

Fermentative L-Lactic Acid Production Using *Bacillus coagulans* from Corn Stalk Deconstructed by An Anaerobic Microbial Community

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LA batch fermentations. Cellulase was added to 10 FPU.g⁻¹ cellulose. LA batch fermentation was started with 10% (v/v) of *B. coagulans* NBRC 12583 inoculation. The details of the ability of *B. coagulans* NBRC 12583 to metabolize glucose, xylose and complex sugars to produce lactic acid were shown in the Supporting Information (Table 1, 2 and 3). LA batch fermentation was carried out in a 250 mL flask containing 50 mL of synthetic medium at 52°C and 100 rpm. CaCO₃ (36 g/L) was added to neutralize the generated L-lactic acid. The LA fermentation was performed for 72 h, and samples were collected every 12 h. The concentration of LA in the system was determined and the conversion rate of LA was calculated.

Table S1. Comparison of the characteristics of the conversion of different concentrations glucose into lactic acid with *Bacillus coagulans* NBRC 12583.

Set initial glucose concentration g/L	Measured glucose concentration g/L	Conversion rate %	Yield g/g	Production intensity g/(L·h)		
				72 h	36 h	24 h
40	34.96	99	0.68	0.39	0.81	1.08
60	49.36	99	0.99	0.81	0.90	1.02
80	64.53	80	0.90	0.77	0.89	0.99
100	79.61	58	1.02	0.79	0.85	0.98
115	86.22	46	1.18	0.78	0.82	0.91
145	121.92	39	0.87	0.70	0.76	0.75

Table S2. Comparison of the characteristics of converting different concentrations xylose into lactic acid with *Bacillus coagulans* NBRC 12583.

Set initial xylose concentration g/L	Measured xylose concentration g/L	Conversion rate %	Yield g/g	Production intensity g/(L·h)		
				72 h	36 h	24 h
40	40.87	98	0.40	0.22	0.56	0.69
60	61.46	76	0.44	0.29	0.54	0.70
80	81.43	61	0.39	0.27	0.52	0.67
100	98.97	52	0.36	0.26	0.49	0.58
115	110.84	48	0.37	0.27	0.47	0.52
145	135.11	2	0.05	0.00	0.00	0.01

Table S3. Comparison of the characteristics of the conversion of mixed sugars (glucose:xylose) into lactic acid in different proportions with *Bacillus coagulans* NBRC 12583.

Set initial total sugar concentration (glucose:xylose) g/L	Measured total sugar concentration g/L	Conversion rate %	Yield g/g	Production intensity g/(L·h)		
				72 h	36 h	24 h
60(1:9)	60.07	0	0	0	0	0.01
60(3:7)	57.48	92	0.51	0.40	0.47	0.35
60(5:5)	60.46	92	0.51	0.42	0.60	0.59

60(7:3)	58.53	96	0.62	0.49	0.82	0.70
60(9:1)	55.64	99	0.71	0.54	0.91	0.81

1. Characterization analysis of corn stalk samples before and after ensiling

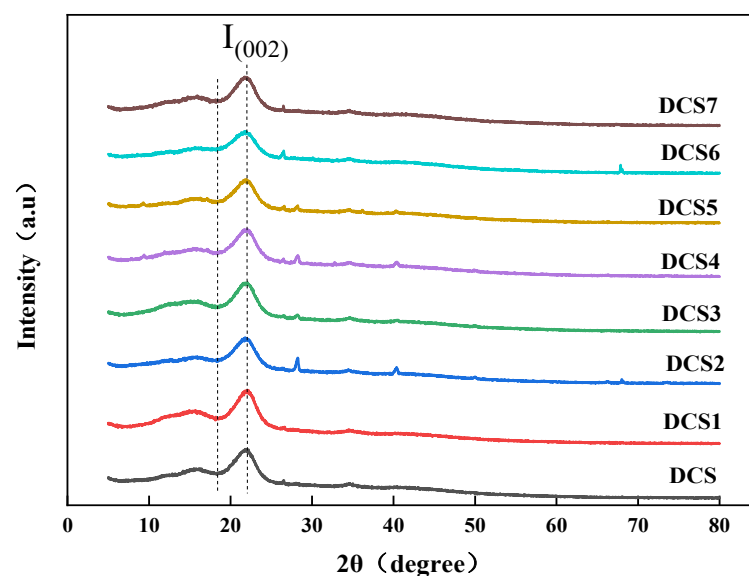


Figure S1. XRD patterns of DCS samples before and after ensiling pretreatment.

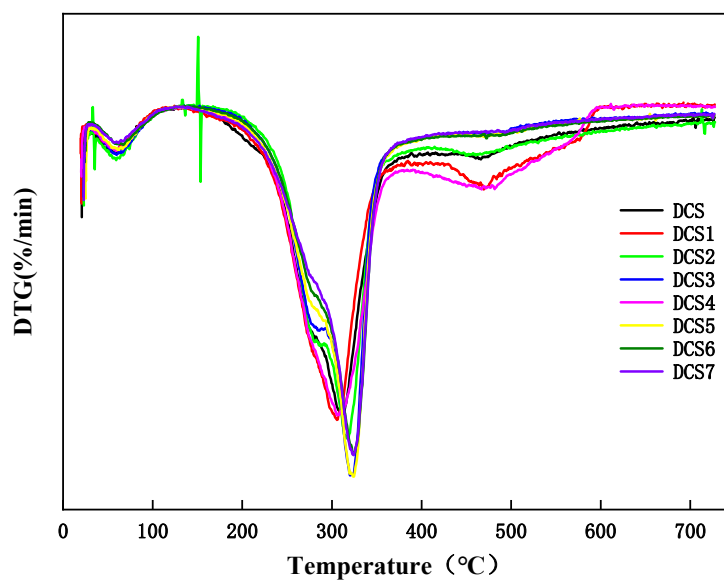


Figure S2. DTG curves of corn stalk samples before and after ensiling pretreatment.

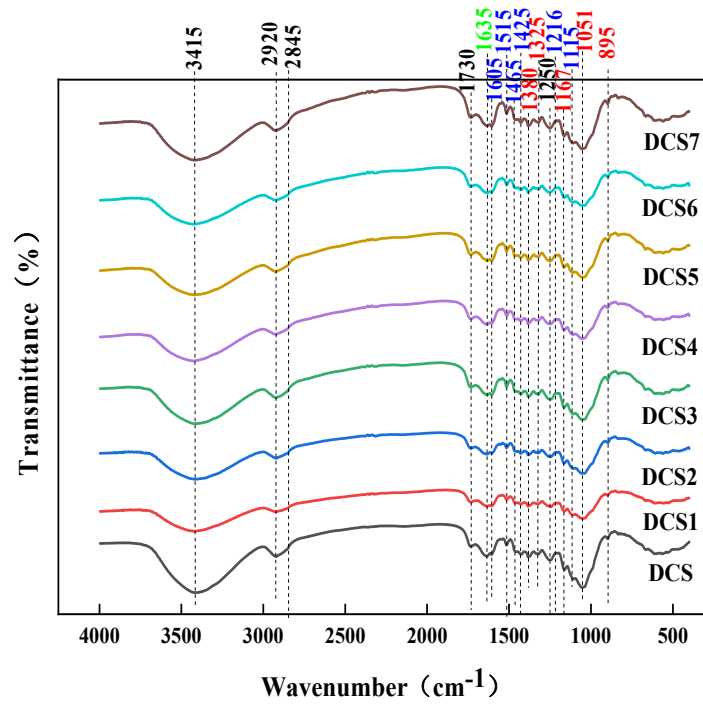


Figure S3. Infrared spectroscopy analysis of corn stalk samples before and after ensiling pretreatment.