

Supplementary Materials

Table S1. Spearman's correlation between total metal content in the soil with metals in leaves and rhizome + roots of *N. ovata* from the natural forest community and the fly ash dump.

Metal Content, mg kg ⁻¹ DW		K	Ca	Mg	Fe	Zn	Mn	Pb	Cu	Ni	Cr	Co
K	Leaves	0.343 ¹	-0.462	-0.881 *	-0.469	-0.818 *	-0.846 *	0.783 *	-0.881 *	-0.524	0.874 *	0.077
	Rhizome + roots	0.448	-0.559	-0.643 *	-0.210	-0.622 *	-0.685 *	0.727 *	-0.713 *	-0.224	0.713 *	0.231
Ca	Leaves	0.371	-0.147	0.343	0.776 *	0.469	0.350	-0.573	0.378	0.301	-0.063	0.147
	Rhizome + roots	0.245	-0.070	0.517	0.720 *	0.615 *	0.448	-0.364	0.608 *	0.685	-0.371	0.490
Mg	Leaves	-0.503	0.441	0.888 *	0.371	0.720 *	0.874 *	-0.783 *	0.797 *	0.420	-0.888 *	-0.259
	Rhizome + roots	-0.224	0.168	0.727 *	0.371	0.573	0.622 *	-0.483	0.657 *	0.629	-0.804 *	0.168
Fe	Leaves	-0.930 *	0.881 *	0.476	-0.497	0.175	0.455	-0.266	0.385	-0.336	-0.497	-0.755 *
	Rhizome + roots	-0.853 *	0.888 *	0.483	-0.483	0.217	0.420	-0.231	0.385	-0.301	-0.483	-0.713 *
Zn	Leaves	-0.420	0.517	-0.420	-0.846 *	-0.517	-0.399	0.469	-0.420	-0.860	0.497	-0.622 *
	Rhizome + roots	0.272	-0.308	0.517	0.818 *	0.685 *	0.483	-0.601 *	0.594 *	0.790	-0.524	0.503
Mn	Leaves	-0.874 *	0.874 *	0.399	-0.427	0.168	0.448	-0.385	0.336	-0.427	-0.427	-0.762 *
	Rhizome + roots	-0.895 *	0.888 *	0.399	-0.441	0.161	0.503	-0.315	0.371	-0.357	-0.441	-0.769 *
Pb	Leaves	0.350	-0.322	-0.825 *	-0.392	-0.699 *	-0.881 *	0.783 *	-0.769 *	-0.573	0.951 *	0.224
	Rhizome + roots	0.636 *	-0.762 *	-0.594 *	0.112	-0.469	-0.629 *	0.524	-0.580 *	0.035	0.615 *	0.615 *
Cu	Leaves	0.601 *	-0.399	-0.105	0.497	0.112	-0.077	-0.294	-0.091	0.0980	0.245	0.140
	Rhizome + roots	-0.718 *	0.757 *	0.764 *	-0.042	0.448	0.750 *	-0.532	0.592 *	-0.007	-0.673 *	-0.680 *
Ni	Leaves	0.683 *	-0.557	0.207	0.718 *	0.301	0.130	-0.182	0.175	0.697	-0.123	0.536
	Rhizome + roots	-0.455	0.503	-0.406	-0.797 *	-0.503	-0.406	0.399	-0.399	-0.867	0.462	-0.497
Cr	Leaves	0.091	-0.112	-0.666 *	-0.483	-0.676 *	-0.739 *	0.725 *	-0.683 *	-0.697	0.862 *	-0.035
	Rhizome + roots	0.189	-0.028	-0.545	-0.503	-0.357	-0.727 *	0.671 *	-0.483	-0.392	0.671 *	0.147
Co	Leaves	0.560	-0.592 *	-0.200	0.441	0.053	-0.186	0.056	-0.049	0.382	0.231	0.609 *
	Rhizome + roots	0.685 *	-0.692 *	-0.245	0.552	-0.084	-0.168	-0.098	-0.189	0.329	0.217	0.615 *

¹ Data are Spearman's rank correlation coefficients (r); Asterisks (*) mean significant values at $p < 0.05$ (n = 10).

Table S2. Spearman's correlation between available metal content in the soil with metals in leaves and rhizome + roots of *N. ovata* from the natural forest community and the fly ash dump.

Metal Content, mg kg ⁻¹ DW		K	Ca	Mg	Fe	Zn	Mn	Pb	Cu	Ni	Cr	Co
K	Leaves	0.783 ^{1*}	-0.825 *	-0.909 *	-0.930 *	-0.462	-0.937 *	0.783 *	-0.895 *	-0.853 *	0.846	0.294
	Rhizome + roots	0.664 *	-0.762 *	-0.790 *	-0.832 *	-0.622 *	-0.790 *	0.755 *	-0.755 *	-0.741 *	0.776	0.378
Ca	Leaves	0.014	0.510	0.280	0.336	-0.112	0.371	-0.049	0.455	0.510	0.021	0.580 *
	Rhizome + roots	-0.140	0.364	0.636 *	0.524	-0.112	0.629 *	-0.161	0.524	0.559	-0.287	0.168
Mg	Leaves	-0.797 *	0.769 *	0.692 *	0.832 *	0.448	0.853 *	-0.692 *	0.846 *	0.741 *	-0.748	-0.217
	Rhizome + roots	-0.615 *	0.510	0.671 *	0.699 *	0.154	0.706 *	-0.524	0.622 *	0.490	-0.643	-0.434
Fe	Leaves	-0.601 *	0.238	0.224	0.399	0.839 *	0.420	-0.378	0.406	0.364	-0.601	-0.685 *
	Rhizome + roots	-0.601 *	0.252	0.273	0.434	0.867	0.413	-0.399	0.427	0.392	-0.580	-0.720 *
Zn	Leaves	0.266	-0.490	-0.538	-0.434	0.503	-0.420	0.420	-0.378	-0.294	0.301	-0.301
	Rhizome + roots	-0.238	0.622 *	0.671 *	0.573	-0.266	0.580 *	-0.385	0.538	0.427	-0.301	0.406
Mn	Leaves	-0.615 *	0.371	0.245	0.427	0.881 *	0.441	-0.441	0.427	0.455	-0.622	-0.615 *
	Rhizome + roots	-0.531	0.266	0.231	0.448	0.909 *	0.469	-0.399	0.455	0.476	-0.524	-0.594 *
Pb	Leaves	0.839 *	-0.797 *	-0.727 *	-0.825 *	-0.336	-0.776 *	0.902 *	-0.818 *	-0.650 *	0.727	0.210
	Rhizome + roots	0.762 *	-0.559	-0.538	-0.566	-0.692 *	-0.566	0.748 *	-0.594 *	-0.580 *	0.762	0.371
Cu	Leaves	0.098	0.329	-0.063	-0.140	-0.406	-0.147	-0.014	-0.014	-0.021	0.245	0.706 *
	Rhizome + roots	-0.851 *	0.504	0.368	0.525	0.627 *	0.627 *	-0.560	0.644 *	0.609 *	-0.725	-0.399
Ni	Leaves	0.011	0.210	0.186	0.091	-0.606 *	0.095	-0.060	0.151	0.049	0.130	0.424
	Rhizome + roots	0.259	-0.420	-0.455	-0.336	0.538	-0.322	0.441	-0.343	-0.224	0.203	-0.434
Cr	Leaves	0.739 *	-0.795 *	-0.781 *	-0.764 *	-0.144	-0.697 *	0.914 *	-0.711 *	-0.543	0.655	0.112
	Rhizome + roots	0.601 *	-0.538	-0.420	-0.538	-0.014	-0.497	0.790 *	-0.524	-0.559	0.671	0.105
Co	Leaves	0.333	-0.067	-0.007	-0.294	-0.718 *	-0.098	0.305	-0.228	-0.280	0.273	0.736 *
	Rhizome + roots	0.308	0.070	-0.084	-0.133	-0.629 *	-0.105	0.203	-0.147	-0.140	0.315	0.406

¹Data are Spearman's rank correlation coefficients (r); Asterisks (*) mean significant values at $p < 0.05$ (n = 10).

Table S3. Spearman's correlation between total and available metal content in the soil with physiological parameters of *N. ovata* from the natural forest community and the fly ash dump.

Metal Content, mg kg ⁻¹ DW		Chl a, mg g ⁻¹ DW	Chl b, mg g ⁻¹ DW	Chl (a+b), mg g ⁻¹ DW	CAR, mg g ⁻¹ DW	CO ₂ uptake, mg CO ₂ mg ⁻¹ chlorophyll h ⁻¹	CO ₂ uptake, mg CO ₂ 10 ⁻⁸ chloroplast h ⁻¹	CO ₂ uptake, mg CO ₂ dm ⁻² h ⁻¹	Transpiration, g H ₂ O dm ⁻² h ⁻¹
K	Total	-0.354 ¹	0.553 *	-0.029	0.855 *	-0.147	-0.693 *	-0.693 *	-0.759 *
	Available	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
Ca	Total	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
	Available	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Mg	Total	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
	Available	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Fe	Total	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
	Available	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Zn	Total	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
	Available	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
Mn	Total	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
	Available	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Pb	Total	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
	Available	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
Cu	Total	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
	Available	0.874 *	0.225	0.737 *	-0.483	-0.048	0.239	0.239	0.593 *
Ni	Total	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
	Available	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Cr	Total	-0.863 *	-0.199	-0.722 *	0.494 *	-0.059	-0.236	-0.236	-0.714 *
	Available	-0.863 *	-0.199	-0.722 *	0.494 *	-0.059	-0.236	-0.236 *	-0.714 *
Co	Total	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
	Available	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170

¹Data are Spearman's rank correlation coefficients (r); Asterisks (*) mean significant values at $p < 0.05$ (n = 24).

Table S4. Spearman's correlation between metal content in the leaves and rhizome + roots with physiological parameters of *N. ovata* from the natural forest community and the fly ash dump.

Metal Content, mg kg ⁻¹ DW		Chl a, mg g ⁻¹ DW	Chl b, mg g ⁻¹ DW	Chl (a+b), mg g ⁻¹ DW	CAR, mg g ⁻¹ DW	CO ₂ uptake, mg CO ₂ mg ⁻¹ chlorophyll h ⁻¹	CO ₂ uptake, mg CO ₂ 10 ⁻⁸ chloroplast h ⁻¹	CO ₂ uptake, mg CO ₂ dm ⁻² h ⁻¹	Transpiration, g H ₂ O dm ⁻² h ⁻¹
K	Leaves	-0.863 ^{1*}	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
	Rhizome + roots	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
Ca	Leaves	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
	Rhizome + roots	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
Mg	Leaves	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
	Rhizome + roots	0.863 *	0.199	0.722 *	-0.494 *	-0.059	0.236	0.236	0.590 *
Fe	Leaves	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
	Rhizome + roots	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
Zn	Leaves	-0.509 *	-0.752 *	-0.693 *	-0.361	0.206	0.457 *	0.457 *	0.170
	Rhizome + roots	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
Mn	Leaves	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
	Rhizome + roots	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
Pb	Leaves	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
	Rhizome + roots	-0.354	0.553 *	-0.029	0.855 *	-0.147	-0.693 *	-0.693 *	-0.759 *
Cu	Leaves	-0.354	0.553 *	-0.029	0.855 *	-0.147	-0.693 *	-0.693 *	-0.759 *
	Rhizome + roots	0.354	-0.553 *	0.029	-0.855 *	0.147	0.693 *	0.693 *	0.759 *
Ni	Leaves	0.509 *	0.752 *	0.693 *	0.361	-0.206	-0.457 *	-0.457 *	-0.170
	Rhizome + roots	-0.509 *	-0.752 *	-0.693 *	-0.361	0.206	0.457 *	0.457 *	0.170
Cr	Leaves	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
	Rhizome + roots	-0.863 *	-0.199	-0.722 *	0.494 *	0.059	-0.236	-0.236	-0.590 *
Co	Leaves	-0.354	0.553 *	-0.029	0.855 *	-0.147	-0.693 *	-0.693 *	-0.759 *
	Rhizome + roots	-0.354	0.553 *	-0.029	0.855 *	-0.147	-0.693 *	-0.693 *	-0.759 *

¹Data are Spearman's rank correlation coefficients (r); Asterisks (*) mean significant values at $p < 0.05$ (n = 24).

Table S5. The mesostructure parameters of the lower leaf of *N. ovata* from the natural forest community (P-1) and the fly ash dump (P-2).

Parameters	Populations	
	P-1	P-2
Leaf thickness, μm	510.18 ± 6.15 ¹ (432.00–600.48) ²	504.91 ± 6.85 (399.60–712.80)
Number of chloroplasts per unit area (million cm^{-2})	2.48 ± 0.05 (1.78–3.58)	2.80 ± 0.05 * (1.35–4.03)
Mesophyll cell surface area, thousand μm^2	15.34 ± 0.38 (6.02–23.11)	14.81 ± 0.24 (9.71–23.80)
Mesophyll cell volume, thousand μm^3	101.26 ± 3.69 (24.57–219.30)	99.88 ± 2.37 (50.27–206.22)
Chloroplast surface area, μm^2	87.32 ± 1.88 (57.87–129.83)	90.47 ± 1.60 (53.10–146.39)
Chloroplast volume, μm^3	77.82 ± 2.55 (41.41–139.15)	82.46 ± 2.18 (36.37–140.14)

¹ Data is presented as mean \pm SE (n = 30); ² In the brackets are the minimum and maximum values. Asterisk (*) indicates significant differences between the studied populations according to Mann–Whitney *U*-test ($p < 0.05$).