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## **Algal flora from the area of the Poiana Ştiol peatbogs (Rodnei Mountains National Park)**

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**Abstract.** This study focuses on the inventory of the algal flora from the peatbogs, in the Poiana Ştiol, Rodnei Mountains National Park, the determination of their ecology and the evaluation of the water's ecology state with the help of the algae. The main condition, for a peatbog to form, is the lack of nutrients in the water or in the soil, especially the lack of calcium and the total annual precipitations have to be minimum 600 mm. The samples were collected in the 18<sup>th</sup> of august 2009, and the determination of the species was made during a period of six months (October-March).

**Keywords.** Romania, peatbogs, *Sphagnum*, algae, oligotrophic waters

### **Introduction**

The peatbogs occupy only 0,03% of the territory of Romania, but they have a great economic and scientific importance. The scientific importance results from their ability to preserve; the peats, especially the acidic and aseptic ones preserve animal and plant scraps, that serve to the paleontology studies. The main condition,

for a peatbog to form, is the lack of nutrients in the water or in the soil, especially the lack of calcium and the total annual precipitations have to be minimum of 600 mm.

The algae have an important rol in the determination of the pollution degree. The eutrophication phenomenon is understood like a human intervention that accelerates the natural and normal evolution of the aquatic ecosystems from the initiall stage of oligotrophic waters to the finale stage when the pond disappears.

Types of phytoplankton:

- oligotrophic – characterized by an extremely low or low number of species; the phytoplankton is very poor or poor;
- mesotrophic - characterized by a moderate to high number of species; the phytoplankton is well developed;
- eutrophic – characterized by a high to extremely high number of species.

The greatest part of the Rodnei Mountains is situated inside of the Rodnei Mountains National Park (Reservation of the Biosphere), which was founded in 1937 (Pietrosul Rodnei Reservation). Today the surface of the Park is bigger, 46 399 ha and the geographical limits are: 47°25'54" - 47°37'28" north latitude and 24°31'30" - 25°01'30" east longitude (Planul de management a PNMR, p.14).

Apart form the Pietrosul Rodnei Scientific Reservation, inside the park, exist three more important areas, which are under major protection: the Scientific Reservation of Piatra Rea, situated to North-East from the Pietrosul Rodnei; and the strictly protected areas of Bila-Lala and Corongiș in the East (Fig.1).



Fig. 1. The Rodnei Mountains National Park with the protected areas

The necessity of this study is justified by the lack of studies on the algal communities from the studied habitats, although there exist's previous studies (Momeu, Péterfi, 1985; Momeu, Péterfi, 1990) but in other areas of the Maramureș mountains.

Poiana Știol belongs to the scientific reserve Piatra Rea, and it is located at an altitude of 1500 m to 1900 m. The geographical limits for the lake Știol are 47°34'20" north latitude and 24°48'49" east longitude, and for the top Știol are 47°35'56" north latitude and 24°48'55" east longitude (Fig. 2).

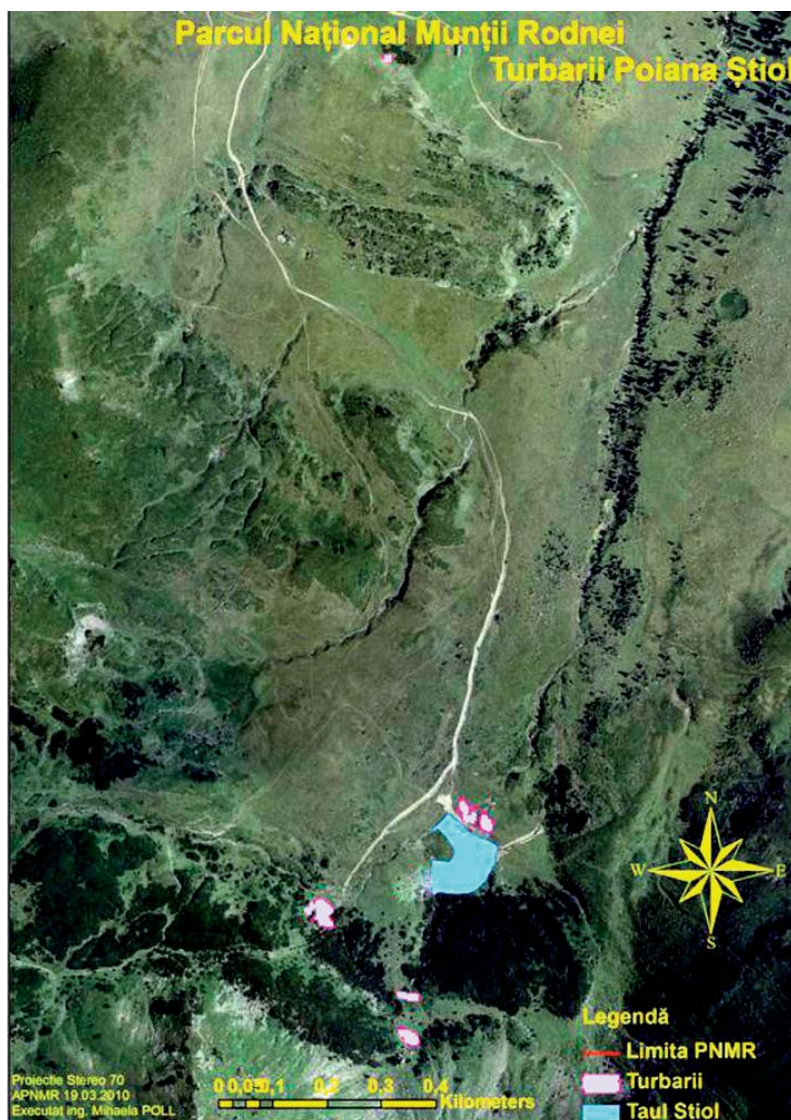


Fig. 2. Poiana Știol with the peatbogs and the Lake Știol

## Materials and methods

The samples were collected in the 18<sup>th</sup> of august 2009 from the peatbogs 1, 2, 3, 5, 8 and from the lake Știol, and the determination of the species was made during a period of six months (October-March), with the help of the microscope Nikon, type Eclipse E 400.

The samples of plankton were collected with a planktonic netting with holes that measure 40  $\mu\text{m}$ , by filtrating 4-5 liters of water to concentrate the algae material. The samples of benthos were collected with a pipette or simple with the hands. The fixation of the material was made with formaldehyde 40%. We used common determination books: Broock, 2005; Ettl, 1983 și 1988; Godeanu, 2002; Komarek, Anagnostidis, 1999; Lewis, Dodge, 2005, etc.

To find out the trophicity level and the organic pollution level we used different indicators: Thunmark, 1945 Index; Heinonen Index; Nygaard, 1949 Index; Palmer, 1969 Index; Jaccard's similarity index (PAST).

## Results and discussion

In the nine samples that were analyzed there were identified 107 species of algae. Where it was possible were taken both samples of plankton and benthos (peatbog 1 and 5, and Lake Știol). The 107 species belong to six phyla: Cyanophyta, Euglenophyta, Pyrophyta, Chrysophyta, Xanthophyta, Chlorophyta (Table 1).

The majority of the species belong to the order Zygnematales (Desmidiaceae), phylum Chlorophyta (green algae). The ecology of the species indicate that most are oligotrophic species, that prefer acid and clean waters, conditions that are fulfilled by the subalpine and alpine peatbogs. The majority of the species develop among the *Sphagnum* stalks. Also there were found species of algae that prefer mesotrophic and eutrophic waters and contaminated water (*Trachelomonas volvocina*).

The similarity index values are very low, which indicate a low floristic similarity (Fig.3).

The study results chime with studies obtained by other authors in similar habitats in the Rodnei mountains (Momeu & Péterfi, 1985; Momeu & Péterfi, 1990).

Table 1

| SPECIES                                          | SAMPLES       |        |           |           |               |        |           |               |        |
|--------------------------------------------------|---------------|--------|-----------|-----------|---------------|--------|-----------|---------------|--------|
|                                                  | Peatbog 1     |        | Peatbog 2 | Peatbog 3 | Peatbog 5     |        | Peatbog 8 | Lake Ştiol    |        |
|                                                  | plank-<br>ton | bentos | bentos    | bentos    | plank-<br>ton | bentos | bentos    | plank-<br>ton | bentos |
| <b>Phylum Cyanophyta</b> (Cyanobacteria)         |               |        |           |           |               |        |           |               |        |
| <b>Order Chroococcales</b>                       |               |        |           |           |               |        |           |               |        |
| <i>Aphanotece microscopica</i>                   |               | +      |           |           |               |        |           |               |        |
| <i>Chroococcus minor</i>                         |               |        |           |           |               |        |           |               | +      |
| <i>Chroococcus minutus</i>                       |               | +      |           |           |               |        |           |               |        |
| <i>Chroococcus turgidus</i>                      |               | +      | +         |           |               |        |           |               |        |
| <i>Merismopedia glauca</i>                       |               |        |           |           |               |        |           |               | +      |
| <i>Merismopedia punctata</i>                     |               |        |           |           |               |        |           |               | +      |
| <i>Synechococcus aeruginosus</i>                 |               | +      |           |           |               |        |           |               |        |
| <b>Order Oscillatoriales</b>                     |               |        |           |           |               |        |           |               |        |
| <i>Oscillatoria bornetii</i>                     |               |        |           |           |               |        |           |               | +      |
| <i>Oscillatoria lutea</i>                        |               |        |           |           |               |        |           | +             | +      |
| <b>Order Nostocales</b>                          |               |        |           |           |               |        |           |               |        |
| <i>Anabaena variabilis</i>                       |               |        |           |           |               | +      |           |               |        |
| <i>Nostoc coeruleum</i> var. <i>planctonicum</i> |               |        |           |           |               |        |           | +             |        |
| <b>Order Stigonematales</b>                      |               |        |           |           |               |        |           |               |        |
| <i>Stigonema ocellatum</i>                       |               | +      |           |           |               |        |           |               |        |
| <b>Phylum Euglenophyta</b>                       |               |        |           |           |               |        |           |               |        |
| <b>Order Euglenales</b>                          |               |        |           |           |               |        |           |               |        |
| <i>Euglena fusca</i>                             |               |        |           |           | +             |        |           |               |        |

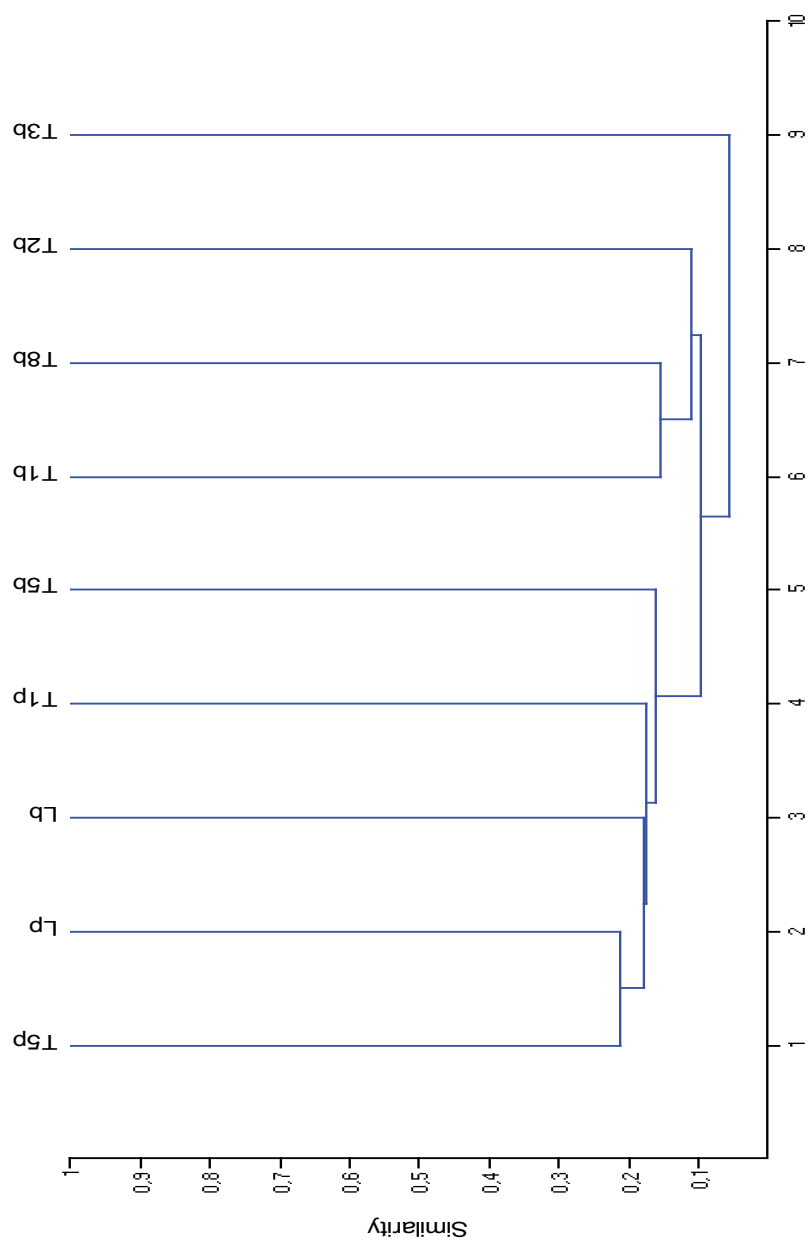








|                                  |   |   |  |  |  |   |  |   |     |
|----------------------------------|---|---|--|--|--|---|--|---|-----|
| <i>Staurostrum hirsutum</i>      |   |   |  |  |  |   |  |   | + + |
| <i>Staurostrum margaritaceum</i> |   | + |  |  |  | + |  |   |     |
| <i>Staurostrum muricatum</i>     |   | + |  |  |  |   |  |   | + + |
| <i>Staurostrum orbiculare</i>    |   |   |  |  |  |   |  |   | + + |
| <i>Staurostrum polymorphus</i>   |   |   |  |  |  | + |  |   |     |
| <i>Staurostrum punctulatum</i>   | + | + |  |  |  | + |  | + | + + |
| <i>Staurostrum scabrum</i>       |   |   |  |  |  |   |  |   | + + |
| <i>Staurostrum spongiosum</i>    |   | + |  |  |  |   |  |   | + + |
| <i>Staurostrum striatum</i>      |   |   |  |  |  |   |  | + |     |
| <i>Stauroidesmus cuspidatus</i>  |   |   |  |  |  | + |  |   |     |
| <i>Tetmemorus granulatus</i>     |   | + |  |  |  |   |  |   |     |
| <i>Tetmemorus laevis</i>         |   |   |  |  |  |   |  |   | + + |
| <i>Zygnema sp.</i>               |   | + |  |  |  | + |  | + | + + |



**Fig. 3.** The floristic similarity degree between the algae community

## Conclusions

If we take all of the information mentioned above we can formulate the next conclusions:

- In the 9 samples that were analyzed there were identified 107 species of algae;
- The 107 species belong to 6 phylums: Cyanophyta, Euglenophyta, Pyrophyta Chrysophyta, Xanthophyta, Chlorophyta;
- Most of the species are oligotrophic species, that prefer acid and clean waters;
- Because of the intervention of humans there were identified a series of eutrophic algae: *Ankistrodesmus falcatus*, *Ankistrodesmus gracilis*, *Dictiosphaerum pulchellum*, *Pediastrum boryanum*, *Scenedesmus acutus*, *Cosmarium hornavanense*, *Cosmarium laeve*;
- The similarity index values are very low, which indicate a low floristic similarity.

## Aknowledgements

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## Rezumat

Această lucrare are ca subiect inventarierea speciilor de alge din turbăriile din Poiana Știol, Parcul Național Munții Rodnei și determinarea ecologiei acestora. Condiția principală pentru formarea și dăinuirea unei mlaștini oligotrofe este carența solului sau a apei în substanțe minerale nutritive și, mai ales, în calciu. Prelevarea probelor s-a efectuat în data de 18 august 2009, iar determinarea speciilor s-a efectuat pe parcursul a șase luni (octombrie-martie).