Can Tobacco Have a Potentially Beneficial Effect to our Health?

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With urgent pressure to clean up the contaminated environment, new approaches are needed. Phyto- and rhizoremediation using plants and related bacteria is a promising approach, but has its inborn limitations. To overcome the slow performance of the process, transgenic plants have been prepared specifically tailored for phytoremediation purposes. Our projects addressed a group of widespread synthetic organic xenobiotics, polychlorinated biphenyls (PCBs), and heavy metals as representatives of inorganic contaminants. Beside basic research studies in the field of phyto/rhizoremediation of the mentioned toxicants we focused on genetically modified plants as a highly promising tool for these purposes. We tried to prepare tobacco plants expressing the bacterial enzyme responsible for cleaving PCBs, coded by the gene *bphC* from the bacterial biphenyl operon. The expression of *bphC* product in fusion with the green fluorescent protein is described together with evaluation of the twice increased resistance of transgenic seeds towards PCBs. The other model is addressing improvement of cadmium accumulation by preparing plants bearing fused transgenes of metal binding protein (yeast metallothionein) with an introduced additional metal binding domain – polyhistidine anchor with high affinity to metals. The genetically modified plants exhibit 190% Cd accumulation of the control in harvestable parts, higher resistance and lower Cd content in roots. The performance of the plants in real contaminated soil is also evaluated.

Key words: Phytoremediation, Transgenic Plants, Heavy Metal Accumulation, PCB Degradation