Supplementary information (SI)

A Promising Screw-Extrusion Steam Explosion Pretreatment process: Effects on the Morphological and Structural Features of *Eucalyptus* Woodchips

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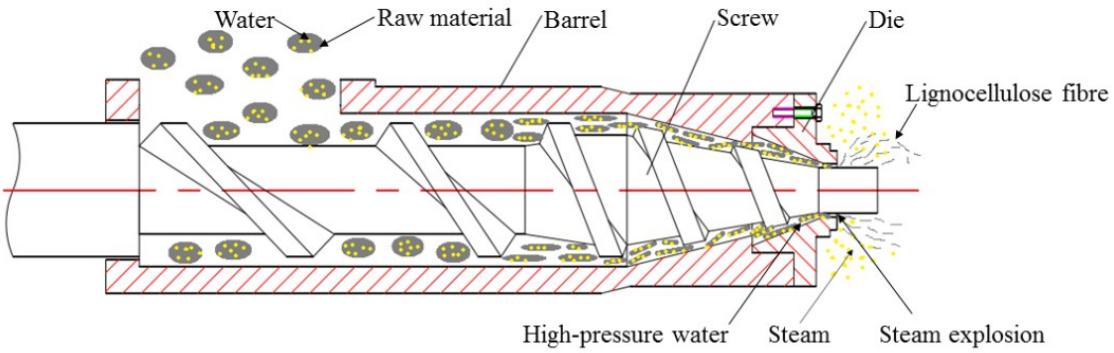

Figure S1 Schematic Diagram of SESE pretreatment

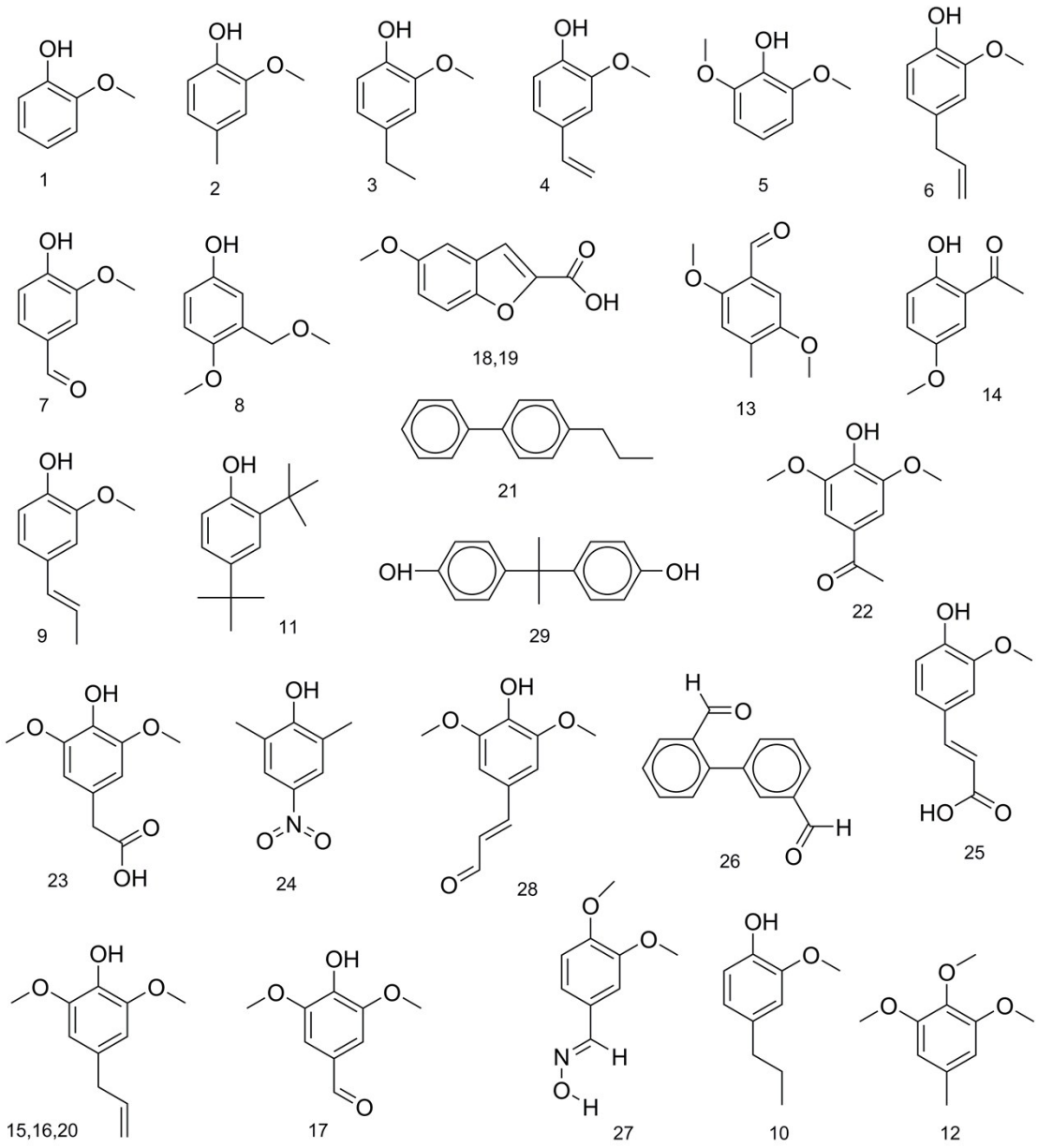

Figure S2 Different aromatic compound structures of lignin units

Table S1. Assignment of the main lignin ^{13}C-^{1}H cross-coupled signals in the 2D-HSQC NMR spectra of the EMALs

Label	δC/δH (ppm)	Assignments
B_β	53.9/3.05	C_β–H_β in β-β′ (resinol) (B)
-OCH_3	56.4/3.70	C-H in methoxyls
A_γ	59.7/3.20-3.75	C_γ-H_γ in β-O-4′ substructures (A)
C_γ	62.5/3.72	C_γ-H_γ in phenylcoumaran (C)
B_γ	71.2/3.82-4.18	C_γ-H_γ in β-β′ resinol (B)
A_α	72.2/4.85	C_α-H_α in β-O-4′ unit (A)
C_α	86.8/5.45	C_α-H_α in phenylcoumaran (C)
B_α	84.8/4.66	C_α-H_α in β-β′ resinol (B)
$A_{acyl,\ \beta(G)}$	82.2/4.50	C_β-H_β in β-O-4′ linked to G unit (A)
$A_{\beta(G)}$	84.1/4.31	C_β-H_β in β-O-4′ linked to G unit (A)
$A_{\beta(S)}$	86.2/4.12	C_β-H_β in β-O-4′ linked to S unit (A)
$A_{\beta(S)}$	87.2/4.00	C_β-H_β in β-O-4′ linked to S unit (A)
$S_{2,6}$	104.5/6.70	$C_{2,6}$-$H_{2,6}$ in syringyl units (S)
$S'_{2,6}$	106.8/7.22	$C_{2,6}$-$H_{2,6}$ in oxidized S units (S′)
G_2	111.0/6.90	C_2-H_2 in guaiacyl units (G)
G_5	115.2/6.70	C_5-H_5 in guaiacyl units (G)
G_6	119.0/6.75	C_6-H_6 in guaiacyl units (G)

Table S2. Identification and relative abundance (%) of the lignin derived compounds released after the Py-GC/GS of the lignin samples

Label	Compound	Retention Time (min)	Origin	EP-0	EP-4
1	Phenol, 2-methoxy-	11.56	G	1.14	2.32
2	Phenol,2-Methoxy-4-methyl	14.55	G	3.60	2.95
3	Phenol, 4-ethyl-2-methoxy-	16.95	G	1.67	1.50
4	2-Methoxy-4-vinylphenol	17.93	G	2.49	3.80
5	Phenol, 2,6-dimethoxy-	18.92	S	4.26	6.20
6	Eugenol	19.04	G	1.71	1.48
7	Vanillin	20.37	G	1.35	4.27
8	Phenol, 4-methoxy-3-(methoxymethyl)-	21.36	G	8.86	7.49
9	Phenol, 2-methoxy-4-(1-propenyl)-	21.42	G	4.89	5.04
10	Phenol, 2-methoxy-4-propyl-	21.77	G	1.77	1.61
11	Phenol, 2,4-bis(1,1-dimethylethyl)-	22.93	G	0.93	1.22
12	Benzene, 1,2,3-trimethoxy-5-methyl-	23.29	G	1.32	1.42
13	4-Methyl-2,5-dimethoxybenzaldehyde	24.23	G	6.36	8.82
14	Ethanone, 1-(2-hydroxy-5-methoxyphenyl)-	24.85	G	2.23	2.45
15	Phenol, 2,6-dimethoxy-4-(2-propenyl)-	25.10	S	2.46	2.00
16	Phenol, 2,6-dimethoxy-4-(2-propenyl)-	26.20	S	2.06	1.51
17	Benzaldehyde, 4-hydroxy-3,5-dimethoxy-	26.47	S	6.47	8.56
18	7-Methoxybenzofuran-2-carboxylic acid	26.77	S	2.00	1.65
19	7-Methoxybenzofuran-2-carboxylic acid	26.93	S	1.30	1.02
20	Phenol, 2,6-dimethoxy-4-(2-propenyl)-	27.31	S	11.96	10.32
21	4-Propyl-1,1′-diphenyl	27.44	S	4.93	2.62
22	Ethanone, 1-(4-hydroxy-3,5-dimethoxyphenyl)-	28.07	S	1.89	5.21
23	3,5-Dimethoxy-4-hydroxyphenylacetic acid	28.85	S	3.55	3.96
24	Phenol, 2,6-dimethyl-4-nitro-	29.84	S	1.57	0.68
25	Propanoic acid, 2-methyl-, 2-[1,1′-biphenyl]-4-yl-2-oxoethyl ester	29.98	G	3.81	3.12
26	(1,1′-Biphenyl)-2,2′-dicarboxaldehyde	30.07	G	1.28	1.33
27	3,4-Dimethoxybenzaldehyde oxime	30.11	G	1.16	0.57
28	3,5-Dimethoxy-4-hydroxycinnamaldehyde	33.11	S	7.16	5.54

29	Phenol, 4,4′-(1-methylethylidene)bis-	36.80	G	5.80	1.31
	S%			49.61	49.27
	G%			50.39	50.73
	S/G			0.99	0.97