Proceedings of the Joint Congress SIBV-SIGA
Pisa, Italy – 19/22 September, 2017
ISBN **978-88-904570-7-4**

Poster Communication Abstract – 5.44

TOWARDS BENZ[A]ANTHRACENE XENOME ELUCIDATION IN PLANTS AND GREEN MICROALGAE

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PAHs, xenome, tomato, microalgae

In only 12,000 years the *Homo sapiens sapiens* has completely modified the face of the Earth. The human pressure on the atmosphere, water and soil has been accelerate from the industrial revolution from which chemicals and energy have been released in the environment. Therefore, chemical environmental pollution and world climate changes are two of the main concerns that modern human must deal. Among chemicals released in the ecosystem the polycyclic aromatic hydrocarbon (PAHs) have gathered significant environment concerns for their detrimental biological effects, toxicity, mutagenicity, and carcinogenicity. The distribution of PAHs in the three environment compartments is related to the number of fused benzene rings. Two or three benzene rings have been occurring in the atmosphere whereas 5 or more rings are largely bounds in the soil particles. Intermediate, 4-rings, such as benz(a)anthracene (B[a]A) are partitioned between air and soil. The molecular mechanism involved to degrade PAHs into less toxic compounds by bacteria and fungi in soil has been elucidated. On the other hands, the metabolism of PAHs in plant and microalgae remain unknown. Signalling, transport, biotransformation of PAHs to less toxic molecules and compartmentalization are the main steps involved for their detoxification in photosynthetic cell. The expression of genes involved in these xenobiotics detoxification steps constitutes the xenome. The final aim of this work is to determine the B[a]A xenome in plants of tomato and in microalgae. So far, we have assessed the ability of tomato plants to grow *in vitro* and take up the B[a]A. Tomato seedlings were transplanted to MS medium added with 50 and 100 $\mu g\ g^{-1}$ B[a]A and cultivated for 30 days. The detection of B[a]A in shoots infer a translocation from roots to shoots. However, the content of the PAH in shoots was much lower than in the root apparatus indicating that B[a]A was translocated very little from roots to shoots. The identification of microalgae species capable of growing in presence of B[a]A has been performed on 14 different species belonging to the genera *Chlorella*, *Scenedesmus*, *Chlamydomonas*, *Ankistrodesmus*, *Botriococcus* and *Selenastrum*, with six different concentrations of B[a]A. Four microalgae species showed a growth inhibition percentage less than 50% in a medium containing 43.8 µM B[a]A. The capacity to degrade B[a]A and affect the photosynthetic pigment content has been evaluated in the identified microalgae grown for 21 days in the medium containing B[a]A. The four microalgae strains reached 90% B[a]A degradation. Then, in silico analysis was carried out on *C. reinhardtii* proteome to identify potential laccase involved in the degradation process. Finally, the response of intracellular and extracellular activity in the absence and presence of the B[a]A was analysed by ABTS and 2,6-DMP assays.