

# Supplementary Materials: Efficacy of Different Waste and By-Products from Forest and Food Industries in the Removal/Retention of the Antibiotic Cefuroxime

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## Characterization of the sorbent materials

The values corresponding to pH in water and pH in KCl (solid:liquid ratio 1:2.5) were measured with a CRISON-2001 pH-meter (Crison, Barcelona, Spain). Total C and N were determined by means of elemental analysis, using a LECO CHN-100 equipment (Leco Corporation, St. Joseph, MI, USA). The exchangeable cations ( $\text{Ca}_e$ ,  $\text{Mg}_e$ ,  $\text{Na}_e$ ,  $\text{K}_e$  and  $\text{Al}_e$ ) were displaced using a 1 M  $\text{NH}_4\text{Cl}$  solution in a 1:10 soil: solution ratio, and were then quantified by means of atomic absorption spectrophotometry, using a Perkin Elmer AAnalyst 200 apparatus (Perkin Elmer, Inc, USA). The effective cation exchange capacity (eCEC) was determined as the sum of these five exchangeable cations. Available phosphorus was extracted using 0.5 M  $\text{NaHCO}_3$  and quantified using a UV-visible spectrophotometer (UV-1201, Shimadzu, Kyoto, Japan). To determine total non-crystalline Fe and Al, a specific extraction was performed using ammonium oxalate buffered at pH 3, stirred for 4 h in the dark, then adding 5 drops of 0.25% superfloc to the resulting extract, then centrifuging at 2000 rpm for 10 min, filtering and diluting the supernatant to 1:5. Finally, Fe and Al in non-crystalline form ( $\text{Fe}_o$  and  $\text{Al}_o$ ) were quantified by atomic absorption spectrophotometry. Total contents of different elements ( $\text{Na}_T$ ,  $\text{Mg}_T$ ,  $\text{Al}_T$ ,  $\text{K}_T$ ,  $\text{Ca}_T$ ,  $\text{Cr}_T$ ,  $\text{Mn}_T$ ,  $\text{Fe}_T$ ,  $\text{Co}_T$ ,  $\text{Ni}_T$ ,  $\text{Cu}_T$ ,  $\text{Zn}_T$ ,  $\text{As}_T$  and  $\text{Cd}_T$ ) were determined following the EPA 3051 method, performing an acid digestion in a microwave with a 65%  $\text{HNO}_3$  solution, and subsequent determination with ICP-MS.

## Data on adsorption

Table S1 shows relevant data on amounts adsorbed and percentage adsorption, for the various sorbent materials and added concentrations of cefuroxime used in the experiments.

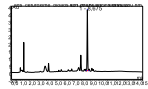
**Table S1.** Adsorption amounts (Ads, in  $\mu\text{mol kg}^{-1}$ ) and percentages (Ads, %) for the five adsorbents used, after adding the different initial concentrations ( $C_0$ ) of the antibiotic CFX.

Adsorbent	$C_0$ ( $\mu\text{M}$ )	$C_{eq}$ ( $\mu\text{M}$ )	Ads ( $\mu\text{mol kg}^{-1}$ )	Ads (%)
Eucalyptus leaves	1.62	0	32.43	100
	4.04	0	80.76	100
	9.25	0	185.06	100
	21.71	4.83	337.50	77.7
	30.98	5.34	512.86	82.8
	43.35	10.26	661.75	76.3
	47.07	9.92	743.05	78.9
Pine bark	1.62	0	32.43	100
	4.04	0	80.76	100
	9.25	2.15	142.13	76.8
	21.71	6.72	299.70	69.0
	30.98	9.80	423.57	68.4
	43.35	18.52	496.61	57.3
	47.07	19.49	551.62	58.6
Pine needles	1.62	0	32.43	100
	4.04	0.28	75.06	92.94
	9.25	1.29	159.33	86.10
	21.71	5.25	329.14	75.80
	30.98	9.22	435.28	70.24
	43.35	14.07	585.53	67.54
	47.07	20.51	531.28	56.43
Wood ash	1.62	0.25	27.34	84.32
	4.04	0.42	72.29	89.51
	9.25	0.70	170.99	92.40
	21.71	0.69	420.31	96.80
	30.98	0.80	603.76	97.43
	43.35	0.73	852.39	98.32
	47.07	0.68	927.95	98.56
Mussel shell	1.62	0.47	23.09	71.20
	4.04	0.73	66.12	81.87
	9.25	1.98	145.43	78.59
	21.71	3.25	369.19	85.03
	30.98	6.91	481.38	77.68
	43.35	7.70	712.88	82.23
	47.07	10.99	721.65	76.65

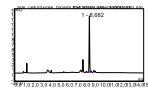
### Chromatograms

Figure S1 shows selected chromatograms corresponding to the detection and quantification of cefuroxime in the experiments performed.

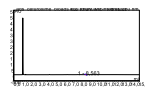
Adsorption on mussel shell. Concentration of CFX added 20  $\mu\text{mol/L}$



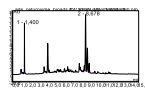
Adsorption on mussel shell. Concentration of CFX added 50  $\mu\text{mol/L}$



Adsorption on wood ash. Concentration of CFX added 10  $\mu\text{mol/L}$



Adsorption on pine bark. Concentration of CFX added 50  $\mu\text{mol/L}$



**Figure S1.** Selected chromatograms corresponding to the detection of CFX after adding various concentrations of the antibiotic to the different adsorbents used in the study.