

TECO Mobility grant

Physiological characterization of Hemeoxygenase-1 under Cd induced oxidative stress in crop plant of Indian Thar Desert

Particulate mater from air and soil phytoremediation by shrubs and trees

Beneficiary of the grant- Robert Popek

Home Institution/Company (EU)- Institute of Dendrology, Polish Academy of Sciences

Host Institution/Company (INDIA)- Jai Narain Vyas University, Jodhpur

Period of the stay in India- 22.10.17 - 21.12.17



TECO Project

*Technological ECO-innovations for the quality control
and the decontamination of polluted waters and soils*

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Objective of the project

- Evaluation of the regulatory changes of the various physiological processes that occurs due to the exposure of cadmium pollution in the seedlings of mung bean (*Vigna radiata*) crop plant
- Investigation of the potential role of HO 1 enzyme activity in plants tissues to increase soil phytoremediation
- Research on the potential of trees and shrubs species from the Indian Thar Desert to phytoremediate PM and heavy metals from soil and air in urbanized areas



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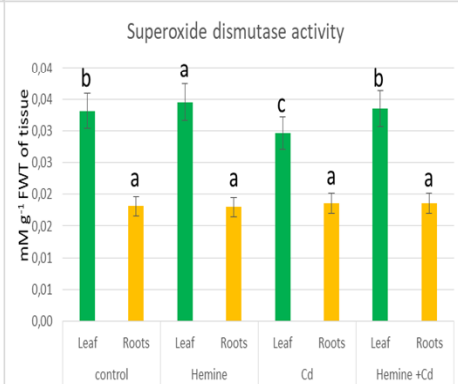
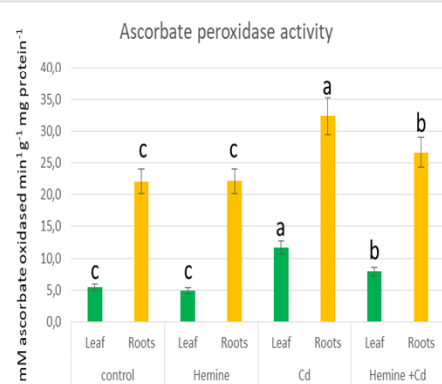
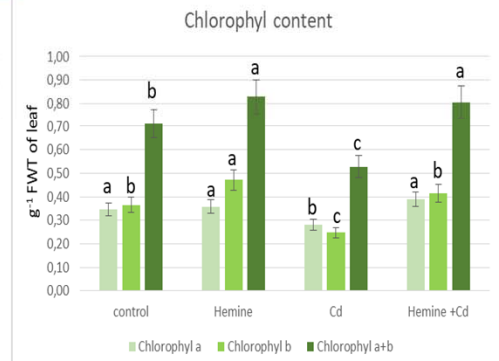
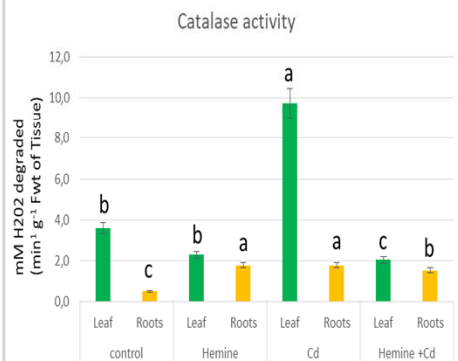
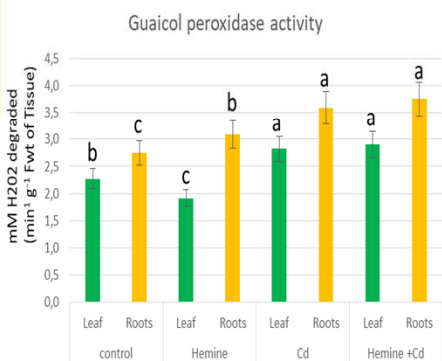
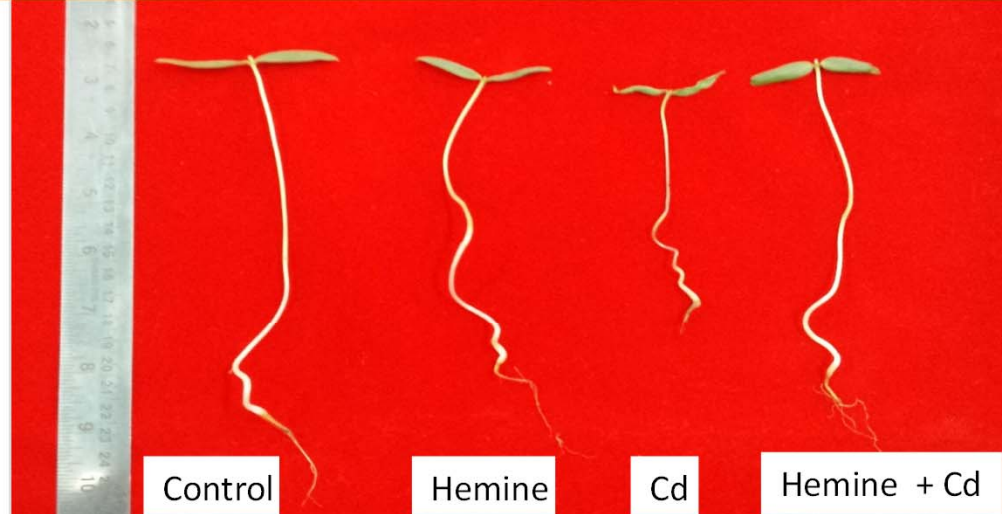
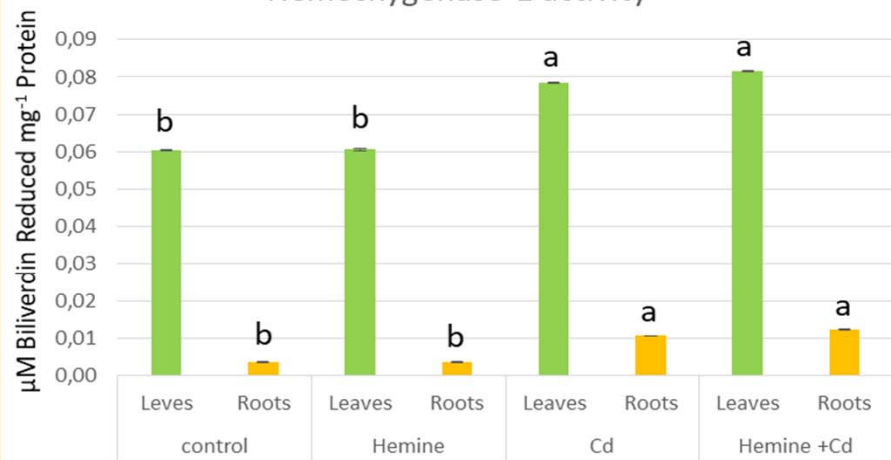
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Activities carried out during the period of the grant

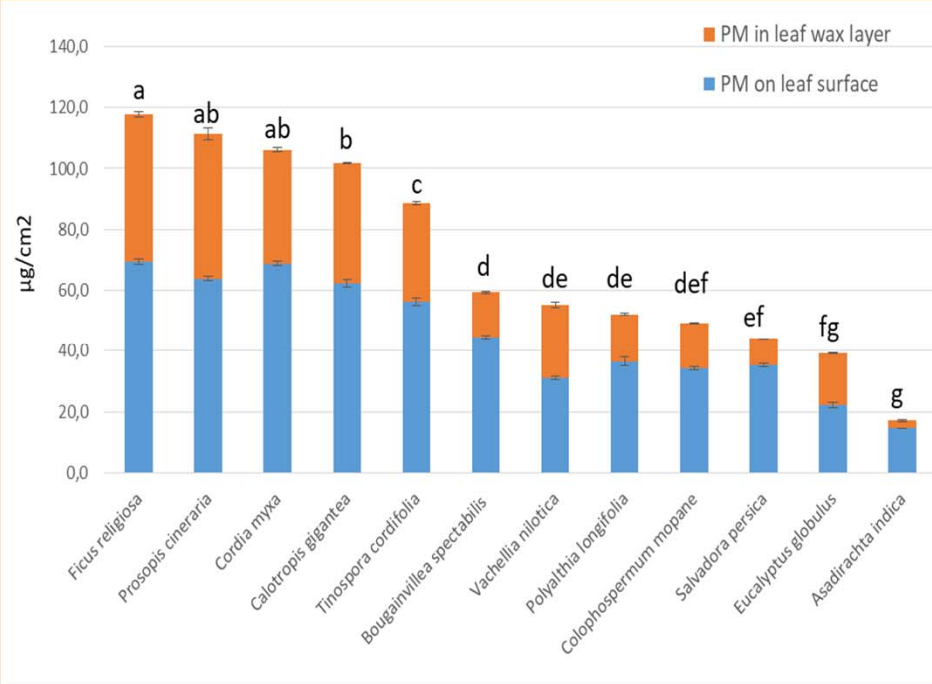
- Research on heavy metal (Cd) induced oxidative stress in *Vigna radiata* crop plant and of HO1 activity response
Measurements conducted on Cd stressed and nonstressed *Vigna radiata* plants: shoot and root length, fresh and dry weight, tolerance index, chlorophyll a and b content, protein, H₂O₂, and proline content, lipid peroxidation and guaicol peroxidase, catalase, ascorbate peroxidase and superoxide dismutase activity
- Measurement of the ability to accumulate particulate matter (PM) from soil and air on leaves of 12 species of trees, shrubs and climber from the Indian Thar Desert and Hemoxygenase 1 activity.
- Measurement of amount of heavy metals (Cd and Cu) in leaves absorbed from the soil by 12 species from Thar Desert



Hemeoxygenase 1 activity



HO 1 plays important role in series of reactions dependable for Cd tolerance. HO 1 works within an assembly of other antioxidant enzymes and generate the defense mechanism for plant's growth as we can see in the hemine (HO1 donor) + Cd variant. This experiment enhances our knowledge of the HO 1 role in the plant defense against metal stress which will be useful in developing metal-tolerant and metal-absorbing varieties of plants useful in soil phytoremediation.



Tested species differed in total PM, Cu and Cd accumulation. The highest of all ability for accumulation of PM had *Ficus religiosa* (117.8µg/cm²). This species has also one of the highest amount of accumulated Cu and Cd in leaves. *F. religiosa* tree is considered sacred by the followers of Hinduism. It gives a shadow in a hot days and it is used in is used in traditional medicine. The phytoremediation ability of air of this tree can be another advantage.

