentés, Hortobágyi Nemzetipark Igazgatósága, Debrecen 2000.