

**The role of selective fungal delignification in overcoming the
saccharification recalcitrance of bamboo culms**

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Table S1 Percentages of cellulase bound to lignin in total cellulase protein during enzymatic hydrolysis of bamboo samples.

Table S2 Chemical shifts and assignments of the main lignin moieties in 2D HSQC NMR analysis.

Table S3 Yield, purity, and molecular weight of the isolated lignin

Figures

Figure S1 Adsorption of cellulase on bamboo culms and isolated bamboo lignin. (A) The adsorption curves of cellulase on raw and treated bamboo culms. (B) The adsorption curves of cellulase on lignin isolated from raw and treated bamboo culms.

Figure S2 Effect of isolated lignin on the hydrolysis of Avicel cellulose at different cellulase concentration.

Figure S3 Relative expression level of esterase during the pretreatment.

Table S1

Pretreatment Time	0 day	30 days	60 days	90 days
Specific adsorptive protein content at 2.5 mg/ml cellulase, $\Gamma_{2.5}$ (mg/g)	20.08	30.97	43.12	30.11
Lignin concentration, L_c (mg/ml)	6.87	5.75	5.22	4.80
Amount of protein bound to lignin, $\Gamma_{2.5} \times L_c$ (mg/ml)	0.138	0.178	0.225	0.145
Percentage of cellulase bound to lignin in total protein (%), $\Gamma_{2.5} \times L_c / 2.5$	5.52	7.12	9.01	5.78

1. cellulase concentration is 2.5 mg/ml (30 FPU/g biomass)

Table S2

Label	δ_C / δ_H (ppm)	Assignments
Ja	153.4/7.59	C α -H α in cinnamyl aldehyde end-groups
PCA α and	144.8/7.51	C α -H α in <i>p</i> -coumarate and ferulate
PCA2,6	130.1/7.45	C2-H2 and C6-H6 in <i>p</i> -coumarate
I α	128.4/6.44	C α -H α in cinnamyl alcohol end-groups
I β	128.4/6.23	C β -H β in cinnamyl alcohol end-groups
H2,6	127.8/7.22	C2,6-H2,6 in <i>p</i> -hydroxyphenyl units
J β	126.3/6.76	C β -H β in cinnamyl aldehyde end-groups
FA6	123.2/7.15	C6-H6 in ferulate
G6	119.0/6.78	C6-H6 in guaiacyl units
G5	115.1/6.92	C5-H5 in etherified guaiacyl units
PCA3,5	115.5/6.77	C3-H3 and C5-H5 in <i>p</i> -coumarate
G5	114.9/6.70	C5-H5 in guaiacyl units
PCA β and	113.5/6.27	C β -H β in <i>p</i> -coumarate and ferulate
FA2	111.0/7.32	C2-H2 in ferulate
G2	110.9/6.99	C2-H2 in guaiacyl units
S'2,6	106.3/7.32	C2,6-H2,6 in oxidized S units
S2,6	103.8/6.69	C2-H2 and C6-H6 in etherified syringyl units
T3	106.2/7.07	C3-H3 in triclin
T8	94.2/6.60	C8-H8 in triclin
T2,6	98.9/6.23	C2,6-H2,6 in triclin
T'2,6	103.9/7.34	C'2,6-H'2,6 in triclin
B α	86.8/5.43	C α -H α in phenylcoumaran substructures
A β (S)	85.9/4.10	C β -H β in β -O-4'substructures linked to a S unit
D β	85.3/3.85	C β -H β in dibenzodioxocin substructures
F α'	84.6/4.75	C α' -H α' in spirodienone substructures
C α	84.8/4.65	C α -H α in β - β' resinol substructures
A β (G)	83.4/4.27	C β -H β in β -O-4'substructures linked to a G unit
D α	83.3/4.81	C α -H α in dibenzodioxocin substructures
A β (H)	82.9/4.48	C β -H β in β -O-4'substructures linked to a H unit
Aox β	82.7/5.22	C β -H β in α -oxidized β -O-4' substructures
F α	81.2/5.10	C α -H α in spirodienone substructures
A' β (G)	80.8/4.52	C β -H β in γ -acylated β -O-4'substructures linked
E α	79.5/5.59	C α -H α in α -O-4' substructures
A α (S)	71.8/4.83	C α -H α in β -O-4'substructures linked to a S unit
A α (G)	70.9/4.71	C α -H α in β -O-4' substructures linked to a G unit
C γ	71.0/3.81 and 4.17	C γ -H γ in β - β' resinol substructures
A' γ	63.5/3.83 and 4.30	C γ -H γ in γ -acylated β -O-4' substructures
B γ	62.6/3.67	C γ -H γ in phenylcoumaran substructures
I γ	61.3/4.08	C γ -H γ in cinnamyl alcohol end-groups
F β	59.5/2.75	C β -H β in spirodienone substructures
A γ	59.4/3.35 – 3.80	C γ -H γ in γ -hydroxylated β -O-4'substructures
-OCH3	55.6/3.73	C-H in methoxyls
C β	53.5/3.05	C β -H β in β - β' resinol substructures
B β	53.1/3.43	C β -H β in phenylcoumaran substructures

Table S3

Lignin sample	Purity (%)	Yield (%)	Molecular weight (Mw)
Raw sample	88.87±0.27	4.59 ±0.22	62079
30-day treatment	86.31±0.07	3.81±0.47	57407
60-day treatment	89.66±0.63	2.85±0.21	54701
90-day treatment	87.89±0.38	2.76±0.25	61895

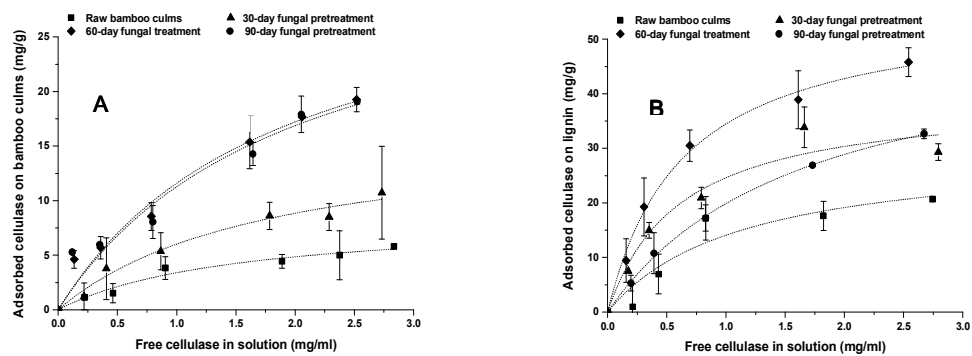


Figure S1

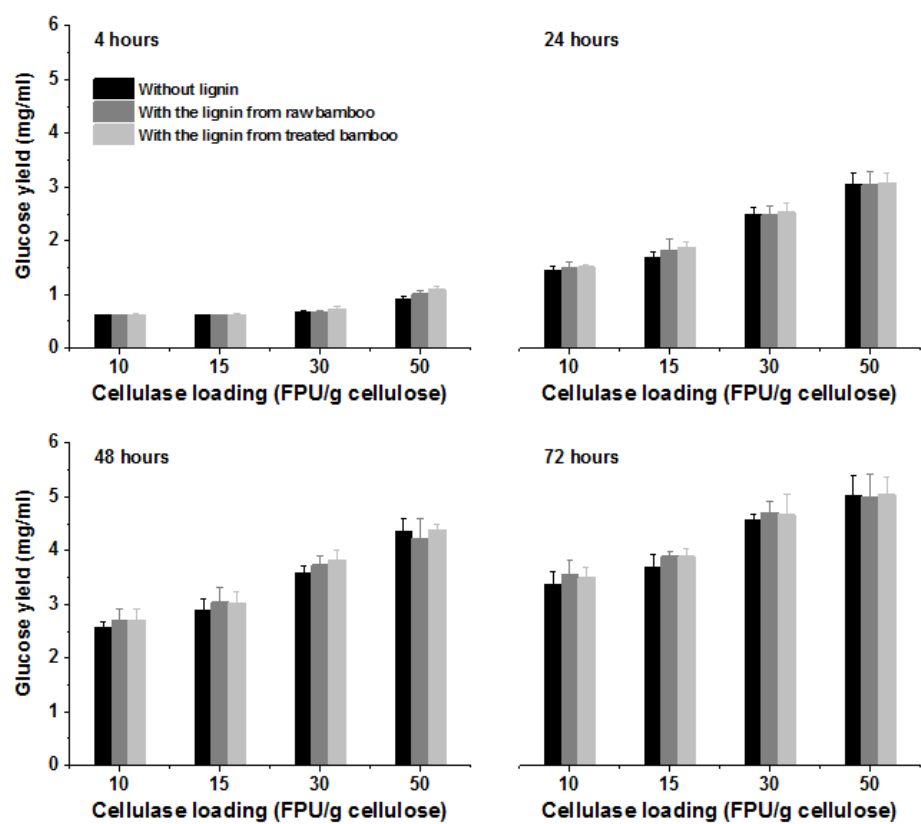


Figure S2

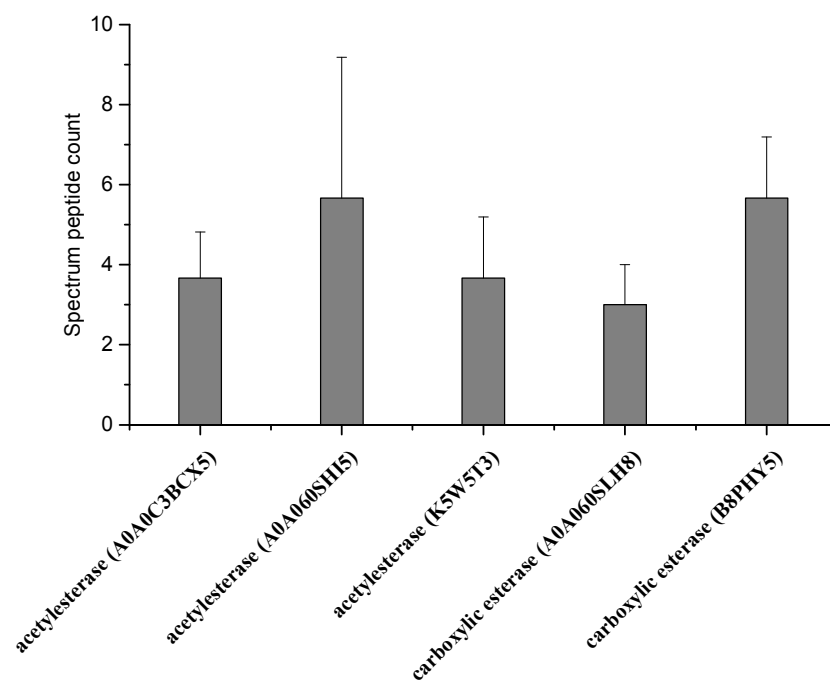


Figure S3