LEAD TOLERANCE EVALUATION OF ENDOPHYTIC FUNGI ISOLATED FROM *Prosopis sp*. FROM A LEAD CONTAMINATED SITE

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Introduction. *Prosopis spp*. have been reported as lead hyperaccumulator desert plants. They are present in heavy metal-polluted sites in Chihuahua State. There is evidence that endophytic fungi are associated with these plants [(1)]. These fungi have the ability to tolerate high concentrations of heavy metals and also protect the host from toxicity increasing the metabolic activity in plants [(2)].
The aim of this work was to evaluate the lead tolerance of three endophytic fungi isolated from *Prosopis sp.* from a lead contaminated site.

Methods. Lead tolerance was evaluated in three strains of endophytic fungi. The fungi were isolated from *Prosopis sp.* roots from a Pb polluted site in Chihuahua City. The strains (C3, C7 (*Fusarium spp*.) and C6) were inoculated (triplicate) on PDA plates supplemented with $Pb(NO_3)_2$ to reach 0, 250, 500 and 1000 mg Pb^{+2}/L. $NaNO_3$ was used to compensate the nitrate supplied in $Pb(NO_3)_2$. The plates were needle stick-inoculated and each 24 hours, during two weeks, the diameter of the each colony was measured to determine the radial growth rate (RGR). The effective concentration inhibiting the RGR by 50 % (EC_{50}) was estimated [(3)]. The tolerance index (TI) to Pb^{2+} was defined as the ratio of the RGR with Pb^{2+} to the RGR without Pb^{2+} (control). Significant differences among Pb-concentrations were tested by ANOVA and Tukey tests ($P < 0.05$).

Results. The RGR of the tested strains decreased as the Pb^{2+} concentration increased (Fig. 1). A reduction in the growth rate is a typical response of fungi to toxic elements [(4)]. In the control treatment, *Fusarium* strains no showed significant difference in their RGR. However, when these strains grew with Pb^{2+}, the RGR of C3 decreased in major percentage at 500 and 1000 mg Pb^{+2}/L than C7. This response was reflected in the TI values (Table 1), being the TI of C7 60% higher than the TI of C3 at 1000 mg Pb^{+2}/L. Nevertheless, the TI of both strains at 1000 mg Pb^{+2}/L were similar or exceeded the TI reported for *Fusarium* strains isolated from metal-polluted soils, sediments and water, whose values ranged from 0.09 to 0.18 [(5)]. Moreover the EC_{50} for C3 and C7 were 250-500 mg Pb^{+2}/L in both cases (Table 1).

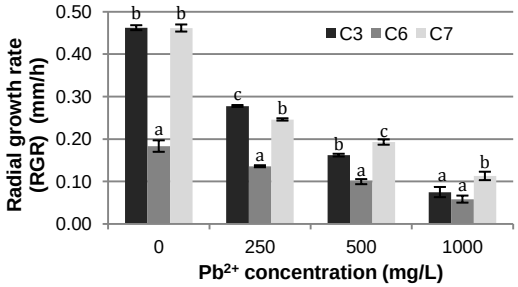

Fig. 1. Effect of the Pb^{2+} concentration on the RGR of three fungal endophytes (C3, C6 and C7). Data with different letter indicate significant differences (n = 3).

The strain C6 presented the lowest RGR values. However, it was less affected by the Pb^2 since its EC_{50} (Table 1) was 500-1000 mg Pb^{+2}/L.

Table 1. EC_{50} and tolerance index to Pb^{2+} of the strains C3, C6 and C7 grown with 250, 500 y 1000 mg Pb^{2+}/L.

Pb^{2+} concentration (mg/L)	Tolerance index to Pb^{2+} (TI)		
	C3	C6	C7
250	0.59 ± 0.04 ^{b}	0.65 ± 0.01 ^{b}	0.52 ± 0.01 ^{a}
500	0.36 ± 0.01 ^{a}	0.49 ± 0.03 ^{c}	0.41 ± 0.01 ^{b}
1000	0.15 ± 0.01 ^{a}	0.27 ± 0.04 ^{b}	0.24 ± 0.02 ^{b}
EC_{50} (mg Pb^{2+}/L)	250-500	500-1000	250-500

Conclusions. There were differences between the tolerance patterns of endophytic fungi at different Pb^{2+} concentrations, even among strains belonging at the same genus. This could be attributed to the tolerance strategies or resistance mechanisms exhibited in each fungus.

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References.

1. Li H-Y, Li D-W, He C-M, Zhou Z-P, Mei T, Xu H-M. (2011). *Fungal Ecol* 30:1-7.
2. Li T, Liu M, Zhang X, Zhang H, Sha T, Zhao Z. (2011). *Sci Total Environ* 409: 1069-1074.
3. Zapotoczny S, Jurkiewicz A, Tylko G, Anielska T, Turnau, K. (2007). *Microbiol Res* 162:219-228.
4. Gadd G M. (1993). *New Phytol* 124: 25-60.
5. Iram S, Parveen K, Usman J, Nasir K, Akhtar N, Arouj S, Ahmad I. (2012). *Biologija* 58(3): 107-116.