

Short Communication

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Effects of Lead Toxicity on Seed Germination and Seedling Growth of Some Tree Species

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Lead has been an important metal in the human societies over many thousands of years. Mining, smelting, refining and Pb-based products release lead in the environment. Sufficient amount of lead is deposited on the plants in urban areas by the automobile activities [1]. Many workers [2-5] have studied the effects of lead on the growth, pollen germination, seed viability and ultrastructures of different plants in the past. In the present study, the effects of lead on seed germination, root length and dry matter of *Leucosphaera leucocephala* (Lam) de Wit., *Peltophorum roxburghii* (G. Dod.) Degerer., *Samania saman* L. and *Dalbergia sissoo* Roxb. has been investigated.

It is evident by the results (Table 1) that the seed germination, root length and dry biomass were found to be significantly reduced by lead pollution as compared to control. Krishnayya and Bedi [6] had also reported that lead pollution affected the seed germination and seed viability of plants near the highways. Nasralla and Ali [7] found that in cabbage roots, the concentration of Pb was quite high as compared to the leaves. This indicates that Pb affects the seed germination as well as the root of the plants. The biomass of the species was also found to be significantly decreased as compared to the control seedlings. *L. leucocephala*, one of the species studies in this experiment showed comparatively less reduction in the dry biomass as compared to other species. Siddiqui and Iqbal in their unpublished work has reported that *L. leucocephala* was comparatively resistant to automobile exhaust pollution. But in the present study, *L. leucocephala* could not be considered as resistant to lead pollution because of the poor seed germination and root length at different lead nitrate treatment.

Key words: Lead, Germination, Growth, Toxicity.

TABLE 1. EFFECTS OF DIFFERENT TREATMENTS OF LEAD ON THE GERMINATION AND GROWTH OF SEEDLINGS OF DIFFERENT SPECIES.

Concentration (mg ml ⁻¹)	<i>L. leucocephala</i>					<i>P. roxburghii</i>					<i>S. saman</i>					<i>D. sissoo</i>				
	Control	500	600	700	800	Control	500	600	700	800	Control	500	600	700	800	Control	500	600	700	800
% germination	100	90	85	70	65	85	85	65	55	40	85	60	45	45	25	95	70	50	45	35
+	(10)	(10)	(5)	(10)	(5)	(5)	(5)	(5)	(5)	(0)	(10)	(15)	(5)	(5)	(5)	(10)	(10)	(0)	(5)	(5)
	A	B	C	ABD	ABCE	A	B	ABC	ABD	ABCDE	A	AB	AC	AD	ABE	A	AB	ABC	ABCD	ABCDE
*	-	10	15	30	35	-	0	23.5	35.3	53	-	29.4	47.1	47.1	70.5	-	26.3	47.4	52.6	63.2
0	(10)	(10)	(10)	(10)	(10)	(0)	(20)	(10)	(0)	(10)	(10)	(10)	(10)	(0)	(0)	(20)	(10)	(20)	(0)	(0)
*	A	B	AC	ABD	ABCE	A	AB	AC	ABCD	ABCE	A	AB	ABC	ABCD	ABCDE	A	B	AC	AD	AE
	-	22	44	67	78	-	25	37.5	50	62.5	-	22.2	44.4	55.5	66.7	-	37.5	50	75	75
Root length (cm) +	10.82	9.99	9.57	9.11	8.65	1.45	1.29	1.27	1.15	1.11	4.47	3.71	3.34	2.85	2.15	1.57	1.53	1.46	1.30	0.99
+	(0.81)	(0.54)	(0.25)	(0.06)	(0.12)	(0.02)	(0.02)	(0.02)	(0.04)	(0.02)	(0.04)	(0.08)	(0.13)	(0.14)	(0.11)	(0.16)	(0.15)	(0.3)	(0.22)	(0.3)
*	A	B	AC	ABD	ABCE	A	AB	AC	ABCD	ABCE	A	AB	ABC	ABCD	ABCDE	A	B	C	D	ABCE
	-	7.6	11.6	15.8	20.1	-	11	12.4	21	23	-	17.1	25.4	36.4	52	-	3	6.4	17.2	37.3
	8.7	6.84	6.48	5.75	5.21	1.56	1.28	1.19	1.11	0.97	3.98	3.34	3.16	3.04	2.95	1.16	1.37	1.28	1.25	1.06
0	(0.53)	(0.55)	(0.290)	(0.12)	(0.0)	(0.06)	(0.71)	(0.02)	(0.08)	(0.04)	(1.98)	(0.77)	(1.38)	(0.04)	(0.45)	(0.19)	(0.05)	(0.19)	(0.34)	(0.0)
*	A	AB	AC	AD	ABE	-	16.4	22.3	27.2	30.4	-	16.3	20.7	23.8	26	-	18.1 [†]	10.3 [†]	7.8 [†]	8.6
Dry Biomass(mg)	249.55	247.6	245.65	239.1	236.0	157.05	152.85	137.75	126.5	98.10	502.7	378.5	344.5	329.4	316.2	91.65	82.20	62.9	40	37.55
+	(2.05)	(1.03)	(0.85)	(0.5)	(0.3)	(1.25)	(0.55)	(3.85)	(4.70)	(7.8)	(3.8)	(6.15)	(1.95)	(3.45)	(5.55)	(3.75)	(15)	(9.1)	(5.1)	(5.2)
*	A	B	C	ABC	ABC	A	B	AB	ABC	ABCD	A	AB	ABC	ABCE	ABC	A	B	AC	ABC	ABC
	-	0.8	1.6	4.2	5.4	-	3	12.6	19.8	37.8	-	25.1	31.5	34.4	37.1	-	10.3	31.4	56.4	65.6
0	(1.75)	(1.80)	(1.40)	(2.25)	(2.1)	(11.66)	(0.84)	(1.08)	(0.91)	(2.09)	(30.5)	(189.7)	(156.3)	(45.6)	(65.0)	(1.95)	(3.2)	(2.4)	(9.35)	(0.0)
*	A	AB	ABC	ABD	ABCE	-	2.7	6.8	8.9	12.5	-	6.5	12.8	17.7	21	-	1.1 [†]	14.3	25.5	36.5

Each treatment has a definite value i.e. control A, 500 B, 600 C, 700 D, 800 E. If two treatments have same value, it indicates that their values are significantly different by Student's Newmann Keul's multiple range test at <0.05. () standard error, + = experiment performed in petri dishes, 0 = experiment performed in soil. * = percentage decrease with relation to control; † = percentage increase.

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