

EVOLUTION OF FLORISTIC DIVERSITY OF CERNICA FOREST UNDER THE PRESSURE OF THE HUMAN FACTOR

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Abstract: The work makes a general presentation of the characteristics of the main types of vegetation met on the territory of Cernica Forest and the main causes which led to the anthropization of these plant formations. Also there are presented the conclusions of the comparison between the composition of the flora of Cernica Forest 50-100 years ago and present time, considering on one part the floristic lists elaborated by Z. Panțu and I. Cristurean and on other part our personal researches. Thus it was noticed that some species quoted in previous works are not found nowadays and from other species are found only few isolated samples. Also, not few are the species newly introduced, intentionally or accidentally, in the flora of Cernica Forest.

Key words: Cernica, floristic diversity, human factor, Romania.

Introduction

The more emphasized impact of human being over the environment or life, implicitly over the vegetal carpet, is determined on one part by the demographic growth and on the other to the development and fast extension of the industry and agriculture. In the last years, great surfaces of forests have been transformed in agricultural lands and have been occupied by industrial and commercial unities, warehouses, constructions of residences, etc. Of course the amplitude of those transformations is much higher in areas from the margin of the big towns.

Cernica Forest is situated at approximately 15 km from Bucharest, on one side and another of the highway that leads to Brănești, between the railway București-Constanța and Cernica village. In the larger part is delimited by agricultural ecosystems. To southwest it is margined by the highway București-Tânganu which separates it from Cernica Lake. At East it is delimited by the village Brănești with Pasărea River (Fig. 1). In the North part, beyond the railway it is continued with a small body of forest, which represents the Pustnicul Forest.

Cernica Forest is situated at an altitude of 6570(72) m. Its climate is characteristic to the field climate where it is inscribed. The local climatic variations are given by the presence of the meadows of small heavens, Pasărea, Tânganu, with the ground water tables more to the surface, of lacustrian formations from the neighbourhood (lakes Cernica, Pasărea) and not in a small measure the direct influence of forest phytocenosis over the environment factors.

The precipitations are generally liquid, under the form of rains. The average annual value of precipitations is of approximate 505.1 mm, with maximum of 855.1 mm and minimum of 260.8 mm.

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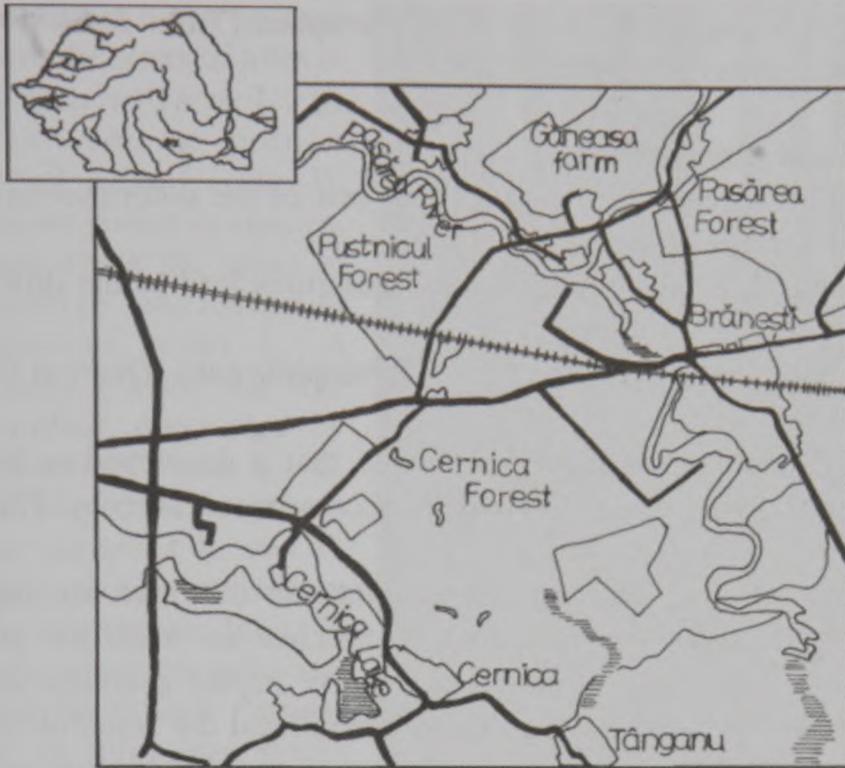


Fig. 1 Placement and delimitation of Cernica Forest

The soils on which Cernica Forest is developed are brown-reddish forest soils, with a well established profile (the horizons A, B, C), a content of humus of approximately 3 % and a good circulation of nutritionist substances. Due to these particularities even in the most drought years, vegetation feels very little the need for water.

Among the first botanists from which there are kept information regarding the flora of this territory we can mention Jean Léveillé (1837) and Arthur Schott (1846) (Spiridon 1970), who in their works make only short references to vegetation quote some of the most frequent species of vascular plants.

The most important researchers of the forest flora and vegetation from the surroundings of Bucharest remain D. Brandză (1878–1883), D. Grecescu (1889–1909), Z. Panțu (1908–1912, 1931), P. Enculescu (1924), I. Cristurean (1956–1958). Important supplements regarding the forest vegetation from this area brought also V. Sanda and A. Popescu (1971–1972).

Material and methods

The identification of plant species on the territory of Cernica Forest was made during the displacements on site by the period of June 2004 - November 2005. The interval between displacements was lower (6 - 10 days) during spring, of 10 - 20 days during June - August and approximately 30 days in September - November.

In some cases it was necessary the harvesting and conservation of some plants so that they could be determined afterwards. In the case of rare, isolated plants we have avoided the harvesting, making in this case photo images.

For the elaboration of the comparative analysis of the flora we have used the works of Z. Panțu (1908–1912) and I. Cristurean (1956–1958). Nomenclature of the

identified taxa is according with the Flora Europaea (Tutin & al. 1964-1980) and with Flora of Romania (Ciocârlan 2000).

Results and discussion

Cernica Forest represents only a small rest of the notorious forest of Vlăsia that occupied the entire Romanian Field.

The climatic and pedologic local particularities lead to the differentiation of two types of forest:

- Forest dominant by sub-mesophyll thermophile oaks (*Quercus frainetto* Ten., *Q. cerris* L.).
- Forest dominated by *Quercus robur* L., that is developed on brown-reddish forest soils, considered relicts. The oak is accompanied here by *Tilia tomentosa* Moench., *Carpinus betulus* L. etc.

The main pollution sources that intervene in this area are represented by escape gases produced by the vehicles that circulate on roads but also on forest roads inside the wood. Also, a significant negative impact exercises over the areas and persons that exploit irrational and many time illegal the wood of this forest. On the other hand the tentative of forest employees to remake as soon as possible the forest planting species of allochthonous trees, which besides a fast growth have also



Fig. 2 Aspect of the forest with ... civilization traces (April 2005)

a high power of regeneration (*Gleditsia triacanthos* L., *Robinia pseudacacia* L.), had also unwanted consequences. In this way, through a non controlled multiplication of these species they formed in the forest true thickets (thickets impossible to cross through). On the margin of the forest, to the limit with the București–Tânganu road, there was planted a protection curtain with *Gleditsia*, but this extended inside the forest, forming a band of approximately 10 m width.

More, placing at such smaller distance from the capital and neighborhood of Cernica Monastery, makes from Cernica Forest one of the main areas of relaxation of the people of Bucharest and not only. Unfortunately their exits to the forest always leave unwanted traces (Fig. 2) over the nature (non recyclable rests, broken glasses, cut trees, fireplaces etc). Often you may see traces of weekend visits made by people from Bucharest.

In Cernica Forest it can be seen **a)** an area where the strata of trees is dominated by *Quercus cerris* L., *Q. frainetto* Ten. and a portion cultivated with *Q. rubra* L. (Fig. 3), and the tree strata poorer in species, and **b)** an area where the strata of trees is dominated by *Tilia tomentosa* Moench., *Quercus robur* L. si *Carpinus betulus* L., and the tree strata well curdled, dominated by species of *Cornus* (*C. mas* L., *C. australis* C.A. Meyer, *C. sanguinea* L.) *Evonymus europaea* L. and *E. verrucosus* Scop., *Ligustrum vulgare* L., *Crataegus monogyna* Jacq. In hollow grounds, where ground-water table is closer to the surface, *Populus alba* L. (Fig. 4) form pure stocks (cultivated) or is associated with the ash-tree (*Fraxinus angustifolia* Vahl.).



Fig. 3 Plantation with *Quercus rubra* (April 2005)

In glades dominate associations with *Festuca valesiaca* Schleicher ex Gaudin.

During our researches we have determined 228 species of vascular plants, the majority *Anthophytae*. Comparing the list of these species with the list made by I. Cristurean (1956–1958), that has 362 species, and with that edited by Z. Panțu (1908–1912) we observed a series of differences, especially regarding the floristic composition.

Thus we noticed that there are:

- Plants recently entered in the flora of Cernica Forest.

Some of these have been introduced in culture by the forest administrators (Fig. 3, 4), either for its regeneration (*Quercus rubra* L., *Populus alba* L.) or for a more efficient use of some wet areas



Fig. 4 *Populus alba* in culture (October 2005)

where water remains permanently at surface (*Taxodium distichum* (L.) L.C.M. Richard) forming an intra-forest lake.

Other plant species (*Juglans regia* L., *Pinus sylvestris* L., *Morus alba* L.) have appeared accidentally in the flora of Cernica Forest. In what concerns the first two wooden species that we mentioned above we do not consider them a danger for the evolution of phytocenosis.

We found only two rare, isolated samples and we did not find nearby plantlets that attest their multiplication through seeds. *Morus alba* is met but very often in the composition of the tree strata of the forest, especially on its margin or in the area visited by people.

We cannot mention the same thing about the herbaceous species (*Galinsoga parviflora* Cav., *Artemisia vulgaris* L., *Arctium lappa* L., *Sorghum halepense* (L.) Pers., *Bromus sterilis* L.) recent introduced in the flora of Cernica Forest. These seem to be extended year after year inside the forest, on the margin of the forest roads and footpaths, in rarer areas from the forest, especially near the places populated in weekends by tourists. These species are not wanted in the flora of the forest because they may replace the flora specific to the phytogenesis of the forest, leading to its anthropization.

- The plant species which were not found in the flora of Cernica Forest are unfortunately pretty much.

One of the explanations of the absence of those species could be the modification of climate characteristics from the area, that took place in the last century, materialized by the growth of annual maximum temperatures (22–23°C at the beginning of last century over 30°C in the last 10 years) and a specific modification of the regime of precipitations (maximums a little lower and higher minimums) (Cristurean, 1958).

More than that, the dams led to the formation of artificial lakes (Cernica, Pantelimon I, Pantelimon II) determined also the modification of hydro regime of the area.

On the other hand the pollution produced by the industrial unities nearby, modified by winds and precipitation, can also be an explanation of the amendments intervened in the phytogenesis from Cernica.

Among the plant species that have been observed in Cernica Forest by Z. Panțu and I. Cristurean, but which we have not found, we mention: *Ophioglossum vulgatum* L., *Iris variegata* L., *Pulsatilla montana* (Hoppe) Reichenb. subsp. *dacica* Rummelsp., *Trifolium alpestre* L., *T. medium* L., *Lathyrus venetus* (Miller) Wohlf., *Polygala comosa* Schkuhr., *Vinca herbacea* Waldst et Kit., *Scutellaria hastifolia* L., *Prunella laciniata* (L.) L., *Vincetoxicum hirudinaria* Medikus, *Thalictrum aquilegifolium* L., *Th. lucidum* L., *Gagea minima* (L.) Ker.-Gawl., *Physalis alkekengi* L., *Odontites vernus* (Bellardi) Dumort., *Himathoglossum hircinum* (L.) Sprengel, *Lilium martagon* L.

- Another category of plants from the flora of Cernica Forest, which we consider worthy of a special attention, groups the species from which we have found also few, isolated samples.

Among these we mention first three species of orchids: *Platanthera bifolia* (L.) L.C.M. Richard, *Orchis purpurea* Hudson (Fig. 5), *Epipactis helleborine* (L.) Crantz., from which be barely found 1-2 isolated samples.

The disappearance or just the rarity of the orchids from the phytocenosis from Cernica could be caused by the fungicides used in the neighbourhood agricultural lands, which have been swept along by precipitations in the soil of the forest, destroy the mycorrhizant fungus.

Together with these orchids we may add other species with much reduced density in Cernica Forest: *Potentilla alba* L., *Lathyrus nissolia* L., *L. niger* (L.) Bernh., *Doronicum hungaricum* (Sadl.) Reichenb. fil., *Convallaria majalis* L., *Trifolium hybridum* L., *Viola mirabilis* L., *Hypericum hirsutum* L.

We mention that all these species are specific and frequent in the composition of the forest type where it is also included Cernica Forest.

Conclusions

- Placed less than 15 km distance from the capital, the evolution of the flora and vegetation from Cernica is strongly influenced by human activities.

- As a consequence in the last century the evolution of the flora of Cernica Forest was modified in a noticeable manner.

- The necessity to regenerate or protect the forest and for a better valuation of the resorts with special humidity conditions led to the introduction of new wood species (*Quercus rubra*, *Gleditsia triacanthos*, *Robinia pseudacacia*, *Populus alba*, *Taxodium distichum*).

Other times humans intervention determined the accidental introduction of some wooden and herbaceous species (*Pinus sylvestris*, *Juglans regia*, *Galinsoga parviflora* etc.), which determines the anthropization of forest vegetation, especially in fields of entertainment or those close to localities.

- It is signalled the fact that some species (*Ophioglossum vulgatum*, *Iris variegata*, *Polygala comosa*, *Prunella laciniata* etc.) mentioned in works that served as comparison were not found anymore during our researches.

- Some species are represented only by very few, isolated samples (12), which may find themselves in danger of disappearance from the flora of Cernica Forest (*Platanthera bifolia*, *Orchis purpurea*, *Epipactis helleborine*).

- This report is only the beginning of extend study who has the main propose to realise a complete list of the plant species and vegetation for this part comparative with the already existing studies about Cernica Forest.

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Fig. 5 *Orchis purpurea* in Cernica Forest (May 2004)

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EVOLUȚIA DIVERSITĂȚII FLORISTICE A PĂDURII CERNICA SUB PRESIUNEA FACTORULUI ANTROPIC

Rezumat: În această lucrare se face o prezentare generală a caracteristicilor principalelor tipuri de vegetație întâlnite pe teritoriul pădurii Cernica și a principalele cauze care determină antropizarea acestor fitocenoze. Sunt prezentate concluziile comparației dintre compoziția florei pădurii Cernica din urmă cu 50–100 de ani și în prezent, luându-se în considerație, pe de o parte listele floristice întocmite de Z. Panțu și I. Cristurean și pe de altă parte cercetările proprii. Astfel, s-a constatat că unele specii citate în lucrările anterioare nu au mai fost identificate în prezent, iar alte specii citate anterior au fost regăsite doar sporadic ca exemplare izolate. Tot în prezent s-a mai constatat că nu puține sunt speciile nou introduse, intenționat sau accidental, în flora pădurii Cernica, cum ar fi de exemplu: *Quercus rubra*, *Gleditsia triacanthos*, *Robinia psedacacia*, *Juglans regia*, *Galinsoga parviflora*.

Cuvinte cheie: Cernica, diversitate floristică, evoluție, antropizare, România.