ЕВРОПЕЙСКА НОЩ НА УЧЕНИТЕ

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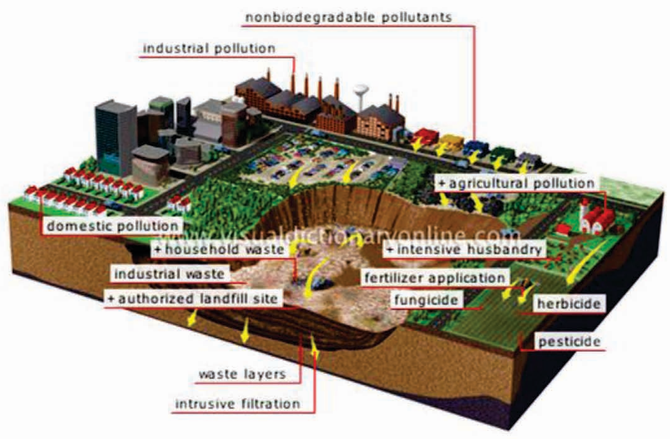
Contribution of arbuscular mycorrhizal fungi in attenuation of heavy metal impact on *Calendula officinalis development*

Institute of Plant Physiology and Genetics IPPG

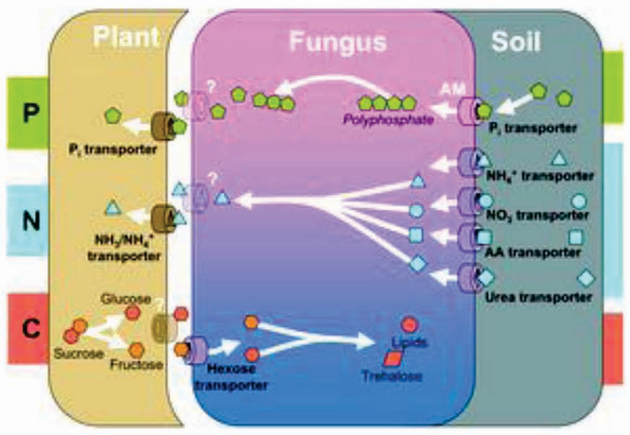
ESF Bulgaria
European Social Fund

BACKGROUND:

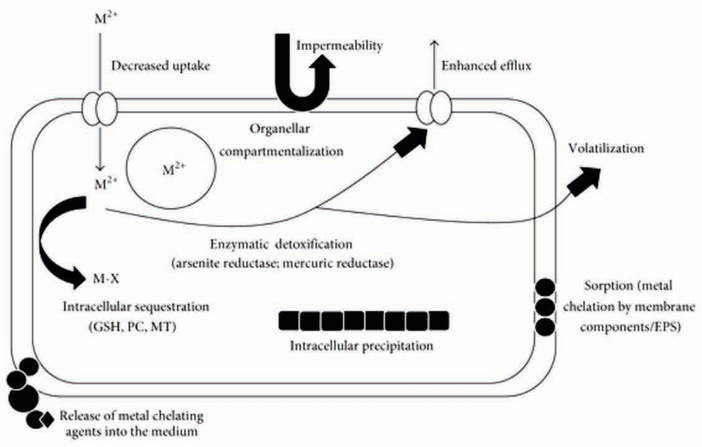
Arbuscular mycorrhizal (AM) fungi are prospective tool for enhancing plant tolerance to environmental stress conditions and restoration of naturally or industrially metal contaminated soils.



Possible sources of heavy metal (HM) pollution (Internet source)



Scheme summarizing the main nutrient exchange processes in AM symbiosis (by Paola Bonfante & Andrea Genre 2010)

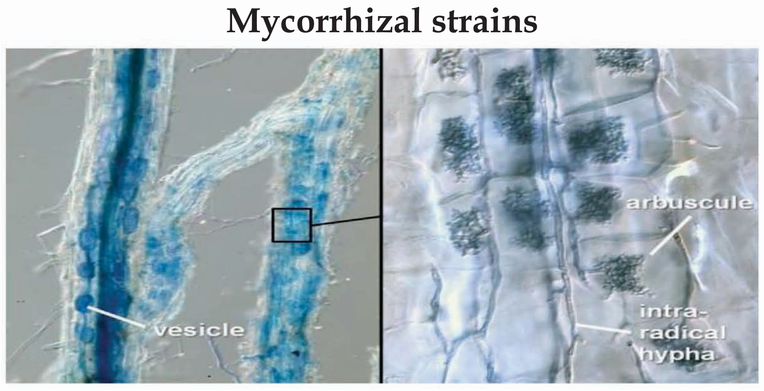


HM detoxification mechanisms of plants and fungi in AM symbioses (by Srivastava and Meenal Kowshik 2013)

OBJECTIVE:
Evaluation of pot marigold (Calendula officinalis L.) response, grown on industrially polluted with Cd and Pb soil to AMF, concerning the growth, mycorrhizal colo-nization, uptake and distribution of heavy metals in the plant organs.

MATERIALS AND METHODS:

Mycorrhizal strains



Electron microscopy of stained AM roots (Schüßler's group website)

<u>Strain EEZ-35</u>: Claroideoglomus claroideum, isolated the rhizosphere of Zea mays in Braunchweig (Germany), in a parcel contaminated by the repeated addition of sludge.

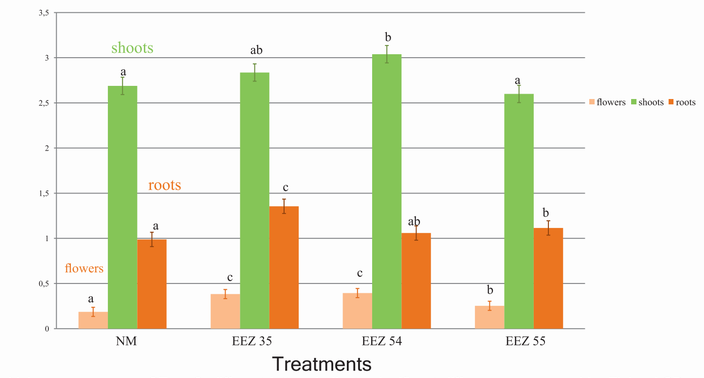
<u>Strain EEZ-54</u>: a different isolate of Claroideoglomus claroideum from Rio Tinto (Huelva, Spain) from the rhizosphere of Lavandula stoechas.

<u>Strain EEZ-55</u>: Funneliformis mosseae, also isolated from Rio Tinto (the soil naturally have a quantity of metals).

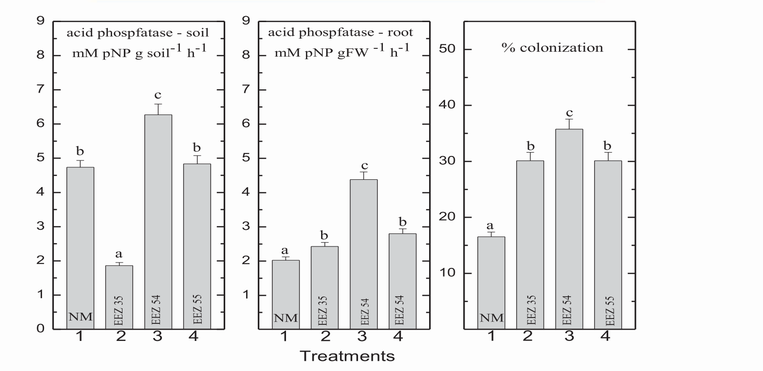
Plant object: Calendula officinalis L. var. "Plamen"

Determination of root colonization: Giovanetti & Mosse (1980). Heavy metal analysis: Doumett, Lamperi, Checchini, et al. (2008).

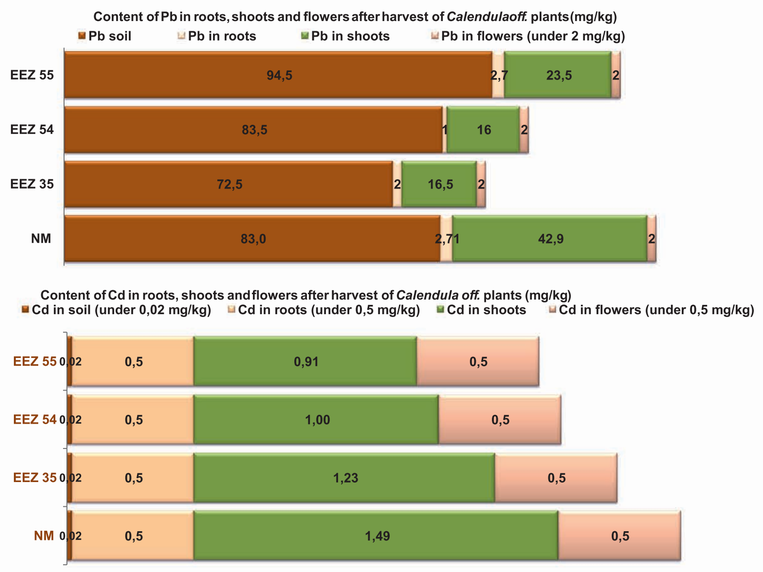
RESULTS:



Values are means ± SE, n=3; different letters indicate significant differences assessed by Fisher LSD test (P≤0.05) after performing ANOVA analysis



Phosphatase activity in soil and roots; percent colonization of *Calendula off.* roots. Values are means ± SE, n=3; different letters indicate significant differences assessed by Fisher LSD test (P≤0.05) after performing ANOVA analysis



CONCLUSIONS:

- **Both strains EEZ-35 and EEZ-54 reduced Pb content in the aerial plant parts with about 60% and EEZ-55 with 45% in comparison with the control. Some decrease of Pb was identified in the roots colonized with both Claroideoglomus claroideum isolates.**
- **Reduction of Cd was noted in the aboveground parts of marigold inoculated with EEZ-35 and EEZ- 55.**
- **Neither Pb nor Cd was detected in the marigold flowers (Calendula flos drug.**
- **The highest biomass accumulation was observed regarding aerial parts of the plants inoculated with EEZ-54, which coincided with the highest percent of colonization and the highest acid phosphatase activity.**

ACHIEVMENTS:

- **keeping metal concentrations in the medicinal plants below critical values and improving plant growth and nutrition by AMF**
- **determination of a suitable and productive AM strain for Calendula officinalis L.**
- **AM strains deriving from a soil with naturally high level of metals, are evolutionarily more adapted to manage with higher metal concentration**

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Европейска комисия

K-TRIO

Този проект се финансира от РП за научни изследвания и иновации „Хоризонт 2020" на ЕС, по договор номер 633175

Проектът K-TRIO 2 за Европейска нощ на учените 2015 се финансира от Европейската комисия по дейностите Мария Склодовска–Кюри на програма „Хоризонт 2020"

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