

Program	Proiect NUCLEU PN 09-13-03.07
Project title (ENG):	Phytoremediation of areas polluted with oil products using organic fertilizers type of sewage sludge
Project title (RO):	Fitoremedierea unor arii poluate cu produse petroliere prin utilizarea fertilizatorilor organici de tipul nămolurilor orașanești
Duration	2012-2015
Team Leader	Senior Researcher Eng. Smaranda Mășu
Summary (short description) ENG	<p>They studied variants of phytoremediation of contaminated soils plants with different amounts of crude oil (total petroleum hydrocarbon (TPH):</p> <ol style="list-style-type: none"> 1. ground with low pollution 1g / kg D.M.cultivated in the following versions: leguminous plants <i>Vicia spp.</i> or <i>Onobrichis spp.</i>, grasses <i>Lolium spp</i> and grasses <i>Lolium spp.</i>; 2. average soil pollution with 27,6-28,6g / kg DM cultivated with: legumes <i>Vicia spp.</i> plants or <i>Onobrichis and</i> grasses <i>Lolium spp.</i>; 3. soil pollution with 18.46 ± 2 30g / kg D.M. cultivation with <i>Glycine max</i>, 4. soil pollution than 64.3 ± 3.5 g / kg D.M mice with wild plant (<i>Hordeum murinum</i>) 5. sol with high pollution 55.45 ± 0.25 g / kg D.M.cultivated with plants of mouse tail 6. Very high polluted soil with 113,5g and 80.5 g / kg D.M by culture of small trefoil (<i>Lotus corniculatus</i>). <p>TPH variants were realized on phytoremediation of polluted soils fertilized with sewage sludge in the absence / presence of additives acting as adsorbent / amendment as indigenous volcanic tuff, ash from coal combustion in power plants fossil plants. For experimental variations of phytoremediation were developed models.</p> <p>Were developed two technologies for phytoremediation of soils contaminated with TPH.</p>
Summary (short description) RO	<p>S-au studiat variante de fitoremediere cu plante a solurilor poluate cu cantități diferite de țitei, (Total petroleum hydrocarbon (TPH):</p> <ol style="list-style-type: none"> 1. sol cu poluare mică de 1g/kg su.,cultivat in variantele: plante leguminoase <i>Vicia spp.</i> sau <i>Onobrichis spp</i> ., plante graminee <i>Lolium spp.</i>; 2. sol cu poluare medie 27,6-28,6g/kg su cultivat in variantele: plante leguminoase <i>Vicia spp.</i> sau <i>Onobrichis spp</i> plante graminee <i>Lolium spp.</i>; 3. sol cu poluare medie $18,46 \pm 2,30$g/kg su cultivare cu <i>Glicine max</i>, 4. sol cu poluare mare de $64,3 \pm 3,5$ g / kg su cu planta sălbatică orzul șoarecelui (<i>Hordeum murinum</i>), 5. sol cu poluare mare $55,45 \pm 0,25$g /kg su cu plante din specia coada șoarecelui ; 6. sol cu poluare foarte mare 80,5 si 113,5g/kg su prin cultura de ghizdei mărunț (<i>Lotus corniculatus</i>). <p>Variantele de fitoremediere au fost realizate pe soluri poluate, fertilizate cu namol orasenesc în absenta/prezenta unor adaosuri cu rol de adsorbant/ amendament precum tuful vulcanic indigen, cenusa rezultata din arderea carbunelui fosil in termocentrale termice. Pentru variantele experimentale de fitoremediere s-au elaborat modele.Pe baza modelelor s-au elaborat 2 tehnologii de fitoremediere a solurilor poluate cu TPH.</p>

Dissemination of results	
Full-paper ISI	Mășu S. Dragomir N., Popa M., Variation of Oil Products in Contaminated Soil Cultivated with Leguminous Species, <i>Journal of Environmental Protection and Ecology</i> , 2013 , 14(3), 901-906, ISSN: 1311-5065 , WOS: 000326128100012.
	Mășu S. , Cojocariu L., Horablaga N.M., Bordean D.-M., Breica A. Borozan, Cojocariu A., Pop G., Sandoiu I.C., The effects of <i>Triticum Aestivum</i> species for the phytoremediation of petroleum – contaminated soil, 16-22 June, 2013 , <i>Ecology, Economics, Education and Legislation, Conference Proceedings 13th International Multidisciplinary Scientific Geoconference SGEM 2013</i> , Albena, Bulgaria, vol.1 963-970, WOS: 000349062300126 ISSN 978-619-7105-04-9, ISSN 1314-2704.
	Mășu S. , Albușescu M., Bălășescu L.C., Assessment on Phytoremediation of Crude Oil Polluted Soils with <i>Achillea millefolium</i> and Total Petroleum Hydrocarbons Removal Efficiency <i>Revista de Chimie</i> , 2014 , 65(9), 1103-1107, ISSN:0034-7752, WOS:000343965900022.
	Mășu S. , Marin A., Popescu D. , Morariu F., Lixandru B., Ciulan V., Morariu S. Crude oil polluted soils phytoremediation with native grass, <i>Journal of Biotechnology</i> 2014 , vol 85 Supliment European Biotechnology Congress, S 64, ISSN 0168-1656, VOS 000350032000196.
	Mășu S. , Morariu F., Popescu D., Research on Rehabilitation of Ancient Oil Polluted Soil Through Perennial Plant Phytoremediation, <i>Journal of Biotechnology</i> , 2015 , 208 supliment, S55, ISSN 0168-1656 VOS 000359087000163,
	S. Mășu , L. Cojocariu, D. M. Bordeian, M. Horablaga, F. Morariu Phytoremediation of Oil Polluted Soils and the Effect of Petroleum Product on the Growth of <i>Glicine max.</i> , <i>Revista de Chimie</i> , 2016 , 67(9), 1774-1777, ISSN:0034-7752, WOS:000385266600025.
	S. Mășu , E. Grecu, I. Oncioiu, M. Petrescu; <i>For a sustainable development: Phytoremediation of oil-polluted soils by using birdsfoot trefoil crops</i> , <i>Romanian Biotechnological Letters</i> , 2016 , 21(6), 12010-12017.
	S. Mășu , F. Morariu, L. Cojocariu, Influenta plantelor salbatice din specia <i>Hordeum murinum sp</i> in restaurarea unor terenuri agricole poluate cu titei., 28. June, 2016 , <i>Conference Proceedings Volume 16th International Multidisciplinary Scientific Geoconference SGEM 2016</i> , Albena, Bulgaria, WOS: 000349062300089.
Full-paper BDI	Mășu S. , Albușescu M, Dragomir N., Influence of <i>Vicia Sativa</i> Culture in Phytoremediation of Soils Polluted with Petroleum Products, <i>Annals of West University of Timisoara Series Chemistry</i> , 2012 , 21 (2), 95-101, ISSN 1224-9513 , WOS:000184327300009.
	Mășu S. , Dragomir N., Morariu F., Using different tolerant plant for phytoremediation of contaminated soils with total petroleum hydrocarbons, <i>Scientific Papers: Animal Science and Biotechnologies</i> , 2013 , 46 (1), 189-184, ISSN 1841-9364
	Mășu S. , Popa M., Morariu F., Lixandru B., Popescu D., Prospects of using leguminous species in phytoremediation of total petroleum hydrocarbons polluted soils, <i>Scientific Papers: Animal Science and Biotechnologies</i> , 2014 , 47 (1), 172-176, ISSN 1841-9364

Full-paper BDI	<p>Mășu S., Removal of some oil compounds from wastewaters using adsorbents of natural origin, Conferința Internațională Practici și Experiențe în Protecția Mediului <i>Ecomedi</i>, 2014 Arad, Romania,9-11</p> <p>Mășu S., Popa M., Morariu F., Aspects of Rehabilitation of Waste Dumps Using Herbaceous Plants, <i>Scientific Papers: Animal Science and Biotechnologies</i>, 2015, 48, 1, 186-190, ISSN 1841-9364</p> <p>Masu S., Morariu F, Popa M., The use of adsorbent materials of improving the characteristics of polluted soils. Part 1., Phytoremediation of soils polluted with oil products, cultivated with technical plants. <i>Scientific Papers: Animal Science and Biotechnologies</i>, 2015, 48,2, , 76-80, ISSN 1841-9364</p> <p>MorariuF., Masu S., Popa M., Popescu D.,The use of adsorbent materials of improving the characteristics of polluted soils. Part 2 The bioaccumulation of metals in plants used in phytoremediation processes <i>Scientific Papers: Animal Science and Biotechnologies</i>, 2015, 48, 1,191-194, ISSN 1841-9364</p> <p>S. Mășu <i>Lotus corniculatus</i> Crop Growth in Crude Oil Polluted Soil. Part 1. Total Petroleum Hydrocarbon Reduction of Polluted and Cultivated Soils, <i>Scientific Papers: Animal Science and Biotechnologies</i>, 2016,49 (1), 119-122. ISSN 1841-9364</p> <p>Morariu F., Masu S., Popa M., <i>Lotus corniculatus</i> Crop Growth of in Crude Oil Contaminated Soil. Part 2 Biomass metals bioaccumulation I, <i>Scientific Papers: Animal Science and Biotechnologies</i>,2016, 49 (1), 123-127, ISSN 1841-9364</p>
Conferences (platform, poster, abstract / full-paper)	<p>Mășu S.,Phytoremediation of Hydrocarbon-Contaminated Soil, Using Plants, 24th September, 2012,<i>The XVIII. International Symposium on Analytical and Environmental Problems</i>, Szeged, Hungary, 56-59, ISBN 978-963-306-1657</p> <p>Mășu S., Dragomir N., Morariu F., Using different tolerant plant for phytoremediation of contaminated soils with total petroleum hydrocarbons, 30-31 May. 2013, <i>Internațional Scientific Symposium Bioengineering of Animal Resources ISSBAR 2013</i>, Timișoara, Romania</p> <p>Mășu S., Dragomir N., Popa, M., The Variation Oil Products in Contaminated Soil Cultivated with Leguminous Species, 23-25 May, 2013, <i>International U.A.B.–B.EN.A. Conference</i>, Alba Iulia, Romania</p> <p>Mășu S., Phytoremediation of Crude Oil Polluted Soil: Studies of the Total Petroleum Hydrocarbons Decrease in the Rhizosphere Planes, 23 September, 2013, <i>The 19th Symposium on Analytical and Environmental Problems</i>, Szeged, Hungary , ISBN 978-963-315-141-9</p> <p>Mășu S., Bălășescu L.C., Assessment on phytoremediation of crude oil polluted soils: growth performance of <i>Achillea millefolium</i> and TPH removal efficiency., 29-30 Octombrie, 2013, <i>International Symposium The Environment and Industry SIMI 2013</i>, București, Romania</p> <p>Mășu S., Popa M., Morariu F., Lixandru B., Popescu D., Prospects of using leguminous species in phytoremediation of total petroleum hydrocarbons polluted soils, 29-30 may, 2014, <i>Internațional Scientific Symposium Bioengineering of Animal Resources</i> Timișoara, Romania</p> <p>Mășu S., Marin A. A., Popescu D., Morariu F., Phytoremediation TPH polluted soil with common flax, 22, September, 2014, <i>The 20th International Symposium on Analytical and Environmental Problems</i>, Szeged, Hungary,, 67 -70, ISBN 978-963-12-1161-0</p>

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	Mâșu S. , Marin A., Popescu D., Morariu F., Lixandru B., Ciulan V., Morariu S. Crude oil polluted soils phytoremediation with native grass, 15-18 may 2014 , <i>European Biotechnology Congress</i> , Lecce, Italia
	Mâșu S. , Morariu F., Popa M., The use of adsorbent materials of improving the characteristics of polluted soils. Part 1. Phytoremediation of soils polluted with oil products, cultivated with technical plants, 28-29 may 2015 , <i>International Scientific Symposium Bioengineering Of Animal Resources</i> , Timisoara, Romania
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	Mâșu S. , Morariu F., Popescu D., <i>Research on Rehabilitation of Ancient Oil Polluted Soil Through Perennial Plant Phytoremediation</i> , 20 august 2015 , <i>European Biotechnology Congress</i> , 2015, Bucuresti. Romania Publicată în Journal of Biotechnology, Volume 208, Supplement, s102.
	Mâșu S. , Morariu F., Oil Polluted Soils Phytoremediation by Grazing Culture, 28 September 2015, <i>21st International Symposium on Analytical and Environmental Problems</i> , Szeged, Hungary, 294-295, ISBN 978-963-306-411-5.
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