Supplementary data

Table S1. Morphology of wet bacterial cellulose films formed within kombucha tea after 6- and 12-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Table S2. Changes in microbial densities (log CFU/mL) of *Komagataeibacter saccharivorans* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Table S3. Changes in microbial densities (log CFU/mL) of *Saccharomyces cerevisiae* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Table S4. Changes in microbial densities (log CFU/mL) of *Levilactobacillus brevis* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Table S1. Morphology of wet bacterial cellulose films formed within kombucha tea after 7- and 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

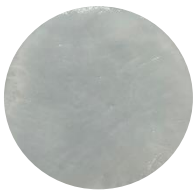
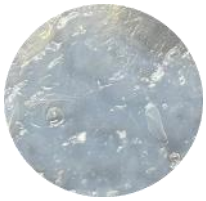
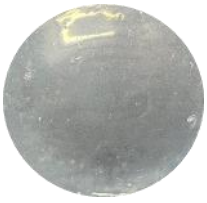
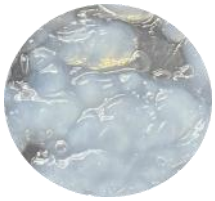
	After 7-day fermentation	After 14-day fermentation		After 7-day fermentation	After 14-day fermentation
A20			YA20		
A50			YA50		
A100			YA100		
YAL20			YAL50		
YAL100				Notes: A – *Komagataeibacter saccharivorans* Y – *Saccharomyces cerevisiae* L – *Levilactobacillus brevis*	

Table S2. Changes in microbial densities (log CFU/mL) of *Komagataeibacter saccharivorans* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Day	A20	A50	A100	YA20	YA50	YA100	YAL20	YAL50	YAL100
0	4.03 (0.03)	4.04 (0.05)	4.09 (0.05)	4.12 (0.02)	4.10 (0.05)	4.06 (0.04)	4.08 (0.02)	4.10 (0.02)	4.10 (0.04)
1	5.94 (0.01)	6.02 (0.01)	5.84 (0.01)	5.54 (0.02)	5.72 (0.02)	5.84 (0.01)	5.37 (0.01)	5.54 (0.03)	5.80 (0.02)
2	6.95 (0.01)	7.05 (0.02)	6.86 (0.01)	6.51 (0.05)	6.59 (0.02)	6.64 (0.01)	6.46 (0.02)	6.69 (0.01)	6.75 (0.02)
3	7.25 (0.07)	7.45 (0.03)	7.29 (0.05)	7.22 (0.06)	7.13 (0.07)	7.18 (0.10)	7.13 (0.07)	7.24 (0.05)	7.27 (0.05)
4	8.11 (0.10)	8.19 (0.06)	8.16 (0.02)	8.09 (0.07)	8.15 (0.04)	8.28 (0.03)	8.13 (0.07)	8.11 (0.05)	8.30 (0.09)
5	8.17 (0.08)	8.27 (0.05)	8.22 (0.06)	8.13 (0.07)	8.16 (0.02)	8.27 (0.05)	8.29 (0.05)	8.2 (0.04)	8.11 (0.10)
6	8.20 (0.04)	8.23 (0.04)	8.27 (0.05)	7.13 (0.07)	7.18 (0.04)	7.30 (0.06)	7.25 (0.07)	7.15 (0.04)	7.63 (0.03)
7	6.17 (0.08)	6.16 (0.06)	6.27 (0.05)	6.11 (0.05)	6.18 (0.04)	6.16 (0.06)	6.14 (0.13)	6.14 (0.09)	6.24 (0.05)
8	6.12 (0.12)	6.29 (0.05)	6.34 (0.08)	5.11 (0.05)	5.48 (0.03)	5.30 (0.06)	4.17 (0.08)	4.18 (0.1)	4.23 (0.07)
9	6.45 (<0.01)	6.13 (0.01)	6.34 (0.01)	3.88 (0.01)	4.32 (<0.01)	4.48 (<0.01)	4.09 (0.01)	4.41 (<0.01)	4.31 (<0.01)
10	4.27 (0.05)	4.31 (0.05)	4.16 (0.06)	3.22 (0.06)	3.38 (0.03)	3.23 (0.04)	3.08 (0.05)	3.22 (0.06)	3.29 (0.05)

11	4.28 (0.03)	4.09 (0.07)	4.24 (0.09)	2.92 (0.11)	2.87 (0.12)	2.90 (0.08)	2.11 (0.10)	2.16 (0.02)	2.09 (0.07)
12	3.99 (0.12)	4.00 (0.06)	4.25 (0.10)	2.57 (0.03)	2.08 (0.05)	2.63 (0.04)	1.48 (<0.01)	2.11 (0.10)	2.14 (0.09)
14	3.58 (0.03)	3.73 (0.03)	3.78 (0.02)	2.00 (0.06)	2.16 (0.02)	2.32 (0.06)	0.48 (<0.01)	0.35 (0.49)	1.09 (0.07)
16	2.79 (0.03)	2.94 (0.01)	3.24 (0.02)	0.45 (0.21)	1.18 (0.04)	1.48 (0.04)	0.30 (<0.01)	0.48 (<0.01)	0.87 (0.04)
18	1.3 (<0.01)	1.24 (0.34)	2.00 (0.06)	0	0.30 (<0.01)	0.50 (0.28)	0	0.48 (<0.01)	0.54 (0.09)

Notes: The results were presented as mean (standard deviation) of triplicates and different letters in the same columns indicate that the mean values were significantly different at 95% confidence level.

A – *Komagataeibacter saccharivorans*, Y – *Saccharomyces cerevisiae*, L – *Levilactobacillus brevis*

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Table S3. Changes in microbial densities (log CFU/mL) of *Saccharomyces cerevisiae* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Day	YA20	YA50	YA100	YAL20	YAL50	YAL100
0	4.11 (0.05)	4.05 (0.02)	4.07 (0.03)	4.12 (0.04)	4.14 (0.02)	4.08 (0.03)
1	5.36 (0.05)	5.42 (0.03)	5.77 (0.01)	5.19 (0.02)	5.28 (0.03)	5.31 (0.08)
2	6.75 (0.02)	6.81 (0.01)	6.69 (0.02)	6.32 (0.03)	6.59 (0.02)	6.77 (0.02)
3	7.36 (0.05)	7.68 (0.03)	7.71 (0.02)	7.55 (0.04)	7.67 (0.02)	7.85 (0.01)
4	8.13 (0.07)	8.14 (0.09)	8.34 (0.06)	8.20 (0.04)	8.27 (0.05)	8.41 (0.04)
5	8.11 (0.05)	8.20 (0.08)	8.27 (0.05)	8.15 (0.04)	8.10 (0.14)	8.23 (0.04)
6	7.34 (0.06)	7.94 (0.01)	8.08 (0.01)	7.25 (0.07)	7.59 (0.03)	7.74 (0.03)
7	6.08 (0.05)	6.22 (0.06)	6.30 (0.06)	6.09 (0.07)	6.14 (0.09)	6.14 (0.09)
8	5.52 (0.06)	5.65 (0.03)	5.82 (0.01)	4.35 (0.04)	4.46 (0.04)	4.65 (0.04)
9	4.44 (<0.01)	4.46 (<0.01)	4.26 (0.01)	4.45 (<0.01)	4.41 (0.01)	4.28 (<0.01)
10	3.43 (0.05)	3.54 (0.02)	3.66 (0.01)	3.48 (0.04)	3.53 (0.04)	3.67 (0.03)

11	3.20 (0.08)	3.23 (0.04)	3.57 (0.03)	2.04 (0.06)	2.29 (0.05)	2.35 (0.04)
12	2.85 (0.03)	2.93 (0.01)	3.33 (0.01)	1.30 (<0.01)	1.99 (0.12)	1.92 (0.11)
14	2.50 (0.04)	2.61 (0.02)	2.97 (0.01)	0.30 (<0.01)	0.48 (<0.01)	0.92 (0.11)
16	1.89 (0.02)	1.97 (0.02)	2.11 (0.01)	0.30 (<0.01)	0	0.59 (0.16)
18	0.30 (<0.01)	0	1.00 (0.06)	0 (<0.01)	0	0.30 (<0.01)

Notes: The results were presented as mean (standard deviation) of triplicates and different letters in the same columns indicate that the mean values were significantly different at 95% confidence level.

A – *Komagataeibacter saccharivorans*, Y – *Saccharomyces cerevisiae*, L – *Levilactobacillus brevis*

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Table S4. Changes in microbial densities (log CFU/mL) of *Levilactobacillus brevis* during 14-day fermentation by single acetic acid bacteria (A), binary culture of yeast-acetic acid bacteria (YA), and ternary culture of yeast-acetic acid bacteria-lactic acid bacteria (YAL) at initial glucose concentrations of 20 g/L, 50 g/L và 100 g/L.

Day	YAL20	YAL50	YAL100
0	4.02 (0.02)	4.14 (0.02)	4.08 (0.03)
1	5.48 (0.02)	5.63 (0.01)	5.86 (0.01)
2	6.25 (0.03)	6.25 (0.03)	6.62 (0.01)
3	7.27 (0.02)	7.22 (0.02)	7.60 (0.02)
4	8.28 (0.03)	8.27 (0.05)	8.16 (0.06)
5	8.28 (0.06)	8.33 (0.07)	8.17 (0.12)
6	7.27 (0.05)	7.23 (0.07)	7.32 (0.06)
7	6.14 (0.09)	6.15 (0.04)	6.24 (0.05)
8	4.14 (0.09)	4.18 (0.10)	4.20 (0.04)
9	3.30 (0.06)	3.33 (0.04)	3.23 (0.04)
10	3.14 (0.09)	3.09 (0.07)	3.18 (0.10)
11	2.02 (0.09)	2.22 (0.06)	2.45 (0.02)
12	2.06 (0.03)	2.09 (0.07)	2.28 (0.06)
14	0.72 (0.17)	0.94 (0.14)	1.09 (0.07)
16	0.30 (<0.01)	0.48 (<0.01)	1.06 (0.08)
18	0	0	0.45 (0.21)

Notes: The results were presented as mean (standard deviation) of triplicates and different letters in the same columns indicate that the mean values were significantly different at 95% confidence level.

A – *Komagataeibacter saccharivorans*, Y – *Saccharomyces cerevisiae*, L – *Levilactobacillus brevis*

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