



Germination responses of *Opuntia ficus-indica* (L.) Mill. on a heavy metal polluted substrate

V. Catanese (1), V. Siracusa (1), C.A. Campiotti (2), F. Saiano (1), G. Alonzo(1)

(1) Department I.T.A.F. University of Palermo, Italy ; (2) ENEA, Department BIOTEC, Casaccia (Roma), Italy

The ability of *Opuntia ficus-indica* (L.) Mill. to grow in stressed environments, induced us to investigate the behavior of *Opuntia ficus-indica* on heavy metal polluted soils. Germination of *Opuntia ficus-indica* has been evaluated under controlled environmental parameters by using substrates polluted with Cd, Cu, Cr(III) and (VI), Hg, Pb and Se heavy metals. Seeds of *Opuntia ficus-indica* ("Bianca" sicilian variety) were obtained during August 2005 from fresh fruits. In order to enhance their germinability, seeds underwent chemical and temperature pretreatments followed by sterilization. The substrate considered for seeds germination was obtained by thoroughly mixing turf (50%), sand (< 2mm, 25%) and volcanic rock (< 2mm, 25%). Each substrate sample (50g) was polluted with one of the above metals. Three different concentrations of each metal were considered with ranges, see above, matching as better as possible Italian regulations (DM 471/99). Substrate samples were sterilized, added of 20 seeds, and placed in a "nursery box", an ENEA prototype developed under PNRA, which allows a full remote control of light, temperature and humidity. All experiments were performed in triplicate and blanks were randomly inserted among the polluted samples. Results indicate that the germination behavior is dependent both on the particular heavy metal considered as well as on its concentration. Peculiar is the behavior of selenium polluted samples resulting in an increase of germination as the selenium concentration increases. For Cd, Cu and Pb, the germination decreases with the increase of the heavy metal concentration. With Hg, germination occurs late and appears strongly reduced while, in the case of Chromium there is apparently a maximum of germination at intermediate concentration values. Further experiments will also explore the potential uptake of various heavy metals from *Opuntia ficus-indica* at various stages of its development and the distribution of the metals into the plant.