APPENDICES

A.1: pH and TTA% assay

pH and TTA% changes of plain- and herbal- yogurts during 4 hours fermentation at 41°C

Tbale 1: pH and TTA% changes in plain yogurt.

Time (Min)	Plain	
	pH	**TTA%**
0	6.27 ± 0.29	0.21 ± 0.051
30	6.13 ± 0.28	0.24 ± 0.051
60	5.99 ± 0.29	0.27 ± 0.063
90	5.80 ± 0.29	0.30 ± 0.025
120	5.72 ± 0.29	0.30 ± 0.025
150	5.40 ± 0.35	0.37 ± 0.025
180	4.92 ± 0.34	0.50 ± 0.036
210	4.63 ± 0.33	0.55 ± 0.025
240	4.52 ± 0.30	0.57 ± 0.085

Tbale 3: pH and TTA% changes in *L. barbarum* yogurt.

Time (Min)	*L. barbarum*	
	pH	**TTA%**
0	6.10 ± 0.31	0.19 ± 0.025
30	5.99 ± 0.28	0.27 ± 0.00
60	5.94 ± 0.28	0.29 ± 0.025
90	5.73 ± 0.29	0.34 ± 0.031
120	5.39 ± 0.30	0.39 ± 0.043
150	5.17 ± 0.34	0.51 ± 0.025
180	4.80 ± 0.32	0.56 ± 0.025
210	4.59 ± 0.26	0.64 ± 0.076
240	4.52 ± 0.22	0.63 ± 0.00

Tbale 5: pH and TTA% changes in *G. mangostana* yogurt.

Time (Min)	*G. mangostana*	
	pH	**TTA%**
0	5.83 ± 0.345	0.26 ± 0.025
30	5.79 ± 0.37	0.29 ± 0.031
60	5.70 ± 0.397	0.28 ± 0.025
90	5.53 ± 0.414	0.34 ± 0.031
120	5.41 ± 0.432	0.48 ± 0.129
150	5.12 ± 0.458	0.56 ± 0.031
180	4.87 ± 0.438	0.60 ± 0.113
210	4.51 ± 0.458	0.61 ± 0.031
240	4.50 ± 0.430	0.69 ± 0.051

Tbale 4: pH and TTA% changes in *P. guajava* yogurt.

Time (Min)	*P. guajava*	
	pH	**TTA%**
0	6.19 ± 0.310	0.27 ± 0.09
30	5.99 ± 0.294	0.28 ± 0.025
60	5.89 ± 0.263	0.32 ± 0.021
90	5.72 ± 0.322	0.33 ± 0.025
120	5.48 ± 0.355	0.38 ± 0.025
150	5.23 ± 0.371	0.51 ± 0.051
180	4.93 ± 0.39	0.55 ± 0.076
210	4.66 ± 0.303	0.57 ± 0.085
240	4.55 ± 0.273	0.59 ± 0.106

Table 2: pH and TTA% changes in *M. grosvenori* yogurt.

Time (Min)	*M. grosvenori*	
	pH	**TTA%**
0	5.88 ± 0.340	0.27 ± 0.00
30	5.79 ± 0.258	0.28 ± 0.025
60	5.73 ± 0.288	0.30 ± 0.043
90	5.49 ± 0.262	0.36 ± 0.00
120	5.27 ± 0.2847	0.42 ± 0.022
150	5.04 ± 0.333	0.47 ± 0.031
180	4.74 ± 0.361	0.54 ± 0.058
210	4.60 ± 0.362	0.61 ± 0.051
240	4.61 ± 0.298	0.58 ± 0.045

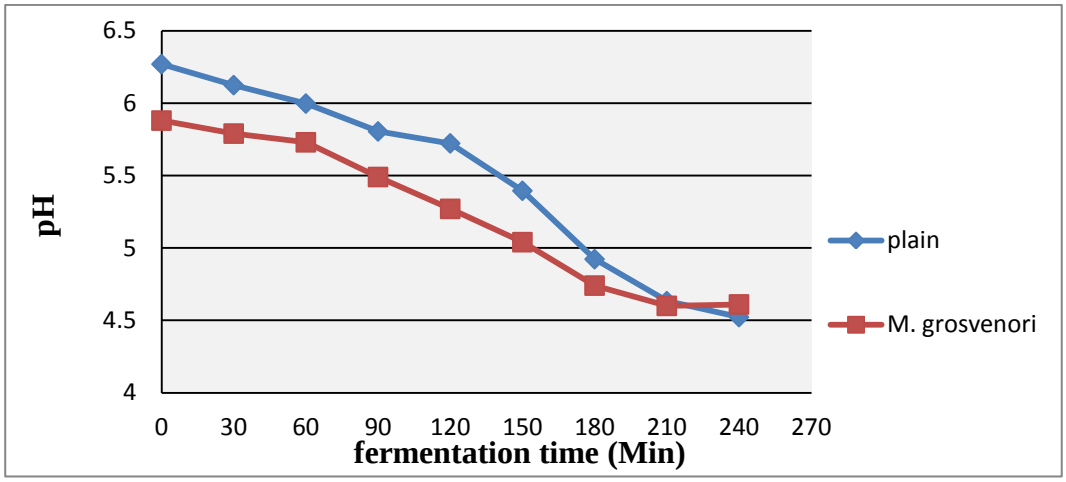

Figure 1: pH changes of *M. grosvenori*- yogurt compared to plain- yogurt.

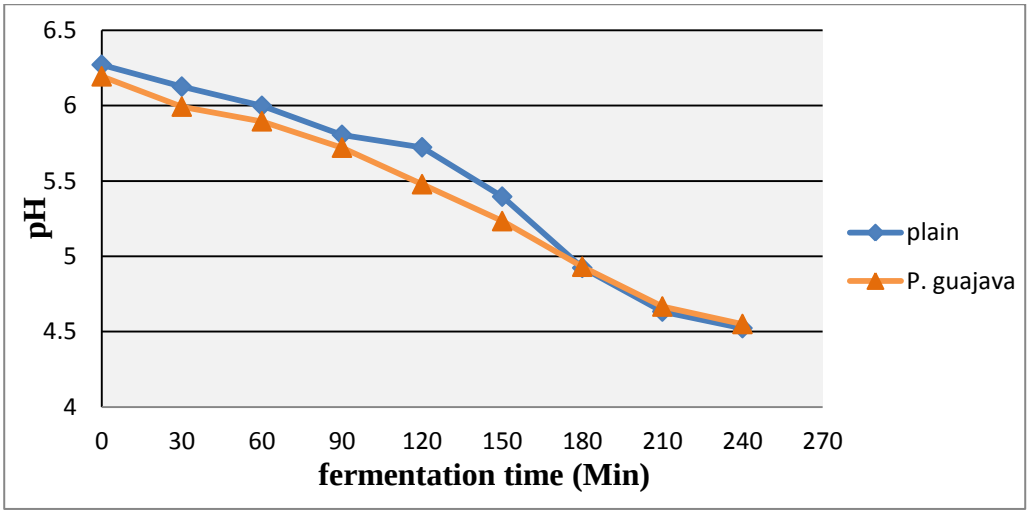

Figure 2: pH changes of *P. guajava*- yogurt compared to plain- yogurt.

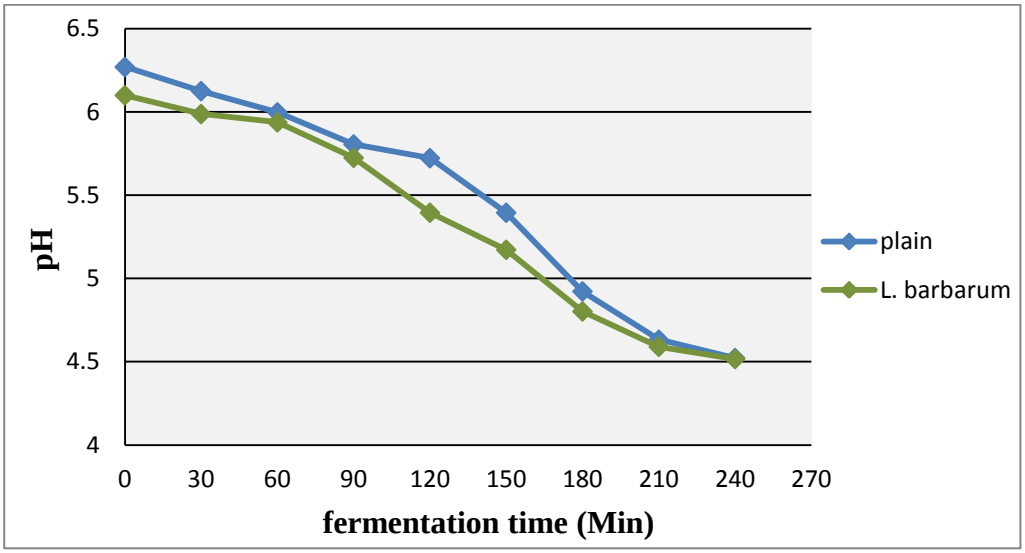

Figure 3: pH changes of *L. barbarum*- yogurt compared to plain- yogurt.

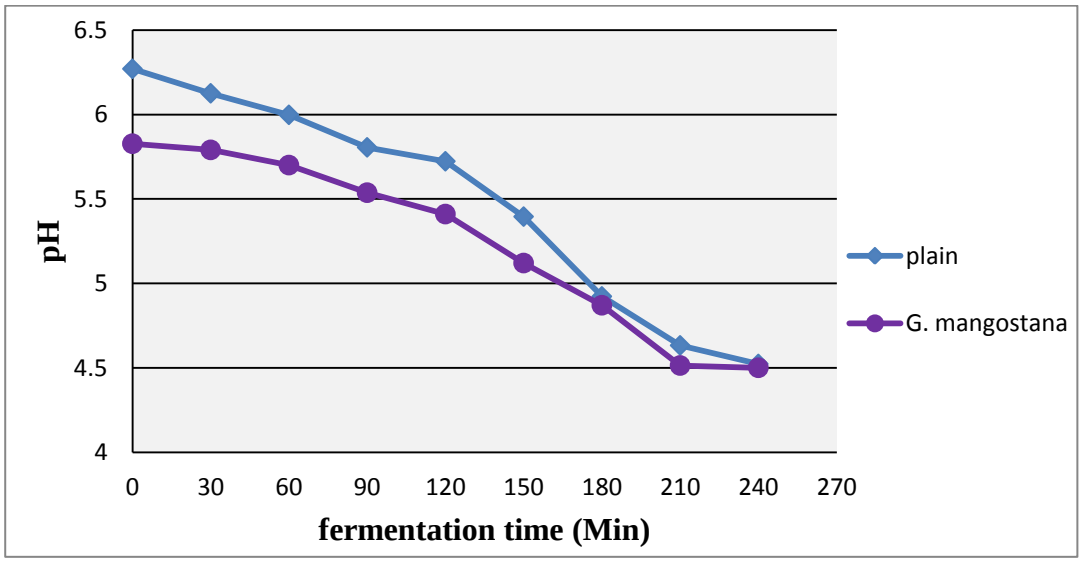

Figure 4: pH changes of *G. mangostana*- yogurt compared to plain- yogurt.

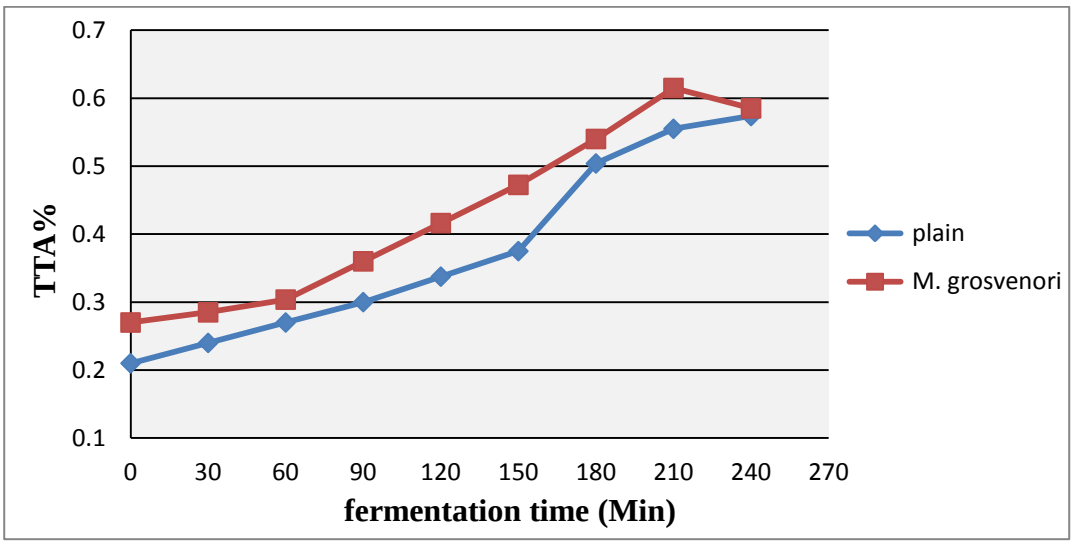

Figure 5: comparison of TTA changes of *M. grosvenori*- with plain- yogurt.

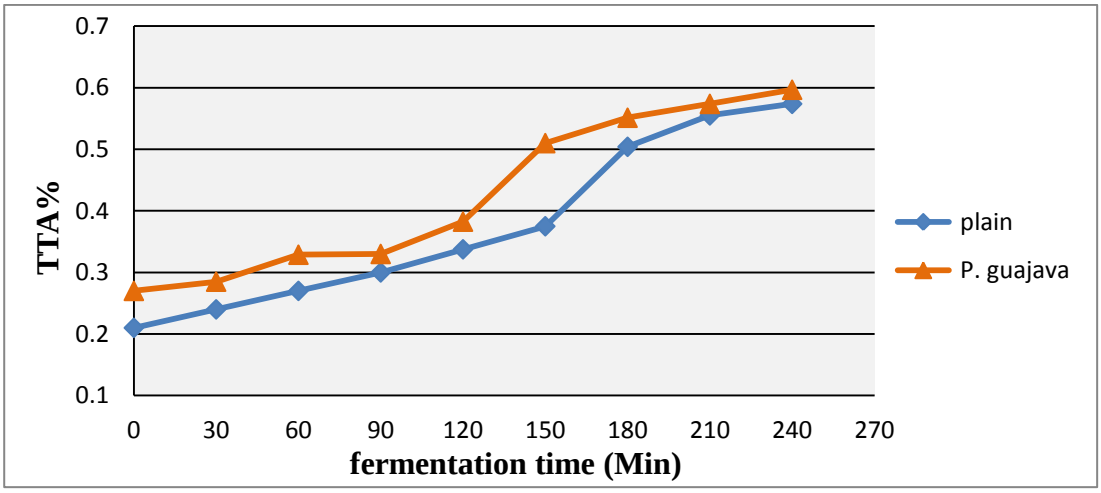

Figure 6: comparison of TTA changes of *P. guajava*- with plain- yogurt.

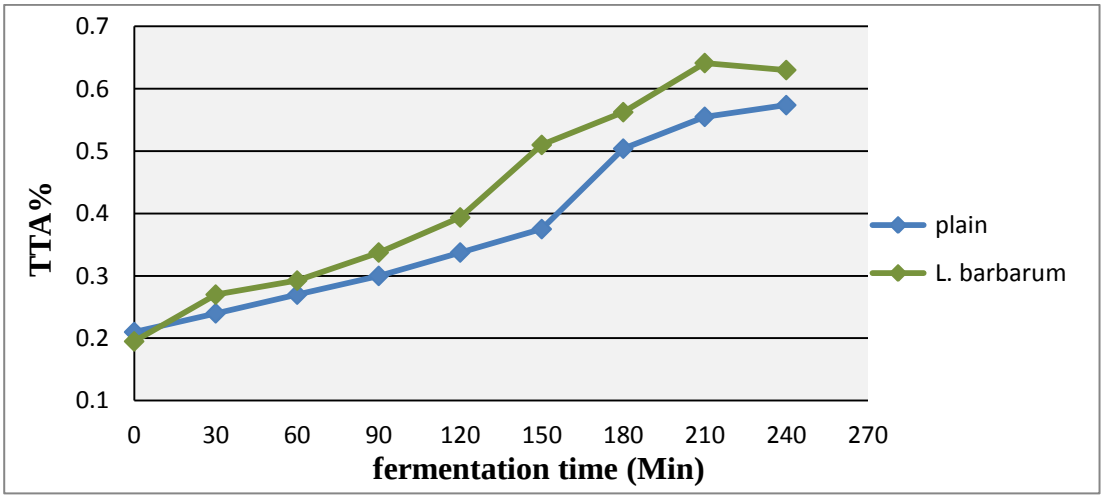

Figure 7: comparison of TTA changes of *L. barbarum*- with plain- yogurt.

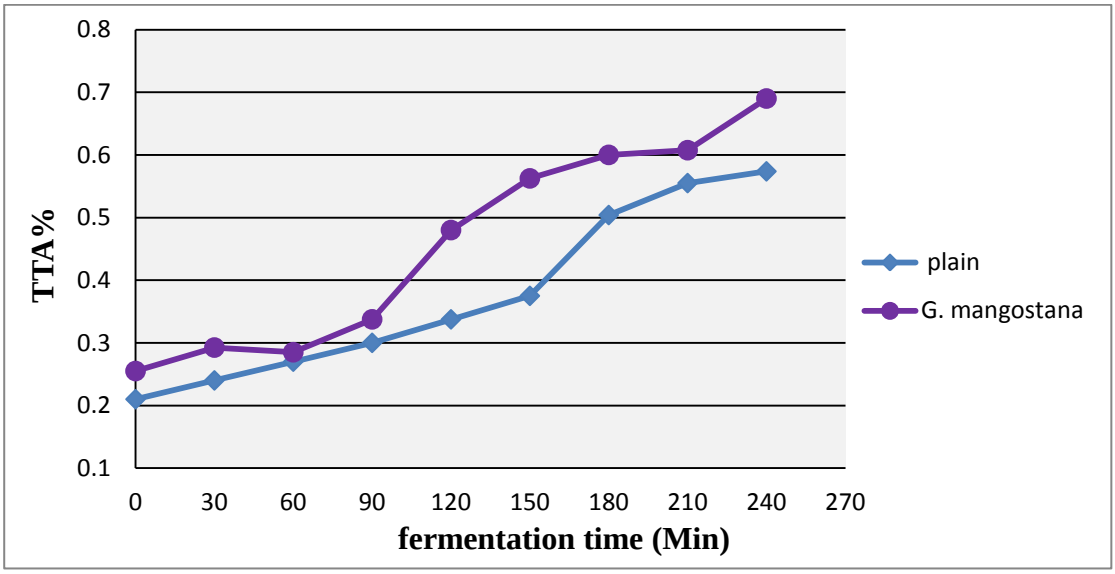

Figure 8: comparison of TTA changes of *G. mangostana*- with plain- yogurt.

A.2: Absorbance reading (600 A) for optical density of *Lactobacillus* ssp.

Bacteria were sampled from several colonies and resuspended in growth medium (MRS broth) containing various concentration of plant water extract (0%, 0.75%, 1.5% & 3%). Values are means from two separate runs.

Table 6: Effects of *L. barbarum* on the optical density (OD) of growth medium containing *Lactobacillus* spp.

Time (Min)	Optical density (OD)			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.024±0.002	0.002±0.001	0.027±0.000	0.043±0.012
10	0.023±0.002	0.008±0.000	0.034±0.004	0.057±0.013
15	0.031±0.003	0.015±0.001	0.036±0.003	0.071±0.023
20	0.041±0.002	0.019±0.002	0.038±0.007	0.093±0.021
25	0.039±0.002	0.013±0.001	0.051±0.000	0.102±0.011
30	0.043±0.003	0.024±0.001	0.53±0.000	0.113±0.014

Table 7: Effects of *P. guajava* on the optical density (OD) of growth medium containing *Lactobacillus* spp.

Time (Min)	Optical density (OD)			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.005±0.000	0.008±0.001	0.033±0.010	0.046±0.000
10	0.009±0.002	0.010±0.004	0.036±0.008	0.061±0.005
15	0.010±0.003	0.011±0.002	0.040±0.002	0.077±0.007
20	0.017±0.006	0.02±0.006	0.044±0.004	0.113±0.026
25	0.021±0.005	0.025±0.004	0.053±0.002	0.116±0.021
30	0.024±0.008	0.027±0.006	0.057±0.005	0.124±0.025

Table 8: Effects of *M. grosvenori* on the optical density (OD) of growth medium containing *Lactobacillus* spp.

Time (Min)	Optical density (OD)			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.014±0.002	0.027±0.002	0.023±0.002	0.040±0.003
10	0.033±0.001	0.039±0.004	0.050±0.002	0.088±0.003
15	0.034±0.011	0.044±0.008	0.053±0.021	0.116±0.001
20	0.049±0.006	0.059±0.011	0.067±0.009	0.167±0.002
25	0.053±0.004	0.069±0.012	0.079±0.005	0.213±0.010
30	0.062±0.006	0.074±0.013	0.098±0.002	0.218±0.003

Table 9: Effects of *G. mangostana* on the optical density (OD) of growth medium containing *Lactobacillus* spp.

Time (Min)	Optical density (OD)			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.003±0.000	0.001±0.001	0.015±0.010	0.075±0.013
10	0.004±0.002	0.003±0.000	0.017±0.010	0.086±0.017
15	0.006±0.001	0.008±0.001	0.017±0.008	0.120±0.020
20	0.007±0.000	0.012±0.005	0.018±0.004	0.127±0.020
25	0.007±0.000	0.012±0.000	0.021±0.003	0.130±0.005
30	0.006±0.002	0.011±0.001	0.020±0.003	0.135±0.009

A.3: Absorbance reading (600 A) for optical density of *S. thermophilus*

Bacteria were sampled from several colonies and resuspended in growth medium (Peptone buffer) containing various concentration of plant water extract (0%, 0.75%, 1.5% & 3%). Values are means from two separate runs.

Table 10: Effects of *L. barbarum* on the optical density (OD) of growth medium containing *S. thermophilus.*

Time (Min)	**Optical density (OD)**			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.002±0.001	0.015±0.005	0.011±0.001	0.019±0.001
10	0.005±0.001	0.021±0.004	0.017±0.004	0.057±0.001
15	0.005±0.002	0.030±0.010	0.029±0.001	0.048±0.001
20	0.010±0.001	0.033±0.003	0.030±0.011	0.059±0.003
25	0.012±0.001	0.034±0.002	0.041±0.002	0.057±0.001
30	0.016±0.003	0.042±0.002	0.049±0.003	0.054±0.004

Table 11: Effects of *P. guajava* on the optical density (OD) of growth medium containing *S. thermophilus.*

Time (Min)	**Optical density (OD)**			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.028±0.004	0.105±0.006	0.115±0.002	0.166±0.006
10	0.040±0.003	0.141±0.002	0.137±0.004	0.210±0.006
15	0.051±0.004	0.158±0.012	0.155±0.009	0.241±0.009
20	0.070±0.004	0.190±0.010	0.176±0.007	0.275±0.012
25	0.083±0.003	0.213±0.000	0.194±0.007	0.301±0.005
30	0.101±0.005	0.233±0.001	0.211±0.007	0.321±0.014

Table 12: Effects of *M. grosvenori* on the optical density (OD) of growth medium containing *S. thermophilus.*

Time (Min)	**Optical density (OD)**			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.023±0.012	0.028±0.012	0.0295±0.001	0.033±0.002
10	0.045±0.010	0.054±0.016	0.045±0.000	0.049±0.004
15	0.055±0.011	0.066±0.010	0.072±0.009	0.056±0.001
20	0.068±0.013	0.082±0.014	0.086±0.003	0.108±0.010
25	0.084±0.026	0.092±0.013	0.097±0.004	0.117±0.012
30	0.093±0.020	0.111±0.020	0.115±0.002	0.130±0.015

Table 13: Effects of *G. mangostana* on the optical density (OD) of growth medium containing *S. thermophilus.*

Time (Min)	**Optical density (OD)**			
	0%	0.75%	1.50%	3%
0	0	0	0	0
5	0.005±0.001	0.009±0.005	0.014±0.001	0.071±0.001
10	0.005±0.002	0.007±0.005	0.026±0.005	0.077±0.003
15	0.006±0.001	0.010±0.004	0.036±0.003	0.089±0.010
20	0.007±0.001	0.016±0.002	0.047±0.006	0.098±0.007
25	0.006±0.000	0.016±0.000	0.055±0.002	0.098±0.008
30	0.008±0.001	0.020±0.001	0.056±0.003	0.100±0.005

A.4: Absorbance reading (490 A) for phenol- sulphoric acid Assays:

Table 14: absorbance reading of glucose from 2 separate batches.

Glucose concentration (µg/ ml)	Abs reading batch A	Abs reading batch B
0	0	0
10	0.168	0.173
20	0.306	0.298
30	0.506	0.41
40	0.624	0.576
50	0.823	0.735
80	1.275	1.111
100	1.617	1.382
150	2.609	2.021

Standard curve

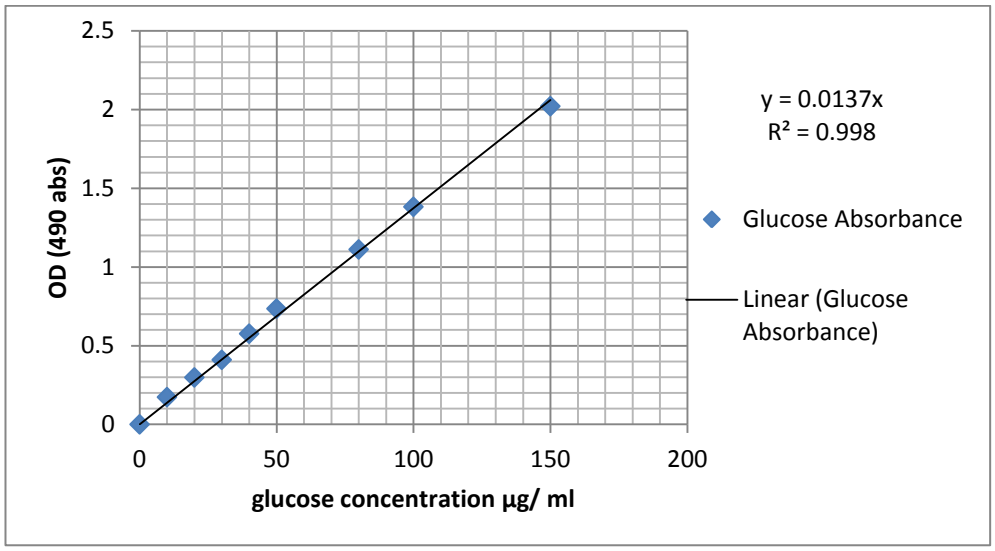

Figure 9: standard curve, absorbance reading for glucose concentration.

A.5: Exo- polysaccharide (EPS) concentration µg/ ml

Table 15: EPS concentration µg/ ml from 3 separated batches in plain- and herbal-yogurts.

Samples	**EPS concentration µg/ ml**			
	A	B	C	Average
plain	123.6	193.6	87.6	132.0 ± 39.6
M. grosvenori	209.3	193.6	162.9	183.9 ± 18.2
P. guajava	191.5	360.7	150.7	258.7 ± 22.0
L. barbarum	243.6	218.6	118.6	181.4 ± 57.0
G. mangostana	168.2	115.7	55.7	113.1 ± 56.2

A.6: Physicochemical properties assay

Table 16: Syneresis (%) of plain- and herbal- yogurts from four separated runs.

Yogurts	**Syneresis (%)**				
	plain	*M. grosvenori*	*L. barbarum*	*P. guajava*	*G. mangostana*
Batch A	2.71	4.60	4.04	3.00	2.528
Batch B	3.00	1.32	2.40	4.50	2.916
Batch C	3.23	1.70	3.50	3.30	3.272
Batch D	3.50	3.33	2.70	3.10	2.761
Average	3.10 ± 0.3	2.73 ± 1.5	3.14 ± 0.7	3.50 ± 0.8	2.90 ± 0.3

Table 17: WHC (%) of plain- and herbal- yogurts from four separated runs.

Yogurts	**WHC (%)**				
	Plain	*M. grosvenori*	*L. barbarum*	*P. guajava*	*G. mangostana*
Batch A	23.80	24.20	27.04	23.70	27.94
Batch B	22.90	22.63	26.71	23.50	26.20
Batch C	25.70	27.73	25.90	21.10	30.24
Batch D	22.80	20.60	22.10	19.24	17.91
Average	23.8 ± 1.4	23.8 ± 3.0	25.4 ± 2.1	21.9 ± 2.3	25.60 ± 5.4

Table 18: Total solids (%) of plain- and herbal- yogurts from four separated runs.

Yogurts	**Total solids (%)**				
	Plain	*M. grosvenori*	*P. guajava*	*L. barbarum*	*G. mangostana*
Batch A	13.7	13.8	13.2	14.9	14.6
Batch B	13.7	13.1	13.4	14.5	14.9
Batch C	13.8	13.7	13.3	14.8	14.5
Batch D	12.7	13.8	13.4	13.9	15.6
Average	13.5 ± 0.51	13.6 ± 0.36	13.3 ± 0.08	14.6 ± 0.46	14.9 ± 0.050