

FLORA AND VEGETATION OF WASTE DUMP OF SLUDGE AT THE SUGAR FACTORY –PASCANI

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INTRODUCTION

Solving the problems related to depositing the industrial and domestic waste and its impact on the environment should represent a priority for the responsible authorities, scientists and people in general.

The fields of depositing the mud from the sugar factory in Păscani, during its period of functioning, collected the water coming from the technological process of washing and transporting the sugar beet. They are situated on the north-east direction, at about 1 km from the factory and they have a surface of 398,238 square meters. The volume of mud deposited on average per day, in the period of the factory functioning, was 585 m³. For a processing of 4000 tones/day during about 70 days, the result was 12,000 t of mud from the operations of transport and washing. The mud was pumped out by means of mud pumps. For 4000 t/day of processed beet the deposit was, in about 40 days, 15,200 t of technological mud.

Characterization of the mud from sugar factories

Around the sugar factories there are deposits in special waste dumps, in open space, of mud called sludge (yellow and black). The black sludge results in sugar factories during the following process: the juice of sugar beet is treated with hydroxide of calcium. The excess of hydroxide of calcium that remains non-precipitated is treated with dioxide of carbon. After these treatments, it results a mixture of carbonates of sodium, potassium and calcium, as well as colloids that are absorbed at the surface of carbonates granules. It includes a series of organic acids (lactic, acetic, oxalic).

In the precipitate are also retained small quantities of sugar in form of sugars of calcium or sugar itself that can become sugar polarized up to 2%. In the precipitate there are also salts of amino acids, pectin substances and organic bases. In principle, 80% of the sludge composition is represented by carbonates; all the ingredients in the juice of treated beet are retained in the technological process on filters. The precipitate is collected, diluted with industrial water and evacuated as a diluted mud in the waste dump in the field, where especially in the period April-

October take place intense processes of fermentation, underlined by the appearance of rich surface foam and gas evacuation.

The black sludge comes from soil adherent on the beet that is eliminated by washing. This soil contains leaves, roots and other vegetable remains resulted after the process of cleaning and washing the beet. Accidentally, this mud can also contain beet noodles. The black sludge is diluted with industrial water (25-30% mud) and evacuated, too, in the waste dump in the field.

On the surface of the deposit of mud from the sugar factory in Păscani take place, in time, mechanisms of natural attenuation that result in the appearance of some specific vegetation.

Consequently, this paper has the aim of: identifying some particularities of the sub-layer in the fields with mud deposits; classifying the species of algae and cormophites that succeeded in colonizing this sub-layer.

MATERIAL AND METHOD

The research in view of writing this paper has a complex character and took place in two stages: the summer period in 2003 and the vernal period 2004.

Taking into account the technological process of generation of technological mud, we were interested in determining the pH values at the soil level at the basis of deposit concavity.

The determination of soil reaction was realized by means of pH – meter, and the interpretation of the obtained results was done according to the scale of interpretation I.C.P.A., Bucharest, 1987.

The vegetation was studied by means of the Braun-Blanquet method, and the flora was recorded on the entire surface of mud deposit.

RESULTS AND DISCUSSIONS

Chemical characteristics of rooting sub-layer

The pH is an index of appreciation of the opportunity of amending the soils, together with the degree of saturation in basic cations and the concentration of aluminum that can be extracted in solutions of neuter salts.

Our samples of soil presented a strongly alkaline reaction, having values between 8.50 and 9.43. This result indicates the fact that the plants situated in the

conditions of biotope studied by us have a very complex response to acquiring mineral salts in the environment. The response is expressed by plant production, by growth rate and the percentage of nutrients in the tissues. The species recorded can tolerate excessive quantities of Ca salts, being among the species of ruderals, eutrophs.

The list of species of algae and cormophytes

After the analysis of the vascular flora, at the level of regions preserved by deposits, 3 years after finishing the factory functioning, we noticed the action of a phenomenon of natural attenuation of the pollution generated by the technological mud, expressed by the appearance of species predominantly eutrophs, mezzo-xerophytes, according to the list below:

Phragmites australis Trin. et. Stend; Eutr.-mezotr.higr.
Onopordon acanthium L.; Eutr.mezox.-xer.
Hordeum murinum L.; Eutr.mezox.-xer.
Urtica dioica L.; Eutr.
Cirsium lanceolatum (L.)Scop.; Eutr.mezoxer.
Atriplex tatarica L.; Eutr.mezoxer.
Puccinelia distans (Jacq.)Pall.; Eutr.higr.
Polygonum aviculare L.; Mezoxer.- xer.
Chenopodium album L.; Eutr.mezoxer.
Cirsium arvense (L.)Scop.; Eutr.mezoxer.
Capsella bursa-pastoris (L.)Medic.; Eutr.
Taraxacum officinale Webb. In Wigg.; Eutr.mezoxer.
Trifolium repens L.; Eutr.
Matricaria chamomilla L.; Eutr.mezoxer.
Stellaria media (L.)Vill.; Eutr.
Xanthium strumarium L.; Eutr.mezoxer.
Rumex crispus L. Eutr.
Achillea millefolium L.; Eutr.mezoxer.
Sisymbrium sophia (L.)Webb.; Eutr.mezoxer.
Artemisia annua L.; Eutr.mezoxer.
Lepidium ruderalis L.; Eutr.mezoxer.
Arctium minus Bernh.; Eutr.mezoxer.
Juncus compressus Jacq. Eutr. Calcicol.

These species are installed in form of belts from the surface to the base of the hole, forming phytocoenosis that can be framed in ruderal vegetal associations. In this idea, we can retain the phytocoenosis from as. Atriplicetum tataricae, having the following composition:

<i>Atriplex tatarica</i>	3
<i>Sisymbrium sophia</i>	+
<i>Lepidium ruderalis</i>	+
<i>Onopordon acanthium</i>	+
<i>Urtica dioica</i>	+
<i>Hordeum murinum</i>	1
<i>Cirsium lanceolatum</i>	1
<i>Capsella bursa pastoris</i>	+
<i>Stellaria media</i>	+
<i>Rumex crispus</i>	+
<i>Achillea millefolium</i>	+
<i>Xanthium strumarium</i>	+

At the bottom of the hole, with a surface of around 900 m², appeared the vegetal as.

Puccineliatum distans, having the following composition:

<i>Puccinelia distans</i> (Jacq) Pall.; Eutr. higr.	5
<i>Chenopodium album</i> L.; Eutr.mezoxer.	+
<i>Taraxacum officinale</i> Webb.in Wigg.; Eutr.mezoxer	+
<i>Atriplex tatarica</i> L.; Eutr.mezoxer.	+
<i>Hordeum murinum</i> L.; Eutr.mezox.-xer. Euras.	+
<i>Trifolium repens</i> L.; Eutr.	+
<i>Agropyron repens</i> P.Beauv.; Eutr.mezoxer.	+

The pioneer species on the bottom of the hole, uncovered by water, is *Puccinelia distans*, which appears and becomes dominant as number and cover. In the regions flooded the predominant is *Phragmites australis*, authoritarian, without mixture with other hydrophilic species met here, such as *Bolboschoenus maritimus* and *Eleocharis palustris*.

In the water that covers isolated the bottom of the hole, it develops well *Oscillatoria tenuis* (Cyanophyceae) and *Euglena polymorpha* (Euglenophyceae). Among the edaphical algae we also identified species in the *Gloeocapsa* genus.

CONCLUSIONS

The field occupied by technological mud from the sugar factory in Pascani was initially not adequate for vegetation appearance. By washing with water from precipitations, appeared conditions of algae appearance, such as *Oscillatoria tenuis* and *Glaeocapsa sp.* framed in the category of saprobes – mezo-saprobes. If water is in excess and stagnant, it develops well *Euglena polymorpha*, which cohabitates with *Oscillatoria tenuis*.

After at least two years, also appeared cormophytes, centripetal, at the base of deposit holes. Most species are eutrophs, meso-xerophytes with great tolerance for the alkaline soil. The dominant species are *Puccinelia distans* (on dry mud) and *Phragmites australis* (on flooded mud). This situation is repeated without important differences on all the surface of deposit fields.

REZUMAT

În apropierea fabricii de zahăr Pașcani au fost depozitate, în halde speciale, nămoluri numite șlamuri. Șlamul, rezultat în urma procesului tehnologic de fabricare a zahărului, este un amestec de carbonați de sodiu, potasiu, calciu, resturi de frunze și pământ desprins de pe sfecla adusă pentru prelucrare. Șlamul a fost diluat cu apă industrială (25 – 30% nămol) și evacuat în haldele din câmp.

După reducerea activității fabricii, o parte din halde au intrat în conservare și după 5 ani s-a constatat instalarea unor specii predominant eutrofe și mezo – xerofite. Aceste specii se instalează sub formă de brăie și alcătuiesc fitocenoze care aparțin asociațiilor vegetale *Atriplex tataricae* și *Puccineliatum distantis*, tolerante la cantități mari de săruri și la un pH cuprins între 8,5 și 9,43.

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