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B[a]P REMOVAL BY *B. CURTIPENDULA* UNDER *IN VITRO* CULTURE CONDITIONS

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Introduction. Polycyclic aromatic hydrocarbons (PAH), are ubiquitous soil contaminants originated from natural and anthropogenic sources. Several PAH have been shown to be carcinogenic and/or mutagenic, like B[a]P, a proved carcinogenic for animals and probably genotoxic for humans. There is an increasing interest in the use of plants for PAH soil decontamination and detoxification. Two serious limitations emerge: (i) not all plant species could survive at any polluted sites; native plants are well suited to organic pollutants[(1)] and environmental stresses at a local site, (ii) many plant species are sensitive to contaminants, they grow slowly and do not accumulate enough biomass (especially roots), in heavily contaminated soils.
The objective in this study was to asses the ability of, *Bouteloua curtipendula* and *Festuca arundinacea* (control) growing in Murashige and Skoog (MS) *in vitro* culture medium spiked with B[a]P.

Metodology. Seeds (both plants) were separated and kept at room temperature for desinfestation and culture. MS medium was prepared; 10 mL were added to each culture tube, prior to sterilization. B[a]P was dissolved in dichloromethane (DCM) at 2 000 mg/kg. B[a]P solution (0.5 mL) was added to culture tubes before hardening of the medium, shaken and maintained at room temperature; one seed was aseptically placed into each culture tube containing semi-solid MS medium spiked with BaP, the culture tube was closed and kept at 25 ºC for 90 d. The liquid-liquid extraction of B[a]P was made with DCM; identification and quantification were carried out with GC and HPLC. Tolerance index and B[a]P content (in roots, stems and MS medium) were evaluated. The means were compared using Tukey-Kramer multiple comparison test.

Results and discussion. Germination was unaffected by B[a]P [(2)]. Stem subsequent growth was better than control without B[a]P. The B[a]P tolerance of plants was evaluated by tolerance index (TI), Table 1 shows the TI for both plants: (i) TI<1 indicate a net decrease in biomass, suggesting that plants are stressed; (ii) TI=1 indicate no difference relative to MS control treatments, and (iii) TI>1 indicate a net increase in biomass, suggesting that plants express a growth positive effect. The results suggest that BaP had a stimulant effect in biomass stem for both plant species.

Table 1. Tolerance index values

	F. arundinacea		*B. curtipendula*	
	Root	Stem	Root	Stem
MS (control)	1.0 Ba	1.0 Aa	1.0 Aa	1.0 Aa
B[a]P	0.583 Aa	1.121 Aa	0.916 Ab	1.124 Aa

Different uppercase letters indicate significant differences among treatments (MS; B[a]P) for each plant specie; different lowercase letters indicate significant differences between plant species; within columns.

High abundance of B[a]P was found in roots of *B. curtipendula*, once in the roots, the hydrocarbon may be trend to bind with lipid membranes or oil possibly present in plant roots, because translocation of B[a]P to stem via xylem is limited as shows Figure 1.

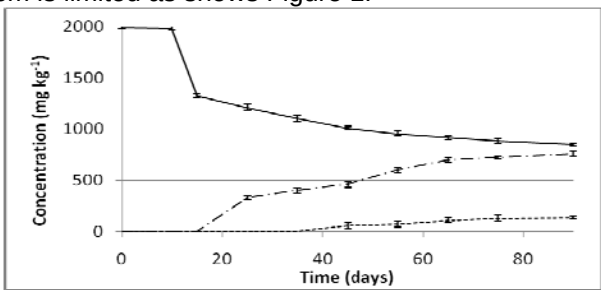

Fig. 1. B. curtipendula *BaP removal (continous line), root accumulation (discontinous) and stem accumulation (dotted)*

Conclusion. Plants have certain limitations to remove and transform organic pollutants. However, our results shown that *B. curtipendula* could remove BaP in MS medium where the pollutant is more available than in soils, and accumulate into roots.

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References.

1.López-Martínez, S., Gallegos-Martínez, M.E., Pérez-Flores, L.J., Gutiérrez-Rojas, M. 2008. Contaminated soil phytoremediation by *Cyperus laxus* Lam. Cytochrome P450 EROD-activity induced by hydrocarbons in roots. *Int J Phytoremediat*. 10:289-301.
2.Reynoso-Cuevas, L., Gallegos-Martínez, M.E., Cruz-Sosa, F., Gutiérrez-Rojas, M. 2008. In vitro evaluation of germination and growth of five plant species on medium supplemented with hydrocarbons associated with contaminated soils. *Bioresource Technol*. 99: 6379-6385.