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Supplementary material

**Effect of a pinocembrin-rich *Lippia origanoides* extract on the
induction of antibiotic resistance and SOS responses in *Escherichia*
*coli***

**Efecto de un extracto de *Lippia origanoides* rico en pinocembrina en
la inducción de la resistencia antibiótica y la respuesta SOS en
*Escherichia coli***

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Table S1. SOS induction values (I) and enzyme activity for genotoxicity and antigenotoxicity assays.

Genotoxicity assays			
LOE treatments	AP	βG	I
NC (distilled water)	2.05 ± 0.60	1.10 ± 0.05	1.00 ± 0.00
PC (10 J/m ² UVB)	1.94 ± 0.56 n.s.	6.05 ± 1.23*	5.64 ± 1.23*
LOE (1.95 µg/mL)	1.96 ± 0.42 n.s.	1.21 ± 0.18 n.s.	1.11 ± 0.03 n.s.
LOE (3.90 µg/mL)	1.66 ± 0.31 n.s.	1.19 ± 0.13 n.s.	1.27 ± 0.10 n.s.
LOE (7.81 µg/mL)	1.86 ± 0.27 n.s.	1.15 ± 0.15 n.s.	1.11 ± 0.06 n.s.
LOE (15.6 µg/mL)	1.75 ± 0.15 n.s.	1.19 ± 0.17 n.s.	1.22 ± 0.05 n.s.
LOE (31.2 µg/mL)	1.50 ± 0.17 n.s.	1.31 ± 0.20 n.s.	1.55 ± 0.07 n.s.
LOE (62.5 µg/mL)	1.35 ± 0.35 n.s.	1.23 ± 0.21 n.s.	1.64 ± 0.37 n.s.
LOE (125 µg/mL)	1.37 ± 0.20 n.s.	1.12 ± 0.22 n.s.	1.43 ± 0.09 n.s.
LOE (250 µg/mL)	1.41 ± 0.25 n.s.	1.05 ± 0.22 n.s.	1.33 ± 0.10 n.s.
LOE (500 µg/mL)	1.51 ± 0.11 n.s.	0.83 ± 0.11*	0.98 ± 0.26 n.s.
PIN treatments	AP	βG	I
NC (distilled water)	1.73 ± 0.12	1.28 ± 0.07	1.00 ± 0.00
PC (10 J/m ² UVB)	1.97 ± 0.21 n.s.	7.03 ± 0.20*	4.83 ± 0.93*
PIN (0.0019 mM)	1.96 ± 0.60 n.s.	1.36 ± 0.06 n.s.	0.99 ± 0.24 n.s.
PIN (0.0039 mM)	1.58 ± 0.48 n.s.	1.11 ± 0.19 n.s.	0.96 ± 0.10 n.s.
PIN (0.0078 mM)	1.98 ± 0.34 n.s.	1.34 ± 0.02 n.s.	0.94 ± 0.17 n.s.
PIN (0.015 mM)	1.93 ± 0.19 n.s.	1.26 ± 0.03 n.s.	0.88 ± 0.08 n.s.
PIN (0.031 mM)	1.67 ± 0.16 n.s.	1.21 ± 0.02 n.s.	1.00 ± 0.12 n.s.
PIN (0.062 mM)	1.85 ± 0.10 n.s.	1.43 ± 0.33 n.s.	1.06 ± 0.26 n.s.
PIN (0.125 mM)	1.88 ± 0.61 n.s.	1.23 ± 0.13 n.s.	0.96 ± 0.37 n.s.
PIN (0.25 mM)	1.37 ± 0.17*	1.14 ± 0.26 n.s.	1.14 ± 0.36 n.s.
PIN (0.5 mM)	1.25 ± 0.14*	1.00 ± 0.09*	1.09 ± 0.11 n.s.
AMP treatments	AP	βG	I

NC (distilled water)	0.86 ± 0.03	1.09 ± 0.05	1.00 ± 0.00
PC (10 J/m ² UVB)	1.13 ± 0.03 n.s.	6.04 ± 0.24 n.s.	4.06 ± 0.05*
AMP (0.27 mM)	1.41 ± 0.05 n.s.	1.05 ± 0.00 n.s.	0.58 ± 0.03 n.s.
AMP (0.54 mM)	1.77 ± 0.08 n.s.	1.14 ± 0.01 n.s.	0.51 ± 0.03*
AMP (1.07 mM)	2.13 ± 0.10 n.s.	1.03 ± 0.02 n.s.	0.37 ± 0.01 n.s.
AMP (1.61 mM)	2.04 ± 0.08 n.s.	1.08 ± 0.00 n.s.	0.42 ± 0.02 n.s.
AMP (2.15 mM)	2.02 ± 0.07 n.s.	1.09 ± 0.00 n.s.	0.42 ± 0.02 n.s.
AMP (2.70 mM)	1.94 ± 0.07 n.s.	1.06 ± 0.00 n.s.	0.42 ± 0.02 n.s.
AMP (3.23 mM)	2.05 ± 0.08 n.s.	1.06 ± 0.00 n.s.	0.41 ± 0.02 n.s.
AMP (4.03 mM)	2.05 ± 0.09 n.s.	1.18 ± 0.00 n.s.	0.45 ± 0.02 n.s.
CIP treatments	AP	βG	I
NC (distilled water)	1.51 ± 0.13	0.89 ± 0.12	1.00 ± 0.00
PC (10 J/m ² UVB)	1.41 ± 0.06 n.s.	5.15 ± 0.15*	6.53 ± 0.57*
CIP (7.1x10 ⁻⁰⁵ mM)	1.42 ± 0.06 n.s.	1.66 ± 0.27 n.s.	2.12 ± 0.39 n.s.
CIP (1.4 x10 ⁻⁰⁴ mM)	1.19 ± 0.00 n.s.	1.91 ± 0.03*	2.16 ± 0.28 n.s.
CIP (2.1x10 ⁻⁰⁴ mM)	1.18 ± 0.00 n.s.	1.84 ± 0.12*	2.13 ± 0.36 n.s.
CIP (2.8x10 ⁻⁰⁴ mM)	1.12 ± 0.10 n.s.	2.01 ± 0.31 n.s.	3.16 ± 0.44 n.s.
CIP (3.5x10 ⁻⁰⁴ mM)	1.20 ± 0.21 n.s.	2.50 ± 0.08*	2.88 ± 0.49 n.s.
CIP (4.2x10 ⁻⁰⁴ mM)	1.04 ± 0.06*	2.36 ± 0.20*	3.06 ± 0.48 n.s.
CIP (4.9x10 ⁻⁰⁴ mM)	1.05 ± 0.04*	2.94 ± 0.13*	3.84 ± 0.38*
CIP (5.6x10 ⁻⁰⁴ mM)	1.18 ± 0.14 n.s.	2.88 ± 0.40*	4.32 ± 0.47*
CIP (1.1x10 ⁻⁰³ mM)	1.20 ± 0.18 n.s.	2.69 ± 0.66 n.s.	5.23 ± 1.13 n.s.
CIP (4.5x10 ⁻⁰³ mM)	0.99 ± 0.06 n.s.	2.40 ± 0.59 n.s.	5.30 ± 0.67 n.s.
CIP (9.1x10 ⁻⁰³ mM)	0.79 ± 0.02*	2.47 ± 0.52 n.s.	7.51 ± 0.91*
CIP (1.8x10 ⁻⁰² mM)	0.64 ± 0.05 n.s.	1.55 ± 0.59 n.s.	5.05 ± 0.95*
CIP (3.6x10 ⁻⁰² mM)	0.47 ± 0.00*	0.66 ± 0.09 n.s.	3.16 ± 0.28*
UVB treatments	AP	βG	I
NC (distilled water)	1.91 ± 0.15	1.01 ± 0.15	1.00 ± 0.00

UVB (5 J/m ²)	2.17 ± 0.26 n.s.	1.96 ± 0.57 n.s.	1.73 ± 0.35 n.s.
UVB (10 J/m ²)	1.85 ± 0.32 n.s.	4.91 ± 3.38 n.s.	3.36 ± 2.59 n.s.
UVB (15 J/m ²)	2.05 ± 0.28 n.s.	5.14 ± 0.67*	5.60 ± 1.17*
UVB (20 J/m ²)	1.79 ± 0.27 n.s.	7.69 ± 0.50*	5.23 ± 0.92*
UVB (25 J/m ²)	1.73 ± 0.25 n.s.	8.26 ± 0.71*	5.72 ± 0.72*
UVB (30 J/m ²)	1.69 ± 0.22 n.s.	5.83 ± 1.13*	6.22 ± 0.62*
UVB (35 J/m ²)	1.59 ± 0.38 n.s.	7.05 ± 3.65 n.s.	5.19 ± 2.38 n.s.
UVB (40 J/m ²)	1.60 ± 0.20 n.s.	7.46 ± 0.72*	5.54 ± 0.51*
UVB (45 J/m ²)	1.54 ± 0.44 n.s.	7.85 ± 0.86*	6.23 ± 1.66*
UVB (50 J/m ²)	1.46 ± 0.37 n.s.	8.35 ± 1.38*	6.98 ± 2.11*
UVB (60 J/m ²)	1.01 ± 0.42*	2.69 ± 1.72 n.s.	8.24 ± 2.70*
UVB (80 J/m ²)	1.08 ± 0.58 n.s.	2.81 ± 0.91 n.s.	9.34 ± 3.50*
UVB (100 J/m ²)	0.83 ± 0.50*	2.64 ± 0.79*	12.7 ± 7.86 n.s.
UVB (120 J/m ²)	0.83 ± 0.70*	1.98 ± 1.40 n.s.	10.6 ± 6.97 n.s.
UVB (140 J/m ²)	0.81 ± 0.59*	1.84 ± 0.86 n.s.	9.42 ± 5.33 n.s.
UVB (160 J/m ²)	0.77 ± 0.35*	1.62 ± 0.77 n.s.	6.78 ± 1.32*
UVB (180 J/m ²)	0.63 ± 0.35*	1.09 ± 0.72 n.s.	5.51 ± 1.38*

Antigenotoxicity

treatments

Cotreatments	AP	βG	I
CIP + LOE			
NC (distilled water)	1.38 ± 0.34	1.12 ± 0.18	1.00 ± 0.00
PC (10 J/m ² UVB)	1.27 ± 0.16 n.s.	6.82 ± 1.23*	5.70 ± 0.51 n.s.
CIP (9.1x10 ⁻⁰³ mM)	0.87 ± 0.03	3.88 ± 0.42	4.78 ± 0.10
CIP (9.1x10 ⁻⁰³ mM) + LOE (62.5 µg/mL)	0.83 ± 0.03 n.s.	3.51 ± 0.46 n.s.	4.51 ± 0.19 n.s.
CIP (9.1x10 ⁻⁰³ mM) + LOE (125 µg/mL)	0.88 ± 0.16 n.s.	3.38 ± 0.20 n.s.	4.26 ± 0.11 n.s.

CIP (9.1x10 ⁻⁰³ mM) + LOE (170 µg/mL)	0.99 ± 0.25 n.s.	3.14 ± 0.23*	3.72 ± 0.37*
CIP (9.1x10 ⁻⁰³ mM) + LOE (250 µg/mL)	1.03 ± 0.11*	1.97 ± 0.39*	2.07 ± 0.38*
CIP (9.1x10 ⁻⁰³ mM) + LOE (350 µg/mL)	1.32 ± 0.09*	1.35 ± 0.31*	1.13 ± 0.29*
CIP (9.1x10 ⁻⁰³ mM) + LOE (500 µg/mL)	1.46 ± 0.10*	1.11 ± 0.14*	0.87 ± 0.23*
CIP (9.1x10 ⁻⁰³ mM) + LOE (700 µg/mL)	1.45 ± 0.04*	0.83 ± 0.09*	0.64 ± 0.13*
CIP (9.1x10 ⁻⁰³ mM) + LOE (1000 µg/mL)	1.67 ± 0.15*	0.84 ± 0.18*	0.54 ± 0.12*
Cotreatments			
UVB + LOE	AP	βG	I
NC (distilled water)	1.06 ± 0.26	1.05 ± 0.14	1.00 ± 0.00
UVB (80 J/m ²)	0.79 ± 0.11	5.59 ± 0.17	6.91 ± 0.22
UVB (80 J/m ²) + LOE (31.25 µg/mL)	0.78 ± 0.10 n.s.	4.67 ± 0.33*	5.91 ± 0.02 n.s.
UVB (80 J/m ²) + LOE (62.5 µg/mL)	0.84 ± 0.13 n.s.	4.77 ± 0.52 n.s.	5.51 ± 0.36*
UVB (80 J/m ²) + LOE (125 µg/mL)	0.95 ± 0.11 n.s.	4.68 ± 0.07 n.s.	4.81 ± 0.06*
UVB (80 J/m ²) + LOE (170 µg/mL)	0.91 ± 0.08 n.s.	4.08 ± 0.30*	4.31 ± 0.26*
UVB (80 J/m ²) + LOE (250 µg/mL)	0.87 ± 0.03 n.s.	3.30 ± 0.27*	3.62 ± 0.26*
UVB (80 J/m ²) + LOE (350 µg/mL)	0.96 ± 0.12 n.s.	2.20 ± 0.23*	2.20 ± 0.14*
UVB (80 J/m ²) + LOE (500 µg/mL)	1.15 ± 0.10*	1.75 ± 0.18*	1.50 ± 0.16*

UVB (80 J/m ²) + LOE (700 µg/mL)	1.28 ± 0.19*	1.16 ± 0.23*	0.87 ± 0.08*
UVB (80 J/m ²) + LOE (1000 µg/mL)	1.21 ± 0.28*	0.92 ± 0.27*	0.77 ± 0.08*
Cotreatments			
CIP + PIN	AP	βG	I
NC (distilled water)	1.49 ± 0.09	0.90 ± 0.08	1.00 ± 0.00
PC (10 J/m ² UVB)	1.37 ± 0.09*	5.24 ± 0.53*	6.26 ± 0.43*
CIP (9.1x10 ⁻⁰³ mM)	0.92 ± 0.08	3.15 ± 0.40	5.69 ± 0.24
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.0039 mM)	0.71 ± 0.17*	2.19 ± 0.57*	5.68 ± 1.19 n.s.
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.0078 mM)	0.71 ± 0.31*	1.84 ± 0.48*	4.74 ± 1.03*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.015 mM)	0.68 ± 0.21*	1.99 ± 0.67*	5.23 ± 0.14 n.s.
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.031 mM)	0.72 ± 0.28*	1.89 ± 0.63*	4.84 ± 0.68*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.062 mM)	0.82 ± 0.08 n.s.	2.12 ± 0.26*	4.35 ± 0.31*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.125 mM)	0.80 ± 0.11 n.s.	1.84 ± 0.23*	4.01 ± 0.29*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.170 mM)	0.88 ± 0.10 n.s.	2.09 ± 0.16*	4.05 ± 0.88*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.250 mM)	0.69 ± 0.08*	1.59 ± 0.15*	4.05 ± 0.35*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.350 mM)	0.90 ± 0.15 n.s.	1.55 ± 0.43*	2.84 ± 0.84*
CIP (9.1x10 ⁻⁰³ mM) + PIN (0.500 mM)	0.95 ± 0.11 n.s.	0.87 ± 0.21*	1.54 ± 0.35*

CIP (9.1×10^{-03} mM) + PIN (0.700 mM)	$1.14 \pm 0.06^*$	$0.72 \pm 0.10^*$	$0.97 \pm 0.08^*$
CIP (9.1×10^{-03} mM) + PIN (1 mM)	1.19 ± 0.15 n.s.	$0.60 \pm 0.07^*$	$0.86 \pm 0.09^*$
Cotreatments			
UVB + PIN	AP	βG	I
NC (distilled water)	1.60 ± 0.14	0.89 ± 0.10	1.00 ± 0.00
UVB (80 J/m ²)	1.05 ± 0.13	4.41 ± 0.61	7.35 ± 0.39
UVB (80 J/m ²) + PIN (0.015 mM)	1.01 ± 0.20 n.s.	3.85 ± 0.75 n.s.	6.84 ± 0.80 n.s.
UVB (80 J/m ²) + PIN (0.031 mM)	0.89 ± 0.17 n.s.	3.59 ± 0.80 n.s.	6.94 ± 0.08 n.s.
UVB (80 J/m ²) + PIN (0.062 mM)	0.90 ± 0.20 n.s.	3.51 ± 0.76 n.s.	6.89 ± 0.18 n.s.
UVB (80 J/m ²) + PIN (0.125 mM)	0.85 ± 0.19 n.s.	$3.24 \pm 0.54^*$	6.90 ± 0.56 n.s.
UVB (80 J/m ²) + PIN (0.250 mM)	$0.80 \pm 0.14^*$	$2.84 \pm 0.50^*$	6.29 ± 0.19 n.s.
UVB (80 J/m ²) + PIN (0.350 mM)	$0.76 \pm 0.07^*$	$2.46 \pm 0.23^*$	$5.61 \pm 0.25^*$
UVB (80 J/m ²) + PIN (0.500 mM)	$0.72 \pm 0.11^*$	$2.09 \pm 0.14^*$	$5.35 \pm 0.81^*$
UVB (80 J/m ²) + PIN (0.700 mM)	$0.82 \pm 0.11^*$	$1.10 \pm 0.38^*$	$2.26 \pm 0.68^*$
UVB (80 J/m ²) + PIN (1 mM)	0.87 ± 0.12 n.s.	$0.94 \pm 0.37^*$	$1.72 \pm 0.55^*$

Note. The table presents the values of the SOS induction factor (I), enzymatic activity in alkaline phosphatase units (AP), and β -galactosidase (β G) obtained through the SOS Chromotest for each

treatment and co-treatment evaluated. CN: negative control, CP: positive control, LOE: *L. origanoides* extract, PIN: pinocembrin, CIP: ciprofloxacin, AMP: ampicillin. * In genotoxicity assays, indicates a significant difference compared to the negative control; in antigenotoxicity assays, indicates a significant difference compared to the individual inducer treatment ($p < 0.05$). For the I value in genotoxicity assays, only genotoxicity positive values (> 2) were considered.