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UPTAKE OF BENZO[a]ANTHRACENE BY VEGETABLES GROWING IN PLANT TISSUE CULTURE

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Polycyclic aromatic hydrocarbons (PAHs) are a group of organic priority pollutant that are produced during the incomplete combustion or pyrolysis of organic matter and during various industrial processes. The major rotes of exposure for humans are food consumption or smoking. Food can be contaminated by environmental sources, industrial food processing and from certain home cooking practices. Vegetables and fruits that are important constituents of Mediterranean diet may accumulate PAHs from the environment and then their chemical contamination could affect the public health. The European Commission (EU Reg. No 835/2011 of August 19, 2011) currently indicates that the occurrence data on the level of PAHs contamination in vegetables (including cereals) is limited. Although the available data indicate that vegetables contain rather small amount of PAHs, the EFSA (European Food Safety Authority) claims that cereals and vegetables could be important contributors to human exposure of PAHs due to their large consumption. Benzo(a)anthracene (B[a]A) is one of the suitable indicators among the PAHS that EFSA recommends for monitoring in food. However, the plant uptake of B[a]A varies among different families and is related to the interaction with soil.

The main purposes of this work were to determine the contamination mechanisms and to evaluate the specific sensitivity of different species of vegetables. So far, we have assessed the ability of tomato and broccoli plants to grow and to take up the B[a]A in an axenic and controlled environment as plant tissue culture. Seeds of tomato and Broccoli were sowed onto a sterile solid medium. After ten days from sowing, five seedlings with similar growth in terms of shoot and root length were transplanted to growth medium added with 50 and 100 µg g^{-1} B[a]A and cultivated for 30 days. Roots, stem and leaves were collected and the B[a]A content was assessed.

The detection of B[a]A in the shoots of both plant species infers a translocation from roots to shoots. However, the content of the PAH in shoots was much lower than in the hypogenous apparatus to indicate that B[a]A was translocated very little from roots to shoots. The stronger contamination of culture medium (100 µg g^{-1} B[a]A) almost halved the broccoli shoot biomass that, in addition, were tenfold more contaminated than biomass obtained at 50 µgg^{-1} B[a]A. A similar behavior was observed in tomato shoots though less markedly. The root architectures of both vegetables was affected by the B[a]A contamination rate: an evident inhibition of the root volume in the broccoli plants whereas more dense hair roots in tomato plants were observed.

The choice to avoid soil in this first stage of the study allowed highlighting a very little B[a]A uptake mainly from plant root apparatus as consequence of the contaminant bioavailability with no interaction with soil colloids responsible for the very complex system such as soil. In order to take

into account also these variables, further experiments are ongoing to study the B[a]A uptake also in a natural system in which the single plants grow up in contaminated soil.