Degradation of Aromatic Compounds in Plants Grown under Aseptic Conditions

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The aim of the work is to investigate the ability of higher plants to absorb and detoxify environmental pollutants – aromatic compounds via aromatic ring cleavage. Transformation of ^{14}C specifically labelled benzene derivatives, [1–6-^{14}C]-nitrobenzene, [1–6-^{14}C]-aniline, [1-^{14}C]- and [7-^{14}C]-benzoic acid, in axenic seedlings of maize (*Zea mays* L.), kidney bean (*Phaseolus vulgaris* L.), pea (*Pisum sativum* L.) and pumpkin (*Cucurbita pepo* L.) were studied. After penetration in plants, the above xenobiotics are transformed by oxidative or reductive reactions, conjugation with cell endogenous compounds, and binding to biopolymers. The initial stage of oxidative degradation consists in hydroxylation reactions. The aromatic ring can then be cleaved and degraded into organic acids of the Krebs cycle. Ring cleavage is accompanied by $^{14}CO_2$ evolution. Aromatic ring cleavage in plants has thus been demonstrated for different xenobiotics carrying different substitutions on their benzene ring. Conjugation with low molecular peptides is the main pathway of aromatic xenobiotics detoxification. Peptide conjugates are formed both by the initial xenobiotics (except nitrobenzene) and by intermediate transformation products. The chemical nature of the radioactive fragment and the amino acid composition of peptides participating in conjugation were identified.

Key words: Benzene Derivatives, Degradation, Plants