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Supplementary Materials

Dose-Dependent Effect of Foliar ZnO Nanoparticles on the Physiology, Mineral Nutrition, and Redox Status of *Coffea arabica* Seedlings Under Soil Acidity

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Table S1. Effects of acidic soil and foliar ZnO NP application on photosynthetic pigments of Coffea arabica.

Treatments	Chlorophyll a (µg g^{-1} FW)	Chlorophyll b (µg g^{-1} FW)	Total chlorophyll (a + b) (µg g^{-1} FW)	Carotenoids (µg g^{-1} FW)	Chlorophyll a/b ratio	Chlorophyll (a + b) / carotenoid ratio
Optimal soil	709.43 ± 60.25 ab	213.15 ± 17.64 abc	922.58 ± 77.89 abc	236.5 ± 11.47 ab	3.33 ± 0.01 a	3.89 ± 0.14 ab
Acidic soil	795.23 ± 1.09 a	304.6 ± 21.35 a	1099.83 ± 20.26 a	254.57 ± 2.2 a	2.65 ± 0.19 a	4.32 ± 0.04 a
ZnO 10 mg L^{-1}	381.83 ± 22.53 c	74.95 ± 4.13 d	456.78 ± 25.92 d	145.89 ± 15.53 c	5.1 ± 0.2 b	3.16 ± 0.15 c
ZnO 25 mg L^{-1}	535.79 ± 52.58 bc	117.94 ± 18.85 bd	653.73 ± 71.43 bd	190.72 ± 15.24 bc	4.69 ± 0.3 bc	3.4 ± 0.1 bc
ZnO 50 mg L^{-1}	759.51 ± 41.19 a	237.43 ± 43.44 ac	996.93 ± 84.63 ac	251.64 ± 11.3 a	3.45 ± 0.46 ac	3.94 ± 0.16 ab
ZnO 100 mg L^{-1}	635.4 ± 8.84 ab	189.77 ± 9.74 bc	825.16 ± 0.9 bc	206.31 ± 6.91 ab	3.38 ± 0.22 a	4.01 ± 0.14 a
CV (%)	24.53	44.63	28.70	19.97	25.35	11.65
p-value	<0.0001	2e-04	<0.0001	1e-04	2e-04	4e-04

Values are presented as mean ± standard error (SE). Different letters indicate significant differences among treatments according to Tukey's HSD test at $p < 0.05$. CV (%): global coefficient of variation per pigment. p-value: global ANOVA test for each pigment.

Table S2. Physical and chemical properties of the soils used in the experiment.

Property	Unit	Optimal soil	Acidic soil
pH*	—	5.98	2.93
Electrical conductivity*	dS m^{-1}	0.84	3.20
Organic matter	%	4.24	6.37
Cation exchange capacity	meq 100 g^{-1}	15.2	13.6
Total organic carbon	%	2.46	3.69
Total nitrogen	%	0.21	0.32
Phosphorus	ppm	43.64	104.97
Exchangeable potassium	meq 100 g^{-1}	0.93	0.56
Exchangeable calcium	meq 100 g^{-1}	9.70	5.17
Exchangeable sodium	meq 100 g^{-1}	0.14	0.29
Exchangeable magnesium	meq 100 g^{-1}	1.32	1.08
Textural class	—	Sandy loam	Sandy loam

* Data provided by the Laboratorio de Investigación de Suelos y Aguas (LABISAG), Universidad Nacional Toribio Rodríguez de Mendoza de Amazonas (UNTRM). Parameters accredited according to the NTP-ISO/IEC 17025:2017 standard, registration code LE-170 [71].