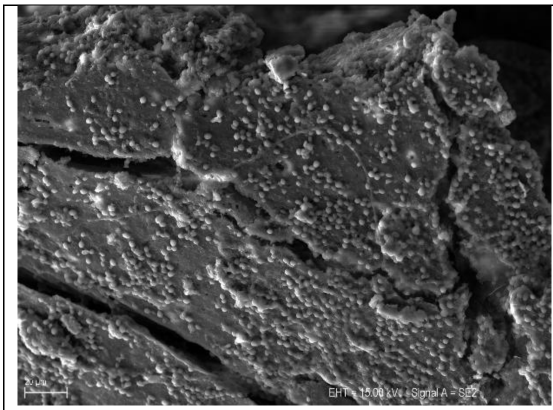
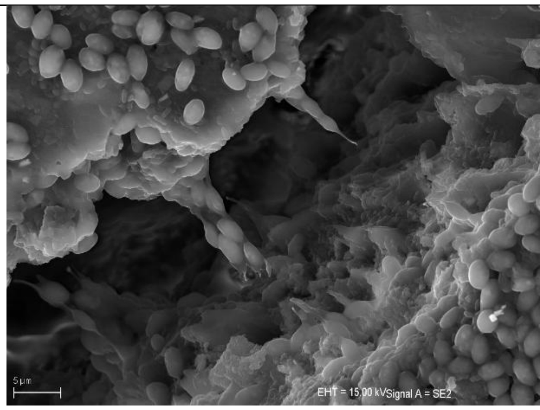
Supplementary material

Fig S1. Microcosms with Floating wetlands, assembling 6 plants of *Thypa* sp. species in the plastic tile in each microcosm (following QUARQ ENTERPRISE S.A. instructions).

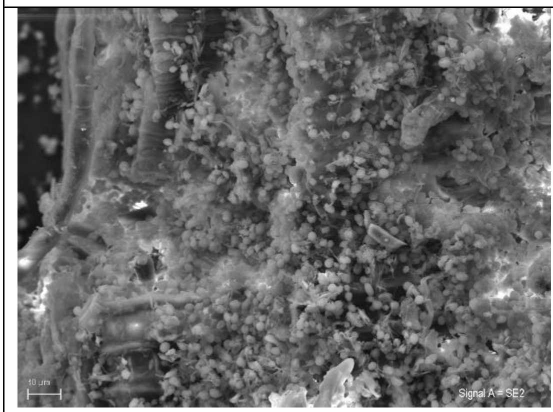
Fig. S2. SEM images showing the formation of biofilm from *Rhodotorula mucilaginosa* 1S1 CECT 13212 on the surface of pruning biochar pellet. Images a and b: general view of the biofilm grown on the pellets and detail of the growth on a fissure, respectively. Images d and e: general appearance of the biofilm grown on the material obtained after grinding the pellet and detail of its formation, respectively.



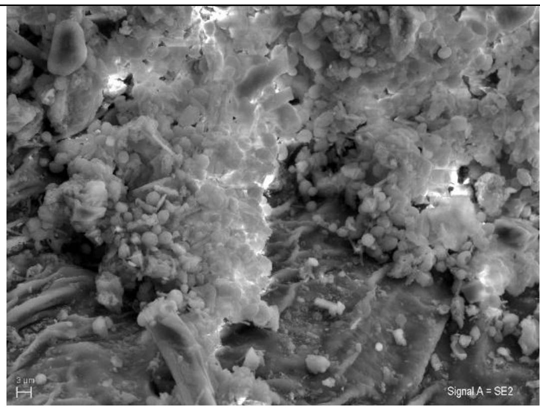
(a)



(b)



(c)



(d)

Fig. S3. FTIR spectra of biochar coated with *Rhodotorula mucilaginosa* 1S1 CECT 13212 biofilm. In blue the spectrum before contact with PP and in red the spectrum after the PP adsorption stage. In the case of carbonyl groups, biological activation had increased their presence. The region between 1300 and 600 cm^{-1} in the FTIR spectra that underwent significant changes, is usually attributed to the absorbance of carbohydrates, polyols and low molecular weight monosaccharides, is not easy to classify (Cao et al., 2017). In the Amide II region located around 1500 cm^{-1} and where the presence of amino groups from N-H bond bending is recorded, significant changes occurred, including a shift from 1513 to 1508 cm^{-1} and the appearance of two low intensity bands at 1541 and 1559 cm^{-1} respectively. At the same time, a strong shift at 1206 cm^{-1} (moved to 1218 cm^{-1}) implied C-O stretching vibrations and therefore the involvement of carbonyl groups (Deniz and Kepekci, 2017). On the other hand, in the region between 1300 and 1500 cm^{-1} that identifies vibrations of C-H and O-H groups, some shifts occurred: 1450 to 1456 cm^{-1}, 1427 to 1420 cm^{-1} and 1369 to 1373 cm^{-1} respectively, which could indicate the presence of an electron donation phenomenon between the negative -COO group (e.g. of diclofenac) and the O-H groups present in the biochar/biofilm complex (Priyan et al., 2021). This effect supports the interaction between pharmaceutical molecules and biomass and adds to other known interactions such as π-π interactions that occur when the aromatic ring of pharmaceuticals accepts electrons, while oxygen ions from the functional groups present on the surface of the adsorbent donate electrons (Choudhary and Philip, 2022).

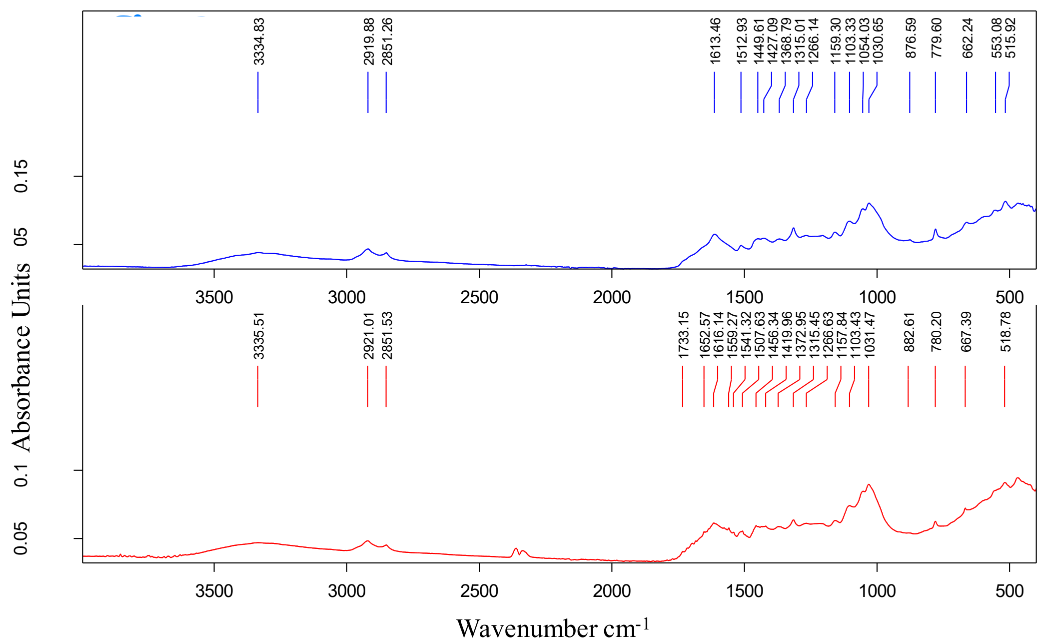


Table S1. List of target pharmaceutical compounds analyzed in water samples by LC-MS, their molecular formula and *m/z* value of the most abundant ion (positive polarity).

	Target Compound	Formula	*m/z*
1	(-)-N-methylephedrine	C11H17NO	180,13829
2	(+-)-Flecainide	C17H20F6N2O3	415,14509
3	(+-)-Sotalol hydrochloride	C12H20N2O3S	273,12674
4	2-ethylidene-1,5-dimethyl-3,3-diphenil-pyrrolidine perclorate	C20H23N	278,19033
5	4-Androsten-3,17-dione	C19H26O2	287,20056
6	9(10H)-Acridone	C13H18O2	196,07569
7	Acridine	C13H9N	180,08078
8	Albendazol-sulfoxide	C12H15N3O3S	282,09069
9	Albendazole	C12H15N3O2S	266,09577
10	Amphetamine	C9H13N	136,11208
11	Atenolol	C14H22N2O3	267,17032
12	Atropine	C17H23NO3	290,17507
13	Bupropion	C13H18ClNO	240,11497
14	Caffeine	C8H10N4O2	195,08765
15	Carbadox	C11H10N4O4	263,07748
16	Carbamazepine	C15H12N2O	237,10224
17	Carbamazepine 10-11-Epoxide	C15H12N2O2	253,09715
18	Ciprofloxacin	C17H18FN3O3	332,14050
19	Citalopram hydrobromide	C20H21FN2O	325,17107
20	Clarithromycin	C38H69NO13	748,48417
21	Clenbuterol	C12H18Cl2N2O	277,08690
22	Clomiphene	C26H28ClNO	406,19322
23	Clotrimazole	C19H13Cl	277,07785
24	Cloxacilin	C19H18ClN3O5S	436,07285
25	Cocaine	C17H21NO4	304,15433
26	Codeine	C18H21NO3	300,15942
27	Cotinine	C10H12N2O	177,10224
28	D-9-THC	C21H30O	315,23186
29	Danofloxacin	C19H20FN3O3	358,15615
30	Diazepam	C16H13ClN2O	285,07892
31	Diclofenac	C14H11Cl2NO2	296,02396
32	Diphenhydramine	C17H21NO	256,16959
33	Enoxacin	C15H17N4FO3	321,13570
34	Enrofloxacin	C19H22FN3O3	360,17180
35	Eprosartan mesylate	C23H24N2O4S	425,15295
36	Erythromycin	C37H67NO13	734,46852
37	Fluconazole	C13H12F2N6O	307,11134
38	Flufenamic acid	C14H10F3NO2	282,07364

39	Flumequine	C14H12FNO	262,08740
40	Gabapentin	C9H17NO2	172,13321
41	Gemfibrozil	C15H22O3	273,14612
42	Heroine	C21H23NO5	370,16490
43	Ibuprofen	C13H18O2	207,13796
44	Indomethacine	C19H16ClNO4	358,08406
45	Irbesartan	C25H28N6O	429,23974
46	Ketamine	C13H16ClNO	238,09932
47	Ketoprofen	C16H14O3	255,10157
48	Lamotrigine	C9H7Cl2N	256,01513
49	Leucomalachite green	C23H26N2	331,21688
50	Levofloxacin	C18H20FN3O4	362,15106
51	Lidocaine	C14H22N2O	235,18049
52	Lincomycin	C18H34N2O6S	407,22103
53	Lomefloxacin	C17H19F2N3O3	352,14672
54	Malachite green	C23H24N2	329,20123
55	MDA	C10H13NO2	180,10191
56	MDEA	C12H17NO2	208,13321
57	MDMA	C11H15NO2	194,11756
58	Mebendazole	C16H13N3O3	296,10300
59	Mefenamic acid	C15H15NO2	242,11756
60	Mepivacaine hydrochloride	C15H22N2O	247,18049
61	Metformin	C4H11N5	130,10872
62	Methadone	C21H27NO	310,21654
63	Methamphetamine	C10H15N	150,12773
64	Metronidazole	C6H9N3O3	172,07167
65	Miconazole	C18H14Cl4N2O	414,99330
66	Morphine	C17H19NO3	286,14377
67	Nadolol	C17H27NO4	310,20128
68	Nicotine	C10H14N2	163,12297
69	Nifuroxazide	C12H9N3O5	276,06150
70	Norpseudophedrine (Cathine)	C9H13NO	152,10699
71	Norfloxacin	C16H18FN3O3	320,14050
72	O-desmethylvenlafaxine	C16H25NO	264,19581
73	Ofloxacin	C18H20FN3O4	362,15106
74	Oxfendazole	C15H13N3O3S	316,07500
75	Oxolinic acid	C13H11NO5	262,07100
76	Paracetamol (Acetaminophen)	C8H9NO2	152,07060
77	Propranolol	C16H21NO2	260,16451
78	Ranitidine	C13H22N4O3S	315,14854
79	Roxithromycin	C41H76N2O15	837,53185

80	Sulfabenzamide	C13H12N2O3S	277,06414
81	Sulfachloropyridazine	C10H9ClN4O2S	285,02080
82	Sulfadiazine	C10H10N4O2	251,05972
83	Sulfadimethoxine	C12H14N4O4S	311,08085
84	Sulfadoxine	C12H14N4O4S	311,08085
85	Sulfaguanidine	C7H10N4O2S	215,05972
86	Sulfamerazine	C11H12N4O2S	265,07537
87	Sulfamethazine	C12H14N4O2S	279,09102
88	Sulfamethoxazole	C10H11N3O3S	254,05939
89	Sulfamethoxypyridazine	C11H12N4O3S	281,07029
90	Sulfamonomethoxine	C11H12N4O3S	281,07029
91	Sulfapyridine	C11H11N3O2S	250,06447
92	Sulfaquinoxaline	C14H12N4O2	301,07537
93	Sulfathiazole	C9H9N3O2S2	256,02090
94	Sulfisoxazol	C11H13N3O3S	268,07504
95	Sulpiride CRS	C15H23N3O4S	342,14820
96	Telmisartan	C33H30N4O2	515,24415
97	Terbutaline	C12H19NO3	226,14432
98	Testosterone	C19H28O2	289,21621
99	Theobromine	C7H8N4O2	181,07200
100	Theophylline	C7H8N4O2	181,07200
101	Timolol	C13H24N4O3S	317,16419
102	Tramadol hydrochloride	C16H25NO2	264,19581
103	Tributyl phosphate	C12H27PO4	267,17197
104	Triethyl phosphate	C6H15O4P	183,07807
105	Trimethoprim	C14H18N4O3	291,14517
106	Valsartan	C24H29N5O3	436,23432
107	Venlafaxine hydrochloride	C17H27NO2	278,21146

Table S2. Results of pharmacological products (PP) reducing rate (%) tests at laboratory scale carried out on biochar and biofilm coated biochar (*Rhodotorula mucilaginosa* 1S1 CECT 13212) after 7 days. Dilutions were prepared with Milli-Q water and 3 PP separately: carbamazepine, sulfamethoxazole and diclofenac (5000 ng L^{-1}). Biochar and biofilm coated biochar were using (10 g L^{-1} in each test). The samples were analyzed by HPLC-QTRAP-MS.

	carbamazepine	**sulfamethoxazole**	**diclofenac**
Biochar	61%	56%	18%
Biofilm coated biochar	54%	38%	37%

Table S3. Physic-chemical and biological variables mean values and SD measured in the microcosms at the end of the wastewater exposure phase (day 42). Asterisk (*) means statistically different.

	Treatments			
	NULL	**FW**	**FWB**	**FWBB**
Temperature (Cº)	18.8 ± 0.2	20.6 ± 0.1	20.7 ± 0.2	20.5 ± 0.3
pH	8.7 ± 0.5*	7.8 ± 1.3	7.8 ± 0.2	7.8 ± 0.2
DO (%)	43.4 ± 2.6	43.01± 13.4	39.7 ± 12.8	44.0 ± 12.0
Conductivity (mS cm^{-1})	1.7 ± 0.1	2.1± 0.1	1.9 ± 0.1	2.0± 0.2
Total Nitrate (mg L^{-1})	0 ± 0	0.1 ± 0.2	0.2 ± 0.2	0.1 ± 0.2
Ammonium (mg/L)	0 ± 0	0 ± 0	0 ± 0	0.05 ± 0.10
Total Phosphate (mg L^{-1})	4.7 ± 3.5	2.5 ± 1.5	1.5 ± 1.7	1.5 ± 1.7
Chlorophyll *a* (µg L^{-1})	19.3 ± 9.3	32.2 ± 25.4	29.6 ± 26.7	33.5± 26.4

Note: Microcosms treatments: **Null**: microcosms without floating wetland, with wastewater; **FW**: microcosms with floating wetland with wastewater; **FWB**: microcosms with floating wetland with wastewater, improved with biochar; **FWBB**: microcosms with floating wetland with wastewater, improved with biofilm coated biochar.