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Supplementary material

SUPPLEMENTARY MATERIAL TO

Comparative assessment of adsorbents performances of plant biomasses grown on different sites: Case study of invasive *Acer negundo* L.

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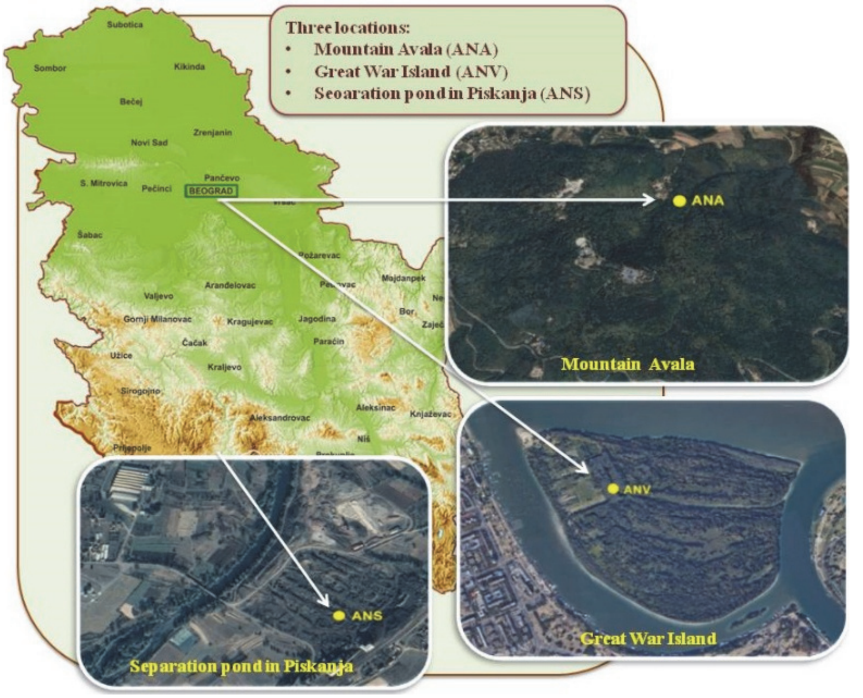

Fig. S-1. Sample points: forest edges on Mt. Avala (a), riparian forests at Great War Island (b) and banks of former coal separation pond in Piskanja (c).

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Table S-I. Models used for evaluation of lead sorption onto investigated *A. negundo* sorbents

Model	Equation	Parameter
Kinetic model		
Pseudo-first order[1]	$\ln(q_e - q_t) = \ln q_e - k_1 t$	q_e (mg/g): sorption capacity at equilibrium q_t (mg/g): sorption capacity at any time t k_1 (g/mg/min): the pseudo first order rate constant
Pseudo-second order[2]	$q_t = \dfrac{t}{\left(\dfrac{1}{k_2 q_e^2}\right) + (\dfrac{t}{q_e})}$	q_e (mg/g): sorption capacity at equilibrium q_t (mg/g): sorption capacity at any time t k_2 (g/mg/min): the pseudo second order rate constant
Elovich[3]	$q_t = \dfrac{1}{b}\ln(ab) + \dfrac{1}{b} ln t$	a(mg/g/min): initial Cu(II) sorption rate b (g/mg): extent of surface coverage
Isotherm model		
Langmuir[4]	$q_e = \dfrac{q_m K_L C_e}{1 + K_L C_e}$	q_m (mg/g): maximum sorption capacity K_L(dm^3/mg): Langmuir constant
Freundlich[5]	$q_e = K_f \; C_e^{1/n}$	K_f (mg/g) (L/g)$^{1/n}$: Freundlich constant n: heterogeneity factor
Sips[6]	$q_e = \dfrac{q_m K_S C_e^s}{1 + C_e K_S{}^s}$	K_s (dm^3/g): Sips constant related to sorption affinity s: heterogeneity factor

TABLE S-II. Soil pH, SOC, oxido-reduction potential (Eh) and pseudo-total content of PTE, and content of macroelements from the topsoil layer, together with mean values of PTE content in leaves of ANA, ANV and ANS. Statistically significant differences are marked with asterisk ($p<0.05$ = *, $p<0.01$ = **, $P<0.001$=***)

Ele. (ppm)	ANA_S	ANV_S	ANS_S		ANA_L	ANV_L	ANS_L	
Cu	58.0 ± 0.1	31.9 ± 0.1	46.9 ± 1.0	***	19.9 ± 0.4	18.5 ± 0.5	15.7 ± 0.2	***
Fe	26,294 ± 182	28,994 ± 2044	41,817 ± 570	***	265 ± 32	222 ± 30	200 ± 13.7	
Ni	64.8 ± 5.0	63.2 ± 2.9	116 ± 6	***	34.9 ± 0.0	34.9 ± 0.2	44.9 ± 0.0	***
Mn	31.1 ± 0.1	34.2 ± 2.3	152 ± 7	***	45.9 ± 6.5	48.4 ± 0.0	12.2 ± 0.2	***
Cd	1.74 ± 0.24	1.5 ± 0.5	2.49 ± 0.00	**	n.d.	n.d.	1.24±0.25	***
Pb	82.2 ± 2.2	39.9 ± 5.1	65.0 ± 4.8	***	n.d.	n.d.	n.d	
Zn	234 ± 7	85.1 ± 6.9	95 ± 1	***	46.9 ± 1.4	48.8 ± 3.5	43.1 ± 2.7	
Ca	80,919 ± 991	11,354 ± 20	6,175 ± 59	***	51,413 ± 1,028	39,914 ± 473	26,430 ± 503	***
Na	226 ± 1	225 ± 16	406 ± 2	***	91.4 ± 18.3	88.8 ± 6	87.7 ± 19.9	
K	4,563 ± 132	5,514 ± 28	3,649 ± 4	***	14,334 ± 107	15,300 ± 276	17,417 ± 1,586	
Mg	16,308 ± 372	6,986 ± 487	6,038 ± 202		4,690 ± 540	4,415 ± 22	3,329 ± 38	***
pH	6.85 - 7.15	5.90 - 6.27	4.64 - 4.76					
Eh (mV)	271.0	212.2	370.2					
SOC (%)	4.0	3.4	2.6					

S – soil; L - leaf

TABLE S-III. BCF_L (soil to leaf) of PTE in ANA, ANV and ANS

Elements	**ANA**	**ANV**	**ANS**
Cu	0.34 ± 0.01	0.58 ± 0.01	0.34 ± 0.01
Fe	0.01 ± 0.001	0.01 ± 0.001	0.005 ± 0.0003
Ni	0.54 ± 0.04	0.55 ± 0.03	0.39 ± 0.02
Mn	1.48 ± 0.22	1.42 ± 0.09	0.08 ± 0.01
Cd	N/A	N/A	0.50 ± 0.10
Zn	0.20 ± 0.0004	0.58 ± 0.09	0.46 ± 0.03

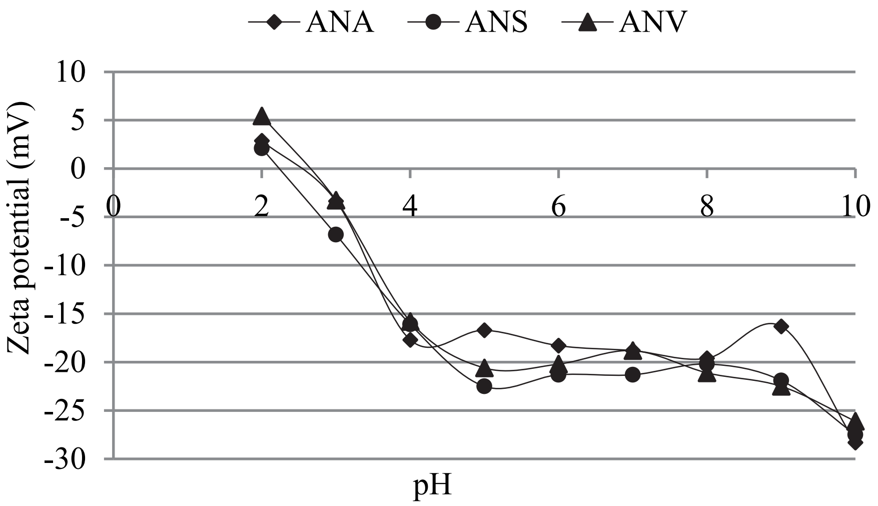

Fig. S-2. The zeta potential values of ANA, ANS and ANV under various pH values range

TABLE S-IV. Release of K^+, Mg^{2+}, Na^+, Ca^{2+} and H^+ due to biosorption of Pb^{2+}

Total metal bound	Net amount of cation released (meq/g)							
	Pb^{2+}	K^+	Na^+	Mg^{2+}	Ca^{2+}	H^+	$R_{b/r}$	pHi	pHf
ANA	43.45	5.0	0.4	12.2	23.0	5.0	0.95	5.0	3.91
ANV	45.56	8.2	0.3	8.9	18.7	6.3	1.07	5.0	3.86
ANS	45.07	15.5	0.25	9.8	33.7	8.0	0.67	5.0	3.77

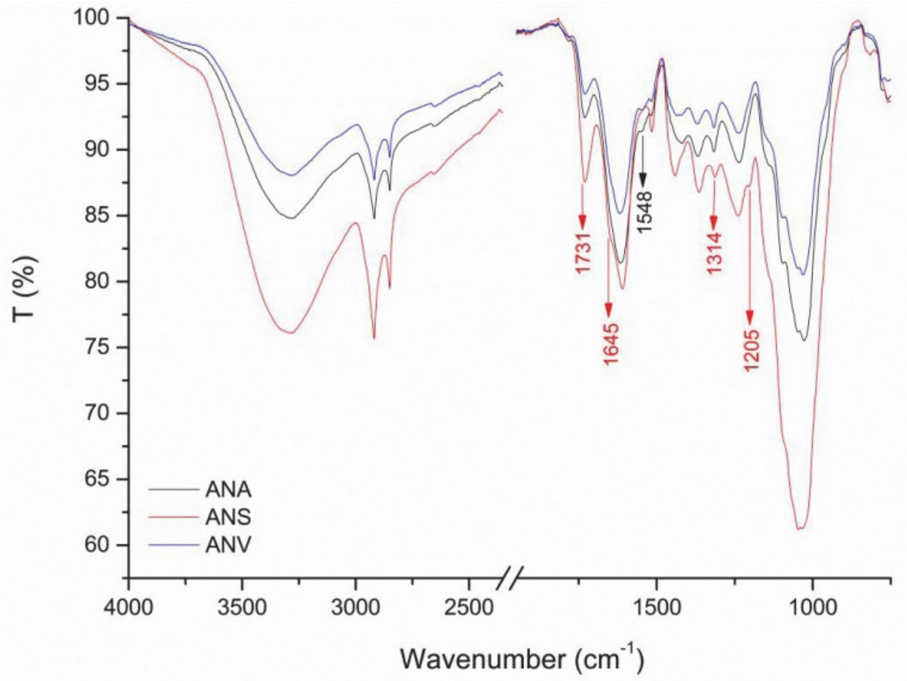

Fig. S-3. ATR-FTIR spectra of all samples

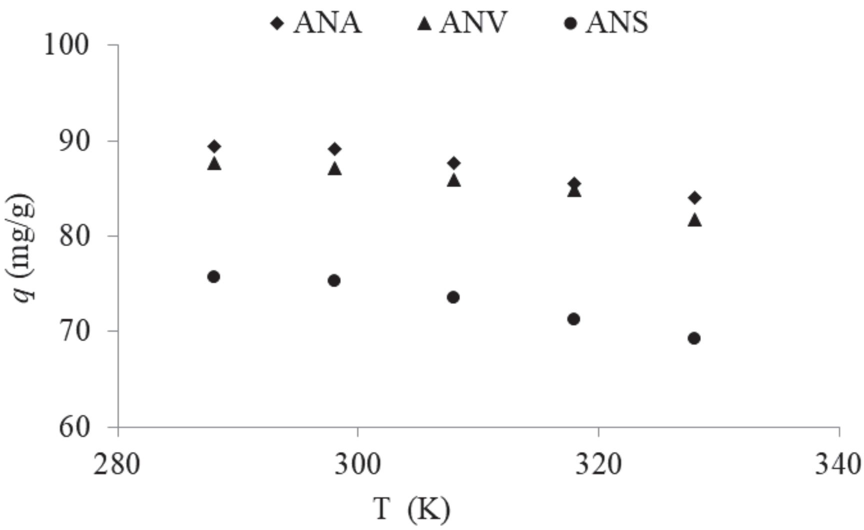

Fig. S-4. Effect of temperature on lead sorption capacity

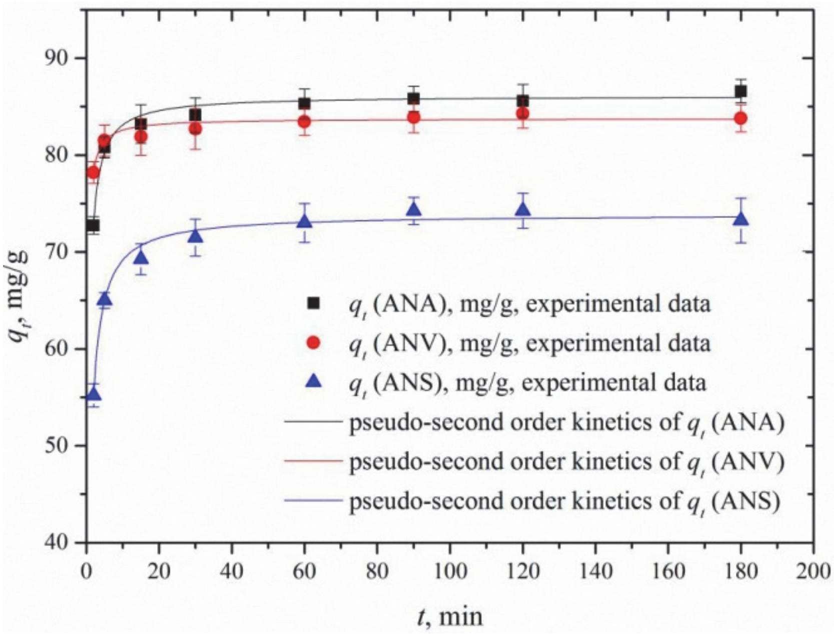

Fig. S-5. Sorption kinetics: sorbed amount of lead per mass of sorbents (q_t) as a function of time: experimental data (symbols) and the best fit predictions of the pseudo second order kinetics

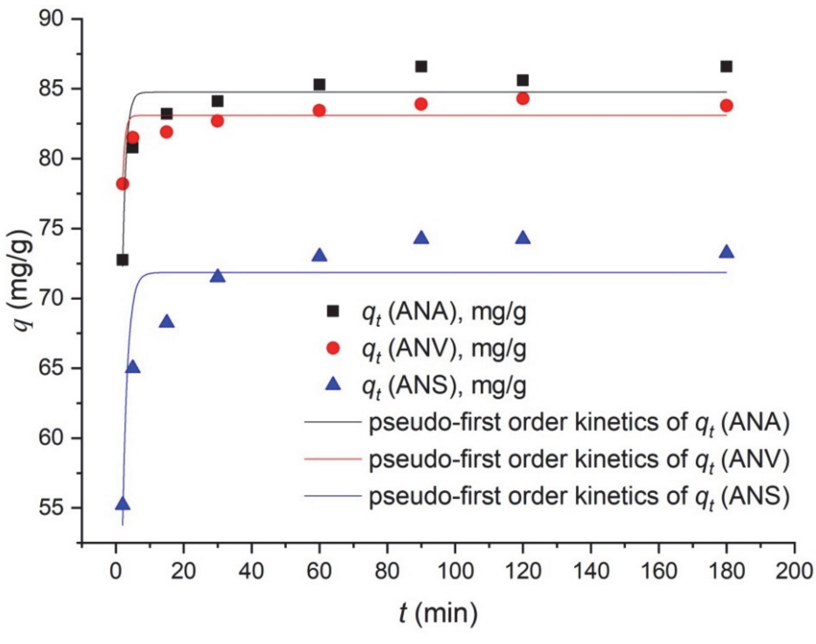

Fig. S-6. Sorption kinetics: the pseudo first order kinetics

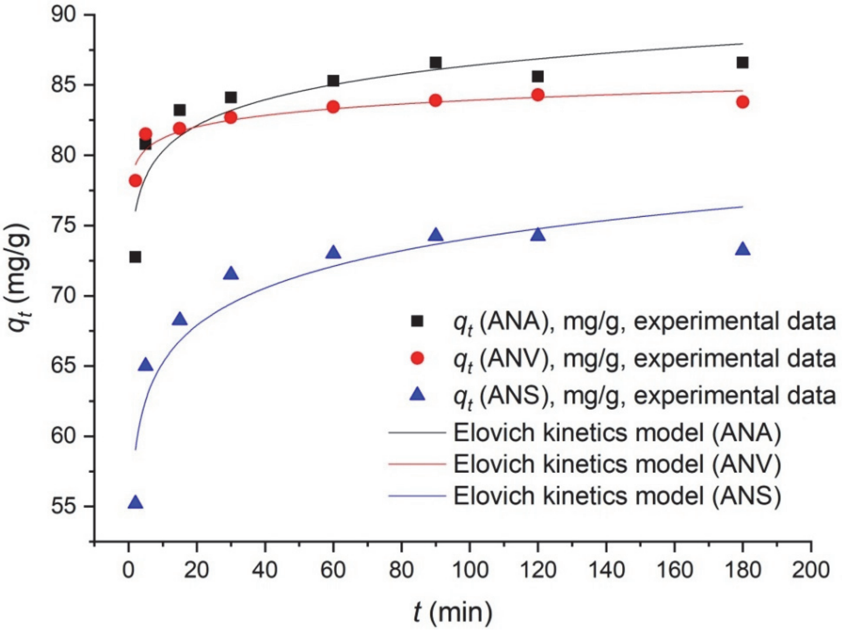

Fig. S-7. Sorption kinetics: the Elovich model

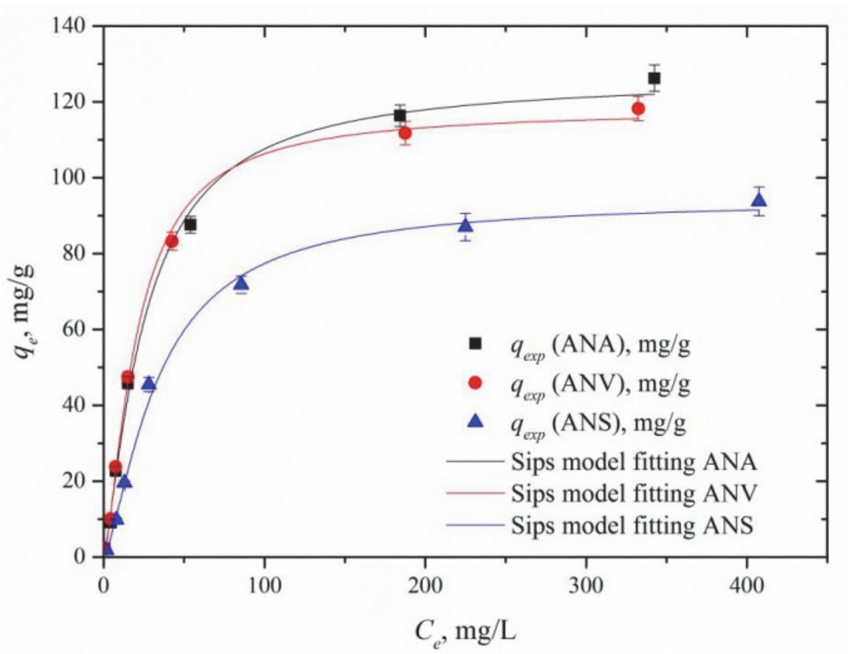

Fig. S-8. Experimental isotherm data and nonlinear Sips model fit of lead sorption onto ANA, ANV and ANS

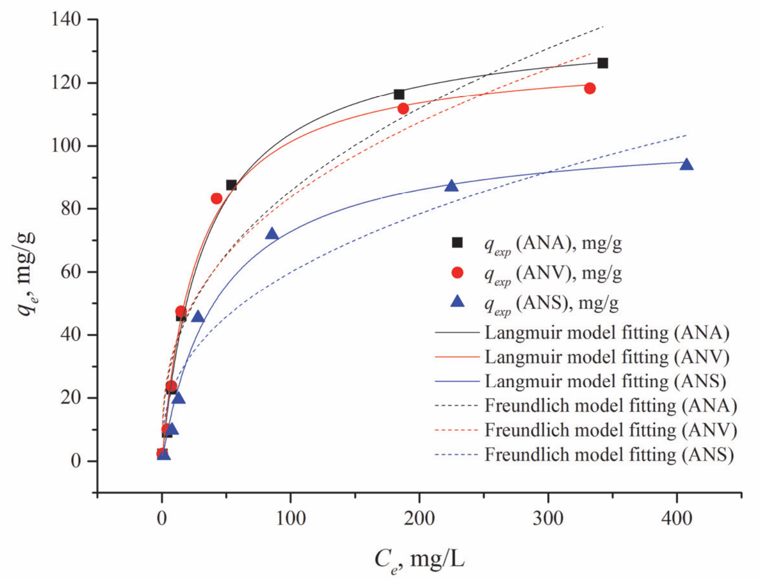

Fig. S-9**.** Experimental isotherm data and nonlinear Langmuir and Freundlich model fit of Pb(II) sorption onto ANA, ANV and ANS.

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