

## Aldehyde-containing clays: a sustainable approach against the olive tree pest, *Bactrocera oleae*

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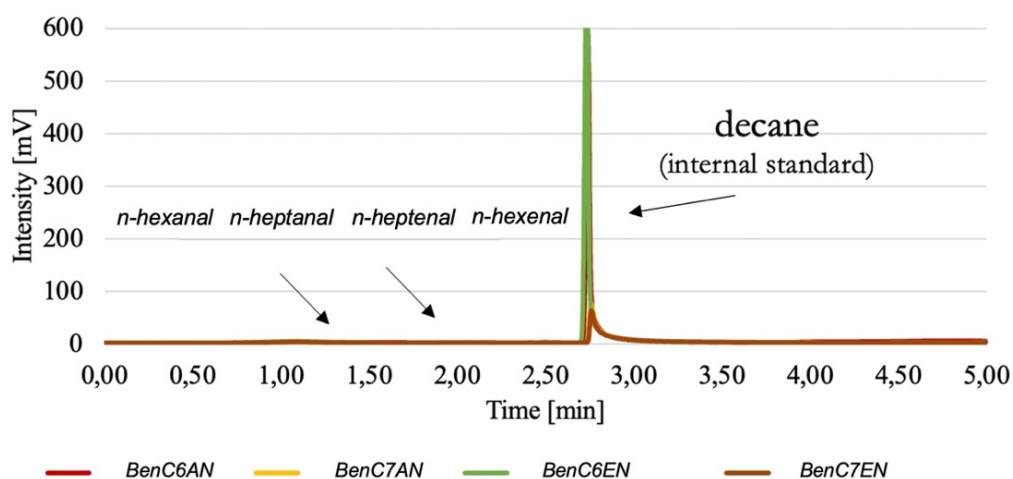
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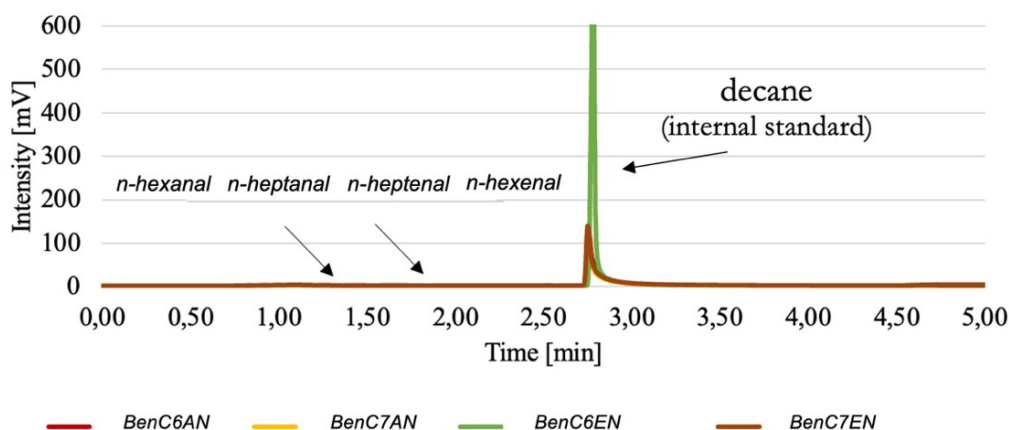
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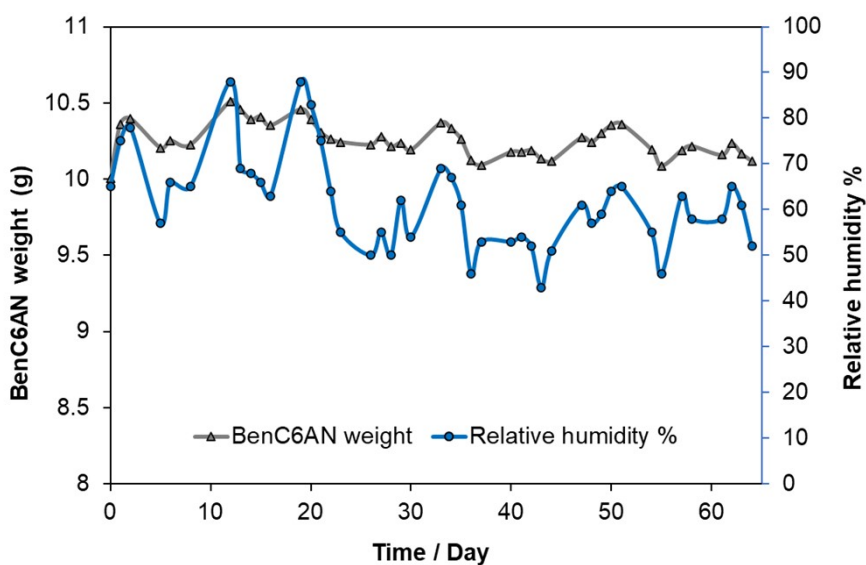
### ELECTRONIC SUPPLEMENTARY INFORMATION



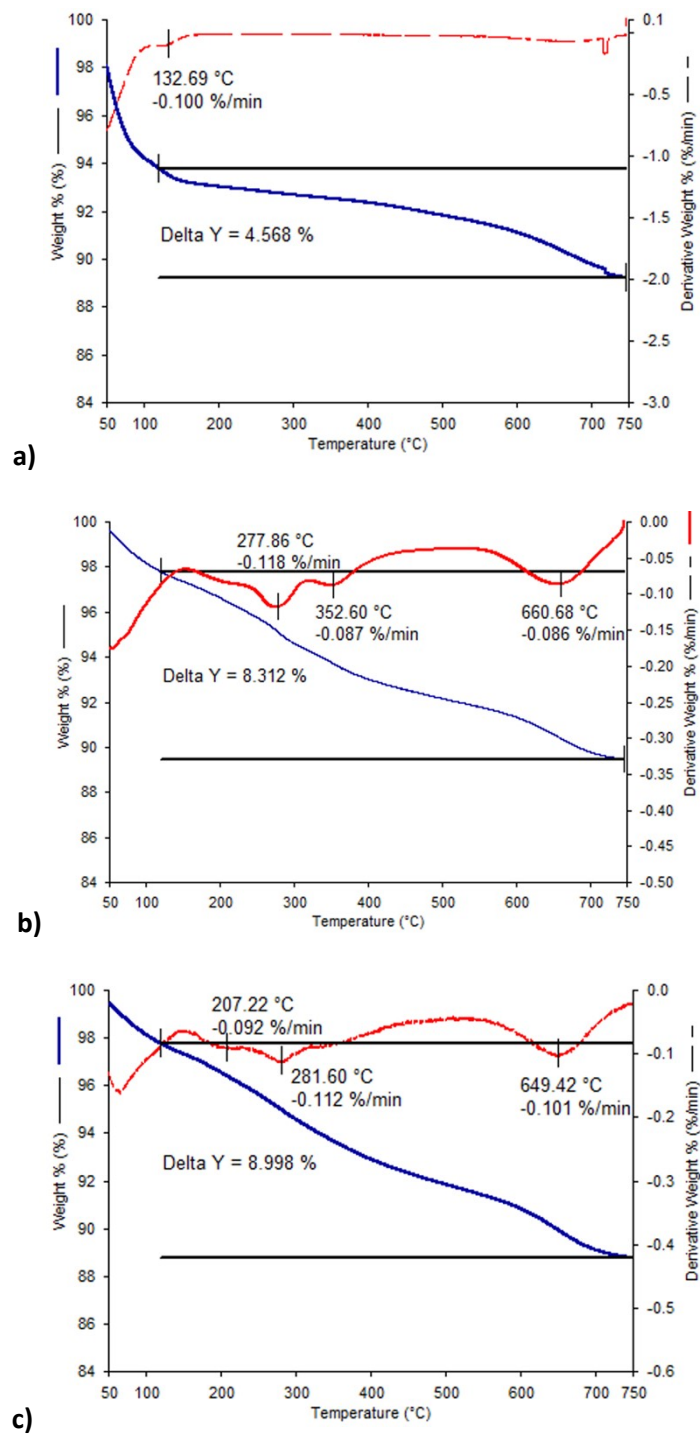
**Fig. S1.** Weathering tests in the presence of MilliQ ultrapure water. Experimental conditions: 1 g solid; 10 mL H<sub>2</sub>O; 30 min; aqueous medium extracted with CH<sub>2</sub>Cl<sub>2</sub>; GC-FID analysis; *n*-decane (int std). Arrows show the expected retention times for the peaks of aldehydes leached out into aqueous solution.



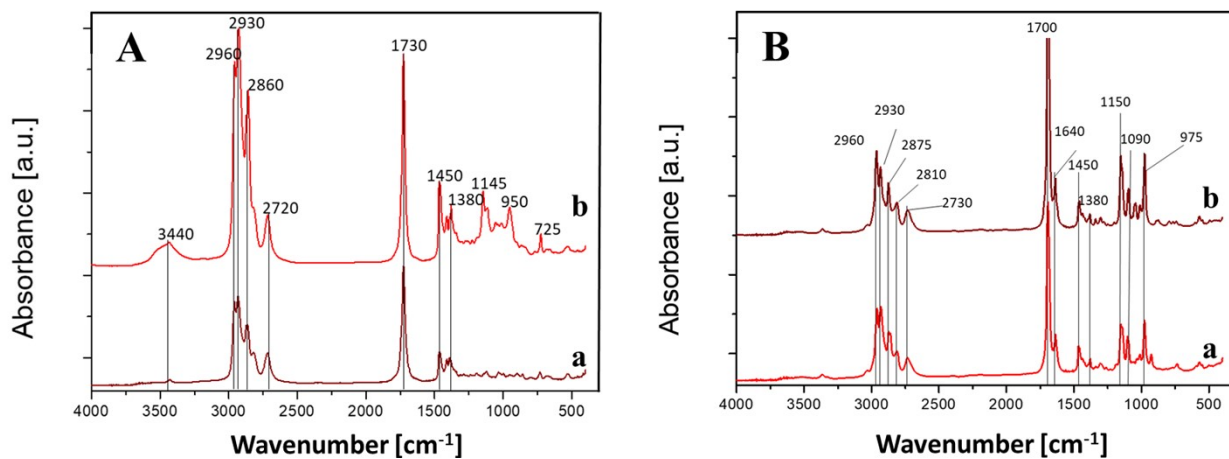
**Fig. S2.** Weathering tests in the presence of acidic water (pH 5, natural rainwater simulant). Experimental conditions: 1 g solid; 10 mL H<sub>2</sub>O at pH 5 by acetic acid addition; 30 min; aqueous medium extracted with CH<sub>2</sub>Cl<sub>2</sub>; GC-FID analysis; *n*-decane (int std). Arrows show the expected retention times for the peaks of aldehydes leached out into aqueous solution.



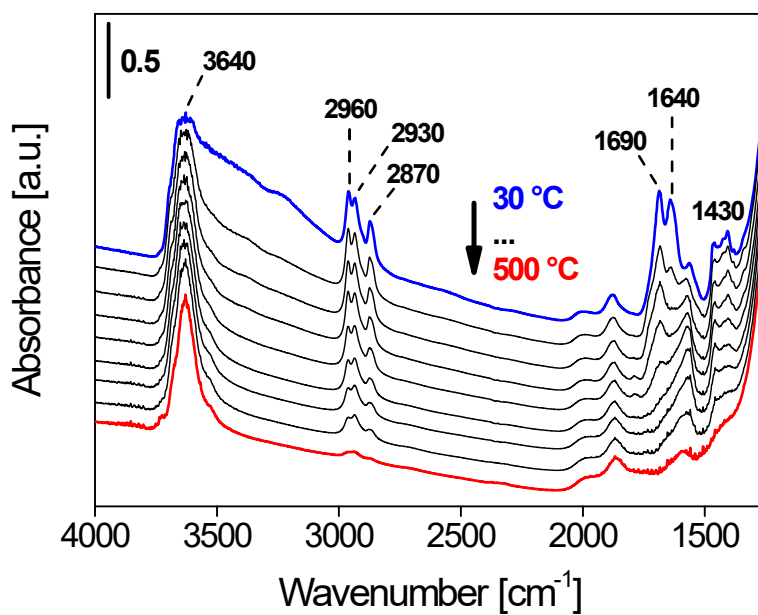
**Fig. S3.** Total weight of BenC6AN material (grey) vs. ambient relative humidity (blue) recorded during the test of controlled release of the bioactive component. Experimental conditions: 65 days; ambient temperature 20°C ÷ 27°C; location: Milan, Italy.



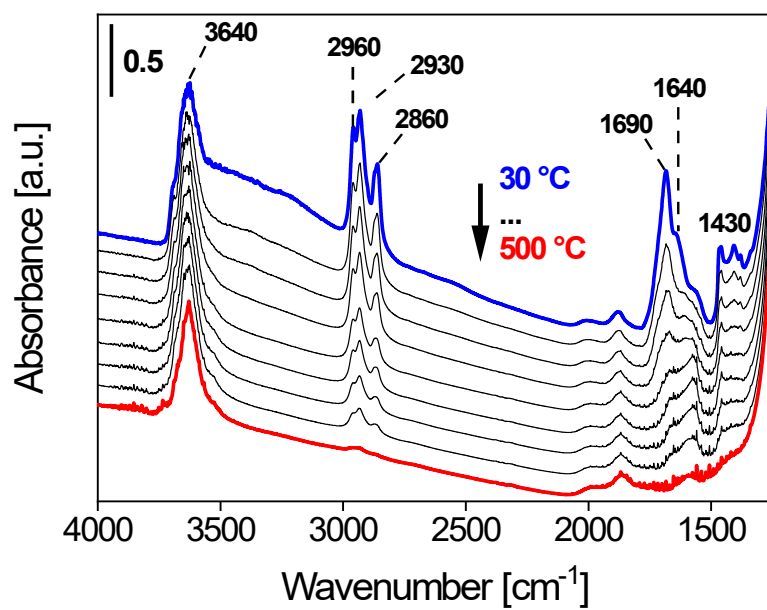
**Fig. S4.** TGA (solid blue curve) and DTGA (dashed red curve) profiles of Ben (a), BenC6AN (b) and BenC7AN (c) materials with weight loss between 120 °C and 750 °C highlighted. Analysis conditions: 50-750°C range; 3 °C min<sup>-1</sup>; extra-pure air.



**Fig. S5.** A) FTIR spectra at liquid state of pure hexanal (C6AN, a) and heptanal (C7AN, b). B) FTIR spectra at liquid state of pure (*E*)-hept-2-enal (C7EN, a) and (*E*)-hex-2-enal (C6EN, b).



**Fig. S6.** Variable temperature FTIR spectra of BenC6AN sample, measured in vacuum on a self-supporting pellet, from 30 °C (a) to 500 °C (b).



**Fig. S7.** Variable temperature FTIR spectra of BenC7AN sample, measured in vacuum on a self-supporting pellet, from 30 °C (a) to 500 °C (b).

Property	<i>n</i> -hexanal C6AN	<i>n</i> -heptanal C7AN	( <i>E</i> )-hex-2-enal C6EN	( <i>E</i> )-hept-2-enal C7EN
Boiling point (at 760 mmHg)	130-131°C	152-154°C	172-173°C	166°C
Vapour pressure (at 25°C)	10.9 mmHg	3.9 mmHg	4.6 mmHg	1.8 mmHg
Solubility in water (estimated at 25°C)	3.5 g L <sup>-1</sup>	1.2 g L <sup>-1</sup>	5.3 g L <sup>-1</sup>	1.8 g L <sup>-1</sup>

**Table S1.** Selected physical properties for C6AN, C6EN, C7AN and C7EN (source: RSC ChemSpider database, <http://www.chemspider.com/>)

Castiglione d'Orcia, Siena - 2018 - average temperature		
Podere Forte, Castiglione d'Orcia 43.00671 N; 11.59636 E		
July 22.6	August 22.6	September 19.3
Castellina in Chianti, Siena - 2019 - average temperature		
Azienda Marchesi Mazzei, Fonterutoli 43.43577 N; 11.30643 E		
July 23.4	August 23.8	September 18.8

**Table S2.** Average temperature values (°C) in the months of the application of the materials at the locations of the olive groves: (Source: <https://www.sir.toscana.it/>)