

PRELIMINARY DATA ABOUT THE FLORA OF THE WASTES AND ASH DUMPS FROM ROVINARI-TURCENI AREA (GORJ COUNTY, ROMANIA)

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Abstract. The data presented in this paper are the result of the research we carried out in the last four years upon the wastes and ash dumps from Rovinari-Turceni area. They are part of a complex research programme, implemented at national scale: at the Research Contract no. 32-150/2008 "The evaluation of the effects of pollution and climatic changes on biodiversity and socio-economic status of the population in the middle basin of the Jiu river". There have been identified 143 species. The individuals of some plant species present aspect alterations (stains, burns, organ and habit distortions, dry branches, abnormal ramifications, premature fall of leaves and fruit), which make their determination more difficult. The majority of the species encountered on the ashes waste dumps are resistant to the content of heavy metals from those places.

Keywords: barren gangue and ashes waste dumps, flora, Rovinari, Turceni.

Rezumat. Date preliminare despre flora haldelor de steril și cenușă din zona Rovinari-Turceni (județul Gorj, România). Datele prezentate în această lucrare sunt rezultatele cercetărilor efectuate de noi în ultimii 4 ani asupra haldelor de steril și cenușă din zona Rovinari-Turceni. Ele fac parte dintr-un program de cercetare complex, realizat la scară națională, anume: Contractul de cercetare nr. 32-150/2008 "Evaluarea efectelor poluării și a schimbărilor climatice asupra biodiversității și stării socio-economice a populației în bazinul mijlociu al Jiului". Au fost identificate 143 specii. Indivizii unor specii de plante prezintă modificări de aspect (pete, arsuri, deformări de organe și habit, ramuri uscate, ramificații anormale, căderea prematură a frunzelor și fructelor) ce îngreunează determinarea acestora. Speciile întâlnite pe haldele de cenușă sunt, în marea lor majoritate, rezistente la conținutul în metale grele din aceste locuri.

Cuvinte cheie: halde de steril și cenușă, floră, Rovinari, Turceni.

INTRODUCTION

The cut down of the forests, the destruction of the vegetal carpet in the Rovinari-Turceni area had as a result the local disappearance of some species or the migration towards other areas, which ensure favourable life conditions and climatic characteristics for those species (RĂDUȚOIU, 2006). Consequently, both the life conditions and the old structure and the diffusion of the flora have been changed.

The pollution in the area of the town of Rovinari is firstly caused by the functioning of Rovinari Thermal Power Plant and secondly by the open pit mining in the neighbouring areas. The most severe impact was detected in the villages of Fărcășești, Timișeni, Mătășari. Near the town of Rovinari, lignite is exploited in the several open pits - Roșia de Jiu, Pinoasa, Tismana I, Tismana II, Rovinari Est, Gârla.

Within the administrative territory of Rovinari, open pits cover a surface of 789 ha (31% from the administrative territory), but, besides these functional open pits, there are also former pits summing up 176 ha, as well as 41 ha of wastes and ash dumps. The open pits of Balta Unchiașului, Beterega and Cicanii used to function within the alluvial plain area.

MATERIAL AND METHODS

The field research started from a previous documentation of that area. In the majority of the studied places the stationary method was used, collecting and preserving the floristic material.

The identification of the taxons was made using all the sources of taxonomic information (CIOCĂRLAN, 2000; SĂVULESCU et al., 1952-1976; TUTIN et al., 1964-1980).

After the identification, we made a floristic list with the identified species.

RESULTS AND DISCUSSIONS

From the research performed in the aforementioned period, a number of 143 species has been identified. For an easy finding of the taxon the species, we made the presentation alphabetically: *Achillea millefolium* L. – H., Euras.; *Agrimonia eupatoria* L. subsp. *grandis* (ANDRZ.) BORNH. – H., Submedit.; *Agrostis capillaris* L. – H., Circ.; *A. stolonifera* L. – H., Circ.; *Alliaria petiolata* (BIEB.) CAVARA et GRANDE – HT.-H., Euras.; *Amaranthus retroflexus* L. – T., Adv.; *Ambrosia artemisiifolia* L. – T., Adv.; *Anagallis arvensis* L. – T.-HT. Circ.; *Anchusa officinalis* L. – H.; Eur., *Anthriscus cerefolium* (L.) HOFFM. subsp. *trichosperma* NYMAN – T., Pont. Medit.; *Apera spica venti* (L.) BEAUV. – T., Euras.; *Arctium lappa* L. – HT., Euras.; *Arenaria serpyllifolia* L. – T., Circ.; *Artemisia annua* L. – T., Euras. Cont.; *A. vulgaris* L. – H., Circ.; *Atriplex patula* L. – T., Circ.; *Ballota nigra* L. – H., Eur. Centr. and NE; *Berteroa incana* (L.) DC. – HT., Euras.; *Brachypodium sylvaticum* (HUDS.) BEAUV. – H., Euras.; *Bromus tectorum* L. – T., Euras. Cont.; *Calamagrostis epigeios* (L.) ROTH – G., Euras. (Fig. 1); *Calamintha menthifolia* HOST – H., Eur.; *Capsella bursa-pastoris* (L.) MEDIK. – T.-HT., Cosm.; *Carduus acanthoides* L. – HT., Eur. (Fig. 2); *Carex divulsa* STOKES – H., Circ.; *Carthamus lanatus* L. – T.,

Pont. Medit.; *Centaurea apiculata* LEDEB. subsp. *spinulosa* (ROCHEL) DOSTAL – H., Centr. and SE Eur.; *C. stenolepis* A. KERNER – H., Centr. and SE Eur.; *Cerasus avium* (L.) MOENCH – Ph., Submedit.; *Cerintho minor* L. – T.-HT., Centr. Eur. Medit.; *Chamaesyce maculata* (L.) SMALL – T., Adv.; *Chelidonium majus* L. – H., Euras.; *Chenopodium botrys* L. – T., Cosm.; *Chondrilla juncea* L. – HT.-H., Cont. Euras.; *Cichorium intybus* L. – H., Euras.; *Cirsium arvense* (L.) SCOP. – G., Euras.; *Clematis vitalba* L. – Ph., Eur. Centr.; *Clinopodium vulgare* L. – H., Circ.; *Convolvulus arvensis* L. – H., Cosm.; *Conyza canadensis* (L.) CRONQ. – T., Adv.; *Cornus sanguinea* L. – Ph., Eur. Centr.; *Coronilla varia* L. – H., Centr. Eur. Submedit.; *Crataegus monogyna* JACQ. – Ph., Euras.; *Crepis foetida* L. subsp. *rheodifolia* (BIEB.) ČELAK. – T., Pont. Medit.; *Cynodon dactylon* (L.) PERS. – G., Cosm.; *Cynoglossum officinale* L. – HT., Euras. Cont.; *Daucus carota* L. – HT., Euras.; *Descurainia sophia* (L.) WEBB. ex PRANTL – T.-HT., Euras.; *Dichanthium ischaemum* (L.) ROBERTY – H., Euras.; *Dipsacus fullonum* L. – HT., Submedit.; *Echinochloa crus-galli* (L.) BEAUV. – T., Cosm.; *Echium vulgare* L. – HT., Euras.; *Eragrostis minor* HOST. – T., Centr. Eur. Medit.; *Erigeron annuus* (L.) PERS. subsp. *strigosus* (MÜHL. ex WILLD.) WAGENITZ – T, HT., H., Adv.; *Erodium cicutarium* (L.) L'HÉRIT – T., Euras.; *Erophila verna* (L.) CHEVALL. – T., Euras.; *Euphorbia cyparissias* L. – H., Euras.; *E. helioscopia* L. – T., Euras.; *Evonymus europaeus* L. – Ph., Eur.; *Fragaria viridis* WESTON – H., Euras.; *Fraxinus excelsior* L. – Ph., Eur.; *Galium aparine* L. – T., Circ.; *Geum urbanum* L. – H., Circ.; *Glechoma hirsuta* WALDST. et KIT. – H. (Ch.), Pont. Medit. Centr. Eur.; *Holcus lanatus* L. – H., Cosm.; *Hordeum murinum* L. – T., Euras.; *Humulus lupulus* L. – H., Euras.; *Hypericum perforatum* L. H., Euras.; *Kohlruschia prolifera* (L.) KUNTH – T., Atl. Medit.; *Lamium amplexicaule* L. – T., Euras.; *L. purpureum* L. – T., Euras.; *Lapsana communis* L. – T.-H., Euras.; *Lavatera thuringiaca* L. – H., Euras. Cont.; *Leontodon autumnalis* L. – H., Euras.; *Leonurus cardiaca* L. – H., Euras.; *Lepidium ruderale* L. – T., Euras.; *Ligustrum vulgare* L. – Ph., Eur.; *Lithospermum arvense* L. – T., Euras.; *Lolium perenne* L. – H., Cosm.; *Lotus corniculatus* L. – H., Euras.; *Lycopus europaeus* L. – H., Euras.; *Malus sylvestris* (L.) MILL. – Ph., Eur.; *Matricaria recutita* L. – T., Euras.; *Medicago lupulina* L. – T.-H., Euras.; *M. minima* (L.) L. – T., Submedit.; *Melilotus albus* Medik – HT., Euras.; *Mentha longifolia* (L.) HUDS. – H., Euras.; *M. pulegium* L. – H., Euras.; *Morus alba* L. – Ph., China; *Mycelis muralis* (L.) DUMORT. – H., Euras.; *Onopordum acanthium* L. – HT., Euras.; *Origanum vulgare* L. – H., Euras.; *Ornithogalum umbellatum* L. – G., Submedit.; *Phytolacca americana* L. – H., Am. de N.; *Pimpinella saxifraga* L. – H., Euras.; *Pinus nigra* ARNOLD – Ph., Eur.; *Plantago lanceolata* L. – H., Euras.; *Polygonum aviculare* L. – T., Cosm.; *P. lapathifolium* L. – T., Cosm.; *Populus canescens* (AITON) SM. – Ph., Eur.; *Portulaca oleracea* L. – T., Cosm.; *Potentilla argentea* L. – H., Euras.; *P. reptans* L. – H., Euras.; *Prunella vulgaris* L. – H., Cosm.; *Prunus spinosa* L. – Ph., Eur.; *Pycris hieracioides* L. – HT.-H., Centr. Eur. Medit.; *Pyrus pyraster* (L.) BURGDS. – Ph., Eur.; *Ranunculus sardous* Cr. – T., Eur.; *Robinia pseudacacia* L. – Ph., Am. de N. (Figs. 3,4); *Rosa canina* L. – Ph. Euras.; *Rumex crispus* L. – H., Euras.; *Rumex sanguineus* L. – H., Euras.; *Rubus candicans* WEIHE ex RCHB. – Ph., Eur. Centr. and SV; *Sambucus ebulus* L. – H., Euras.; *S. nigra* L. – Ph., Eur.; *Sanguisorba minor* SCOP. – H., Euras.; *Setaria pumila* (POIRET) SCHULTES – T., Cosm.; *Silene latifolia* POIRET subsp. *alba* (MILL.) GREUTER et BURDET – T., H., Euras.; *Sisymbrium officinale* (L.) SCOP. – T.-HT., Euras.; *Solanum dulcamara* L. – Ch., Euras.; *S. nigrum* L. – T., Cosm.; *Sonchus arvensis* L. – G., Euras.; *Stellaria media* (L.) VILL. – T.-HT., Cosm.; *Taraxacum officinale* WEBER ex WIGGERS – H., Euras.; *Thlaspi perfoliatum* L. – T.-HT., Euras.; *Torilis arvensis* (HUDS.) LINK – T., Eur. Centr.; *Tribulus terrestris* L. – T., Centr. Eur. Medit.; *Trifolium pratense* L. – H., Euras.; *T. repens* L. – H., Euras.; *T. hybridum* L. – H., Atl. Eur.; *Tussilago farfara* L. – G., Euras.; *Ulmus glabra* HUDS. – Ph., Euras.; *Urtica dioica* L. – H., Cosm.; *Verbascum blattaria* L. – HT., Euras. (Submedit.); *V. phlomooides* L. – HT., Eur. Centr. and SE; *Verbena officinalis* L. – H., Cosm.; *Veronica chamaedrys* L. – H.-Ch., Euras.; *V. hederifolia* L. – T., Euras.; *V. polita* FRIES – T., Euras.; *Viola odorata* L. – H., Atl. Medit.; *Vulpia myuros* (L.) C.C. GMELIN – T., HT., Euras.; *Xanthium italicum* MORETTI – T., Eur. de S; *X. spinosum* L. – T., Adv.

On the barren gangue and ashes waste dumps where plantings of acacia were made the number of the species is lower in comparison to the pioneer waste dumps where the phytodiversity is high. Among the species encountered on the pioneer waste dumps, only some have a bigger development (*Calamagrostis epigeios*, *Carduus acanthoides*, *Chenopodium botrys*), the rest have few representatives and usually they are harmed by the noxa agents from the atmosphere. Analysing the bioforms spectrum it has been found out that the terophytes and hemicriptophytes hold the highest percentage – 72%, followed at big distance the biennial, phanerophytes geophytes and chamephytes species. The rest has an insignificant rate (Fig. 5).

Of the goeolements, the greatest rate is held by the Eurasian elements with 49%, which are followed, at some distance, by the cosmopolites, European and Central-European elements. The other goeolements categories are present in a much smaller percent (Fig. 6).

CONCLUSIONS

The barren gangue and ash waste dumps have a special physiognomy determined by the stationary conditions. A big part of the identified plants are covered by a powder formed by fine materials.

The necessity of foresting these waste dumps is more acute as they are located near human settlements. Besides their unpleasant landscape aspect, they are continuous dust sources for the dwellings, especially in the days when the wind blows.

For these reasons the problem of fixing and leafing out of the waste dumps is a social necessity. Their covering with useful vegetation solves both the problem of the deposit consolidation and landscape recovery, but also the development of some sterile grounds.



Figure 1. *Calamagrostis epigeios* (L.) ROTH. on wastes at Fărcășești (original). / Figura 1. *Calamagrostis epigeios* (L.) ROTH. pe haldele de steril de la Fărcășești (original).



Figure 2. *Carduus acanthoides* L. on the wastes at Rovinari (original). / Figura 2. *Carduus acanthoides* L. pe haldele de steril de la Rovinari (original).



Figure 3. Image of an Acacia plantation from Fărcășești (original). / Figura 3. Imagine din interiorul unei plantații de salcâm din Fărcășești (original).



Figure 4. Image of an Acacia plantation from Moi terrace (original). / Figura 4. Imagine din interiorul unei plantații de salcâm de pe terasa Moi (original).

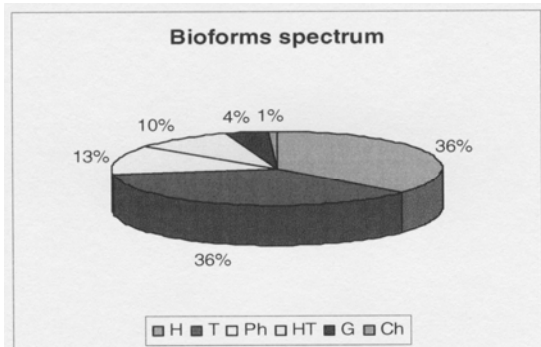


Figure 5. Bioforms spectrum. / Figura 5. Spectrul bioformelor.

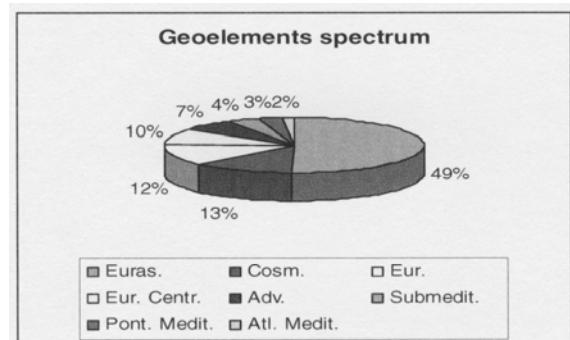


Figure 6. Geoelements spectrum./Figura 6. Spectrul geoelementelor.

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