

Supplementary Materials:

Supplementary Table S1 The extraction rate and yield of the ball-milled lignin samples.

Run	Extraction from	Extraction conditions	Extraction rate (%)	Lignin yield (mg/g of the RS)
1	ES residue	Ball milling, 200 rpm, 12 hours	4.25±1.09d ¹	5.11±1.31d
2	ES residue	Ball milling, 250 rpm, 12 hours	14.45±1.94c	17.38±2.33c
3	ES residue	Ball milling, 300 rpm, 12 hours	28.71±3.18a	34.52±3.82a
4	ES residue	Ball milling, 350 rpm, 12 hours	19.66±5.00b	23.64±6.01b
5	ES residue	Ball milling, 300 rpm, 4 hours	4.11±1.55d	4.94±1.86d
6	ES residue	Ball milling, 300 rpm, 8 hours	22.39±2.55b	26.92±3.06b
7	ES residue	Ball milling, 300 rpm, 16 hours	30.59±3.51a	36.77±4.22a
8	ES residue	Ball milling, 300 rpm, 20 hours	30.70±2.09a	36.92±2.51a
9	Extract-free RS	Ball milling, 300 rpm, 12 hours	5.82±1.13d	8.50±1.64d

¹ Value followed by different letters indicate a significantly difference at $p \leq 0.05$.