

# LAMPIRAN



## Lampiran 1

Tabel 03. Hasil pengukuran biomassa sel (*g/L*) *Rhodotorula mucilaginosa* pada kondisi fermentasi batch (P1) dan fed batch (P2) selama 240 jam inkubasi dengan agitasi 180 rpm dan temperatur ruang.

P	n	Waktu inkubasi (Jam)																				
		0	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
P1	1	0.20	2.60	3.00	2.70	3.10	3.20	3.30	2.50	3.20	3.60	2.70	4.60	4.60	4.00	3.30	3.70	3.40	4.40	3.20	3.10	3.20
	2	0.23	2.10	2.40	2.60	3.60	3.00	3.30	3.10	3.20	3.40	3.60	4.00	4.40	3.70	3.40	2.70	3.30	3.10	3.60	2.90	3.40
	3	0.43	1.60	2.40	3.30	2.80	2.80	3.80	3.10	3.20	3.10	3.00	3.60	4.70	3.40	4.20	3.40	3.30	3.20	3.20	2.10	2.70
	4	0.23	2.60	2.40	3.90	3.30	2.90	3.50	2.90	3.00	3.00	3.00	3.70	3.60	2.90	3.60	3.50	3.80	3.50	2.90	3.30	3.80
	5	0.21	2.00	2.00	3.40	2.40	2.70	2.50	2.30	3.10	3.40	3.30	3.50	3.00	3.10	2.50	2.80	3.00	2.80	3.10	3.10	3.10
	6	0.21	1.90	2.90	2.30	2.30	3.20	3.20	3.00	2.50	3.70	3.20	4.00	4.00	3.80	3.00	3.10	3.10	3.30	3.30	3.30	2.10
	7	0.22	1.90	1.50	2.60	2.50	2.00	2.80	3.40	4.10	3.10	3.60	4.00	2.60	2.80	6.50	3.20	3.20	3.10	3.10	3.10	2.20
	8	0.14	2.90	2.60	2.60	4.00	2.20	2.90	3.10	2.40	3.90	3.70	4.23	3.70	2.30	3.40	2.70	3.00	3.00	3.30	2.90	2.30
	9	0.30	1.90	2.30	2.20	2.60	3.20	3.00	3.10	4.20	3.20	3.20	4.30	4.60	3.30	3.50	3.40	4.40	2.90	2.90	3.00	3.30
	10	0.43	1.50	2.30	2.60	3.00	3.10	3.20	2.30	3.20	3.20	3.40	4.30	4.10	3.90	3.50	3.50	3.40	3.10	3.00	3.40	3.60
	<b>x</b>	<b>0.26</b>	<b>2.10</b>	<b>2.38</b>	<b>2.82</b>	<b>2.96</b>	<b>2.83</b>	<b>3.15</b>	<b>2.88</b>	<b>3.21</b>	<b>3.27</b>	<b>4.02</b>	<b>3.93</b>	<b>3.32</b>	<b>3.69</b>	<b>3.20</b>	<b>3.39</b>	<b>3.24</b>	<b>3.16</b>	<b>3.02</b>	<b>2.97</b>	
P2	1	0.10	1.50	2.50	2.40	2.90	3.80	4.10	3.40	3.50	4.70	3.40	4.00	3.40	4.40	4.10	3.80	4.40	4.00	4.30	4.00	4.30
	2	0.45	1.80	2.40	2.00	2.10	3.20	2.60	3.00	3.00	3.70	2.80	4.00	4.20	3.60	4.00	4.20	3.40	3.90	3.90	3.80	4.20
	3	0.23	2.10	2.60	2.50	3.00	4.30	3.80	3.00	3.00	3.80	5.00	4.20	4.30	4.40	3.10	3.60	3.60	3.90	4.60	4.10	3.80
	4	0.34	2.50	2.10	2.70	4.00	1.90	3.20	3.00	3.00	3.70	3.50	4.40	4.70	3.80	3.90	4.60	6.90	3.40	4.60	4.30	3.20
	5	0.54	2.10	2.50	2.50	2.80	3.00	3.10	3.20	3.80	3.30	3.10	3.90	3.50	3.70	5.50	4.70	4.50	4.70	3.70	3.30	4.30
	6	0.10	2.40	2.80	2.90	2.40	3.50	4.20	3.60	3.00	3.10	2.90	4.30	4.80	4.10	4.30	4.40	5.00	7.00	5.20	4.70	4.70
	7	0.12	2.20	2.00	2.20	3.50	2.80	3.90	3.90	3.40	2.50	3.90	4.40	4.70	4.70	4.90	4.50	5.10	4.30	3.60	5.10	3.90
	8	0.20	2.30	2.40	2.50	2.50	3.20	3.10	4.30	4.30	4.50	4.50	4.20	3.90	4.90	5.00	5.90	4.10	4.90	4.10	4.10	3.80
	9	0.00	2.70	3.10	2.30	3.20	3.40	3.70	3.60	3.90	3.50	4.50	4.60	5.20	5.50	4.60	3.80	4.70	4.10	3.80	4.30	4.10
	10	0.10	2.00	3.10	2.10	3.20	2.30	2.60	2.90	3.60	4.30	4.10	5.20	4.80	5.00	4.20	4.20	4.50	4.30	4.20	3.00	4.30
	<b>x</b>	<b>0.22</b>	<b>2.16</b>	<b>2.55</b>	<b>2.41</b>	<b>2.96</b>	<b>3.14</b>	<b>3.43</b>	<b>3.39</b>	<b>3.66</b>	<b>3.77</b>	<b>4.32</b>	<b>4.35</b>	<b>4.41</b>	<b>4.36</b>	<b>4.37</b>	<b>4.62</b>	<b>4.45</b>	<b>4.20</b>	<b>4.07</b>	<b>4.06</b>	

Keterangan : P = Perlakuan

P1 = Batch, P2 = Fed Batch, n = ulangan, x = rata-rata

## Lampiran 2

Tabel 04. Hasil pengukuran kandungan glukosa dalam medium (g/L) dengan menggunakan metode DNS, pada kondisi fermentasi *batch* (P1) dan *fed batch* (P2) selama 240 jam inkubasi dengan agitasi 180 rpm dan temperatur ruang.

P	n	Waktu inkubasi (Jam)																				
		0	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
P1	1	10.25	6.35	6.17	4.87	3.51	4.73	4.03	3.77	3.26	2.35	1.93	0.53	0.12	0.03	0.20	0.20	0.03	0.03	0.04	0.04	0.04
	2	9.96	5.83	5.83	5.18	3.64	4.58	3.64	3.14	3.14	1.73	1.44	0.79	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04
	3	10.25	6.91	6.53	5.83	4.58	4.44	3.77	3.39	2.91	1.53	1.06	0.45	0.03	0.03	0.12	0.12	0.03	0.03	0.03	0.04	0.04
	4	9.96	6.00	5.18	5.83	4.87	4.73	3.39	2.79	2.79	1.93	1.53	1.16	0.71	0.28	0.28	1.25	0.03	0.03	0.03	0.04	0.03
	5	9.96	6.35	4.73	4.87	5.83	5.03	4.30	4.16	3.51	3.51	3.14	2.91	2.24	1.83	1.70	0.03	0.03	0.03	0.03	0.03	0.03
	6	9.68	6.00	5.66	5.50	4.73	4.44	3.14	2.68	2.46	1.63	1.16	0.97	0.04	0.03	0.03	1.25	0.12	0.12	0.12	0.12	0.03
	7	9.68	6.00	4.87	6.35	5.83	5.03	4.16	4.73	4.16	2.14	1.73	2.24	2.24	1.63	1.10	0.12	0.03	0.03	0.03	0.03	0.01
	8	9.96	6.00	5.66	6.35	5.34	4.58	3.90	3.51	2.91	3.26	3.03	2.57	0.03	0.03	0.28	0.28	0.03	0.03	0.03	0.03	0.04
	9	9.96	6.17	5.66	6.35	5.50	4.87	4.73	4.03	3.51	1.93	1.25	1.16	0.12	0.04	0.05	0.04	0.12	0.12	0.12	0.12	0.04
	10	10.25	6.17	6.17	6.35	5.83	5.34	4.44	4.03	3.77	2.03	1.63	1.34	0.12	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00
x	9.99	6.18	5.65	5.75	4.96	4.78	3.95	3.62	3.24	2.21	1.79	1.41	0.57	0.40	0.38	0.34	0.35	0.05	0.05	0.05	0.03	0.02
P2	1	9.96	6.53	5.66	4.73	4.87	11.20	9.96	9.40	8.17	8.17	8.17	7.73	5.50	6.17	6.35	6.35	7.51	6.17	6.00	5.66	4.44
	2	10.25	6.53	5.83	5.50	4.58	11.91	9.96	9.14	9.96	8.17	8.64	7.95	7.73	7.51	7.51	7.51	7.31	4.87	4.30	4.44	4.44
	3	10.25	5.18	5.66	4.44	5.03	11.20	7.95	6.72	6.91	7.31	8.40	7.11	7.11	6.35	6.11	5.83	6.35	5.18	4.87	4.16	4.16
	4	9.96	5.03	5.66	4.44	4.44	11.55	9.96	8.64	8.64	7.11	7.11	7.95	7.31	6.72	6.50	6.00	6.00	5.34	4.58	4.03	4.03
	5	9.68	5.50	4.58	5.18	5.50	11.20	8.64	8.64	8.17	7.73	8.40	7.73	7.51	6.72	6.27	6.35	6.91	5.50	4.73	4.03	4.03
	6	9.96	6.17	6.91	5.18	4.58	11.55	9.40	6.91	8.89	7.95	9.14	7.73	7.31	7.51	6.87	6.91	5.66	4.73	5.03	3.77	3.64
	7	9.68	5.66	4.87	5.83	5.83	11.20	9.96	9.14	9.14	6.91	7.95	7.73	5.50	7.11	5.34	5.66	4.03	3.39	3.14	4.44	4.30
	8	9.40	6.00	5.34	5.18	4.58	12.29	9.96	8.17	9.96	8.17	8.89	6.53	7.11	5.83	5.76	6.00	4.16	3.26	2.79	3.77	3.39
	9	10.25	6.72	4.58	5.18	4.16	11.20	10.55	8.64	10.87	7.95	8.40	7.51	5.50	3.77	4.30	4.30	4.87	4.03	3.77	3.77	3.39
	10	10.25	6.17	5.34	5.18	4.87	11.20	10.25	8.89	8.89	8.17	9.40	6.91	6.17	4.16	4.02	4.16	4.30	4.03	3.90	3.39	3.39
x	9.96	5.95	5.44	5.08	4.84	11.45	9.66	8.43	9.08	7.76	8.45	7.49	6.67	6.18	5.90	5.91	5.71	4.65	4.31	4.14	3.92	

Keterangan : P = perlakuan

P1 = Batch, P2 = Fed Batch, n = ulangan, x = rata-rata



## Lampiran 4

Tabel 06. Hasil pengukuran produksi pigmen ( $\mu\text{g/g}$ ) *Rhodotorula mucilaginosa* pada kondisi fermentasi batch (P1) dan fed batch (P2) selama 240 jam inkubasi dengan agitasi 180 rpm dan temperatur ruang.

P	n	Waktu inkubasi (Jam)																				
		0	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
P1	1	0.00	31.48	55.13	76.96	80.86	91.88	129.35	100.27	78.34	81.67	76.96	92.79	102.63	118.03	156.94	56.16	61.12	86.84	25.58	26.78	38.56
	2	0.00	38.97	51.42	47.46	57.72	98.00	129.35	94.84	105.56	112.38	81.67	84.45	97.01	91.30	165.94	125.11	120.22	75.12	45.94	43.57	61.12
	3	0.00	0.00	51.42	75.96	74.22	105.00	77.37	108.97	64.94	152.29	98.00	93.83	53.33	138.86	134.33	73.73	87.37	83.39	64.94	67.43	92.84
	4	0.00	47.46	68.91	64.28	75.96	116.48	84.00	147.19	83.56	96.51	112.60	115.36	131.14	131.75	57.72	109.16	104.68	117.60	50.68	47.43	54.68
	5	0.00	20.36	82.69	61.12	86.58	108.89	135.12	146.87	94.84	99.35	50.12	109.16	127.36	94.84	170.74	74.22	69.27	89.53	75.96	76.00	53.35
	6	0.00	64.95	71.66	90.35	90.35	91.88	147.53	157.37	100.27	115.36	113.94	95.52	106.71	112.33	83.56	80.86	67.03	62.97	50.12	50.54	58.76
	7	0.00	21.43	71.90	79.92	100.27	103.90	120.64	125.54	61.14	91.30	117.60	95.52	146.95	89.53	58.78	64.94	64.94	67.03	67.03	68.70	75.17
	8	0.00	57.03	63.61	79.92	94.46	101.38	108.97	104.45	97.97	153.55	100.91	139.97	131.00	138.86	138.86	158.09	112.60	92.28	50.12	52.23	35.59
	9	0.00	43.08	71.90	94.46	79.92	119.40	83.56	137.69	59.68	77.37	91.88	78.56	83.06	102.36	147.97	99.35	97.23	71.66	42.55	43.22	24.80
	10	0.00	54.56	71.90	96.41	69.27	94.84	64.94	185.58	91.88	64.94	86.47	99.27	82.39	97.97	109.16	84.00	73.73	94.84	53.28	50.65	22.74
<b>x</b>	<b>0.00</b>	<b>37.93</b>	<b>66.05</b>	<b>76.68</b>	<b>77.78</b>	<b>102.47</b>	<b>107.32</b>	<b>131.33</b>	<b>84.46</b>	<b>98.91</b>	<b>98.28</b>	<b>96.54</b>	<b>107.06</b>	<b>110.80</b>	<b>122.40</b>	<b>92.56</b>	<b>85.82</b>	<b>84.13</b>	<b>52.62</b>	<b>52.66</b>	<b>51.76</b>	
P2	1	0.00	43.08	83.12	51.42	71.66	148.47	104.11	165.94	169.34	120.04	112.38	106.71	207.75	186.87	172.28	112.33	97.01	62.67	58.30	59.76	48.33
	2	0.00	45.47	68.91	82.69	98.95	133.39	146.95	142.28	112.60	115.36	105.00	118.03	161.84	193.23	176.59	112.41	165.94	132.79	64.28	67.31	49.48
	3	0.00	19.39	63.61	49.36	83.56	88.86	112.33	157.37	159.67	136.29	97.56	134.33	142.10	107.30	212.39	118.57	143.86	64.28	45.17	44.80	54.68
	4	0.00	32.74	78.75	61.25	84.45	131.93	133.39	142.28	112.33	127.60	84.00	117.70	177.95	100.55	218.89	103.26	75.06	125.54	54.49	55.32	64.94
	5	0.00	38.97	66.15	66.15	89.53	83.56	137.69	133.39	100.55	156.94	94.84	107.30	134.89	103.26	102.58	118.57	84.91	81.29	56.16	56.23	58.30
	6	0.00	51.42	59.06	89.03	86.58	84.00	101.63	106.13	138.76	182.00	116.48	109.79	218.22	168.94	178.58	97.01	85.37	80.60	48.21	47.32	71.87
	7	0.00	18.51	82.69	94.46	71.62	152.44	109.45	152.44	156.35	207.15	109.45	107.30	115.36	81.29	154.05	104.91	92.57	109.79	45.94	44.21	53.28
	8	0.00	53.65	68.91	83.12	83.12	119.40	137.69	142.28	168.37	104.91	165.33	134.33	156.67	160.34	141.27	111.59	137.61	68.94	71.71	72.32	37.59
	9	0.00	15.08	53.35	71.90	78.34	112.38	127.60	118.57	109.45	134.89	115.07	100.75	117.50	177.61	112.58	160.80	130.00	82.39	140.00	135.67	50.68
	10	0.00	40.92	53.35	98.95	78.34	146.87	129.92	131.75	118.57	120.44	112.39	108.50	107.89	82.83	208.22	145.48	146.31	78.56	39.38	39.38	56.97
<b>x</b>	<b>0.00</b>	<b>35.92</b>	<b>67.79</b>	<b>74.83</b>	<b>82.61</b>	<b>120.13</b>	<b>124.08</b>	<b>139.24</b>	<b>134.60</b>	<b>140.56</b>	<b>111.25</b>	<b>114.47</b>	<b>154.02</b>	<b>136.22</b>	<b>167.74</b>	<b>118.49</b>	<b>115.86</b>	<b>88.68</b>	<b>62.36</b>	<b>62.23</b>	<b>54.61</b>	

Keterangan : P = perlakuan

P1 = Batch, P2 = FedBatch, n = ulangan, x = rata-rata



**Lampiran 5. Uji normalitas dan homogenitas biomassa sel *R. mucilaginosa* UICC Y-18 (g/L)**

Tabel 07. Uji normalitas untuk biomassa sel *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
JAM_0	.141	20	.200(*)	.922	20	.117
JAM_12	.130	20	.200(*)	.966	20	.640
JAM_24	.139	20	.200(*)	.950	20	.406
JAM_36	.179	20	.092	.927	20	.175
JAM_48	.103	20	.200(*)	.958	20	.490
JAM_60	.156	20	.200(*)	.956	20	.465
JAM_72	.142	20	.200(*)	.959	20	.495
JAM_84	.179	20	.094	.939	20	.297
JAM_96	.164	20	.167	.949	20	.393
JAM_108	.129	20	.200(*)	.954	20	.453
JAM_120	.148	20	.200(*)	.925	20	.151
JAM_132	.128	20	.200(*)	.948	20	.384
JAM_144	.152	20	.200(*)	.949	20	.396
JAM_156	.084	20	.200(*)	.990	20	.990(*)
JAM_168	.135	20	.200(*)	.946	20	.366
JAM_180	.142	20	.200(*)	.940	20	.303
JAM_192	.185	20	.071	.857	20	.010(**)
JAM_204	.142	20	.200(*)	.832	20	.010(**)
JAM_216	.171	20	.129	.926	20	.159
JAM_228	.182	20	.083	.948	20	.391
JAM_240	.148	20	.200(*)	.940	20	.310

Tabel 08. Uji homogenitas untuk biomassa sel *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	Levene Statistic	df1	df2	Sig.
JAM_0	2.765	1	18	.114
JAM_12	.907	1	18	.353
JAM_24	.001	1	18	.974
JAM_36	1.952	1	18	.179
JAM_48	.020	1	18	.890
JAM_60	1.375	1	18	.256
JAM_72	.345	1	18	.564
JAM_84	.390	1	18	.540
JAM_96	.011	1	18	.919
JAM_108	3.182	1	18	.091
JAM_120	1.052	1	18	.319
JAM_132	.001	1	18	.972
JAM_144	.226	1	18	.640
JAM_156	.132	1	18	.721
JAM_168	.277	1	18	.605
JAM_180	.975	1	18	.336
JAM_192	2.233	1	18	.152
JAM_204	2.018	1	18	.172
JAM_216	.471	1	18	.501
JAM_228	1.699	1	18	.209
JAM_240	3.208	1	18	.090

**Lampiran 6. Uji t untuk biomassa sel *R. mucilaginosa* UICC Y-18 (g/L)**

Tabel 09. Statistik dari uji t untuk biomassa sel *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	PLAKUAN	N	Mean	Std. Deviation	Std. Error Mean
JAM_0	P1	10	.2600	9.764E-02	.0309
	P2	10	.2180	.1738	.0550
JAM_12	P1	10	2.1000	.4570	.1445
	P2	10	2.1600	.3471	.1097
JAM_24	P1	10	2.3800	.4264	.1348
	P2	10	2.5500	.3689	.1167
JAM_36	P1	10	2.8200	.5371	.1698
	P2	10	2.4100	.2726	.0862
JAM_48	P1	10	2.9600	.5522	.1746
	P2	10	2.9600	.5562	.1759
JAM_60	P1	10	2.8300	.4244	.1342
	P2	10	3.1400	.6963	.2202
JAM_72	P1	10	3.1500	.3689	.1167
	P2	10	3.4300	.5889	.1862
JAM_84	P1	10	2.8800	.3795	.1200
	P2	10	3.3900	.4606	.1456
JAM_96	P1	10	3.2100	.5763	.1822
	P2	10	3.6600	.4575	.1447
JAM_108	P1	10	3.3600	.2951	.0933
	P2	10	3.7100	.6674	.2111
JAM_120	P1	10	3.2700	.3164	.1001
	P2	10	3.7700	.7499	.2371
JAM_132	P1	10	4.0230	.3476	.1099
	P2	10	4.3200	.3765	.1191
JAM_144	P1	10	3.9300	.7103	.2246
	P2	10	4.3500	.5986	.1893
JAM_156	P1	10	3.3200	.5493	.1737
	P2	10	4.4100	.6226	.1969
JAM_168	P1	10	3.6900	1.0775	.3407
	P2	10	4.3600	.6736	.2130
JAM_180	P1	10	3.2000	.3621	.1145
	P2	10	4.3700	.6516	.2060
JAM_192	P1	10	3.3900	.4254	.1345
	P2	10	4.6200	.9693	.3065
JAM_204	P1	10	3.2400	.4526	.1431
	P2	10	4.4500	.9914	.3135
JAM_216	P1	10	3.1600	.2119	.0670
	P2	10	4.2000	.4944	.1563
JAM_228	P1	10	3.0200	.3645	.1153
	P2	10	4.0700	.6129	.1938
JAM_240	P1	10	2.9700	.6075	.1921
	P2	10	4.0600	.4088	.1293



Tabel 10. Uji t sampel bebas untuk biomassa sel *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
JAM_0	3.092	.096	-.666	18	.514	-.0420	6.303E-02	-.1744	9.042E-02
			-.666	14.168	.516	-.0420	6.303E-02	-.1770	9.304E-02
JAM_12	.907	.353	.331	18	.745	6.000E-02	.1815	-.3213	.4413
			.331	16.789	.745	6.000E-02	.1815	-.3232	.4432
JAM_24	.001	.974	.953	18	.353	.1700	.1783	-.2046	.5446
			.953	17.636	.353	.1700	.1783	-.2051	.5451
JAM_36	4.311	.052	-2.153	18	.045	-.4100	.1905	-.8102	-9.8431E-03
			-2.153	13.350	.050	-.4100	.1905	-.8204	3.862E-04

JAM_48	Equal variances	.020	.890	.000	18	1.000	.0000	.2478	-.5207	.5207
	Equal variances not assumed			.000	17,999	1.000	.0000	.2478	-.5207	.5207
JAM_60	Equal variances	1,375	.256	1.202	18	.245	.3100	.2579	-.2318	.8518
	Equal variances not assumed			1.202	14,875	.248	.3100	.2579	-.2401	.8601
JAM_72	Equal variances	4,954	.039	1.274	18	.219	.2800	.2197	-.1817	.7417
	Equal variances not assumed			1.274	15,122	.222	.2800	.2197	-.1881	.7481
JAM_84	Equal variances	.390	.540	2.703	18	.015	.5100	.1887	.1135	.9065
	Equal variances not assumed			2.703	17,365	.015	.5100	.1887	.1125	.9075
JAM_96	Equal variances	2,050	.169	3.888	18	.001	.6700	.1723	.3079	1.0321
	Equal variances not assumed			3.888	15,413	.001	.6700	.1723	.3035	1.0365
JAM_108	Equal variances	1,074	.314	5.250	18	.000	.7500	.1429	.4498	1.0502
	Equal variances not assumed			5.250	15,399	.000	.7500	.1429	.4462	1.0538

JAM_120	Equal variances	2,514	.130	3,956	18	.001	.8000	.2022	.3752	1,2248
	Equal variances not assumed			3,956	13,261	.002	.8000	.2022	.3640	1,2360
JAM_132	Equal variances	.192	.667	4,577	18	.000	.7500	.1639	.4057	1,0943
	Equal variances not assumed			4,577	17,358	.000	.7500	.1639	.4048	1,0952
JAM_144	Equal variances	.098	.758	3,246	18	.004	.7200	.2218	.2540	1,1860
	Equal variances not assumed			3,246	17,894	.005	.7200	.2218	.2538	1,1862
JAM_156	Equal variances	.132	.721	4,151	18	.001	1,0900	.2626	.5384	1,6416
	Equal variances not assumed			4,151	17,725	.001	1,0900	.2626	.5377	1,6423
JAM_168	Equal variances	.440	.516	5,031	18	.000	1,1300	.2246	.6581	1,6019
	Equal variances not assumed			5,031	17,741	.000	1,1300	.2246	.6576	1,6024
JAM_180	Equal variances	.975	.336	4,963	18	.000	1,1700	.2357	.6748	1,6652
	Equal variances not assumed			4,963	14,075	.000	1,1700	.2357	.6647	1,6753

JAM_192	Equal variances	2,233	.152	3,674	18	.002	1,2300	.3347	.5267	1.9333
	Equal variances not assumed			3,674	12,344	.003	1,2300	.3347	.5029	1.9571
JAM_204	Equal variances	2,018	.172	3,511	18	.002	1,2100	.3446	.4860	1.9340
	Equal variances not assumed			3,511	12,596	.004	1,2100	.3446	.4630	1.9570
JAM_216	Equal variances	4,819	.042	6,114	18	.000	1,0400	.1701	.6826	1.3974
	Equal variances not assumed			6,114	12,198	.000	1,0400	.1701	.6701	1.4099
JAM_228	Equal variances	1,699	.209	4,656	18	.000	1,0500	.2255	.5762	1.5238
	Equal variances not assumed			4,656	14,659	.000	1,0500	.2255	.5684	1.5316
JAM_240	Equal variances	3,208	.090	4,708	18	.000	1,0900	.2315	.6036	1.5764
	Equal variances not assumed			4,708	15,764	.000	1,0900	.2315	.5986	1.5814

**Lampiran 7. Uji normalitas dan homogenitas untuk pigmen total  
*R. mucilaginosa* UICC Y-18 (g/L)**

Tabel 11. Uji normalitas untuk pigmen total *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan system fermentasi batch dan fed batch selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
JAM_12	.149	20	.200(*)	.965	20	.621
JAM_24	.125	20	.200(*)	.926	20	.163
JAM_36	.105	20	.200(*)	.944	20	.348
JAM_48	.081	20	.200(*)	.982	20	.940
JAM_60	.129	20	.200(*)	.920	20	.099
JAM_72	.189	20	.059	.927	20	.170
JAM_84	.117	20	.200(*)	.972	20	.756
JAM_96	.164	20	.164	.930	20	.201
JAM_108	.142	20	.200(*)	.950	20	.405
JAM_120	.142	20	.200(*)	.950	20	.405
JAM_132	.132	20	.200(*)	.961	20	.535
JAM_144	.095	20	.200(*)	.975	20	.813
JAM_156	.117	20	.200(*)	.972	20	.756
JAM_168	.109	20	.200(*)	.958	20	.489
JAM_180	.124	20	.200(*)	.961	20	.546
JAM_192	.147	20	.200(*)	.933	20	.234
JAM_204	.158	20	.200(*)	.895	20	.036
JAM_216	.187	20	.064	.744	20	.010(**)
JAM_228	.172	20	.124	.777	20	.010(**)
JAM_240	.135	20	.200(*)	.964	20	.599

Tabel 12. Uji homogenitas untuk total pigmen *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	Levene Statistic	df1	df2	Sig.
JAM_12	1.009	1	18	.328
JAM_24	.004	1	18	.951
JAM_36	.677	1	18	.421
JAM_48	1.652	1	18	.215
JAM_60	10.612	1	18	.004
JAM_72	7.807	1	18	.012
JAM_84	3.149	1	18	.093
JAM_96	5.212	1	18	.035
JAM_108	1.053	1	18	.318
JAM_120	1.055	1	18	.318
JAM_132	.286	1	18	.599
JAM_144	.718	1	18	.408
JAM_156	4.040	1	18	.060
JAM_168	.184	1	18	.673
JAM_180	2.238	1	18	.152
JAM_192	5.435	1	18	.032
JAM_204	2.641	1	18	.122
JAM_216	1.021	1	18	.326
JAM_228	.935	1	18	.346
JAM_240	5.289	1	18	.034

Tabel 13. Transformasi uji homogenitas untuk varian data total pigmen yang tidak homogen.

	Levene Statistic	df1	df2	Sig.
ZJAM_60	.894	1	18	.357
ZJAM_72	1.114	1	18	.305
ZJAM_96	.022	1	18	.884
ZJAM_192	.792	1	18	.385
ZJAM_240	.719	1	18	.407



**Lampiran 8. Uji t untuk pigmen total *R. mucilaginosa* UICC Y-18 (g/L)**

Tabel 14. Statistik dari uji t untuk pigmen total *R. mucilaginosa* UICC Y-18 (g/L) pada medium dengan perlakuan sistem fermentasi *batch* dan *fed batch* selama 240 jam inkubasi pada agitasi 180 rpm dan temperatur ruang.

	PLAKUAN	N	Mean	Std. Deviation	Std. Error Mean
JAM_12	P1	10	37.9320	19.8637	6.2815
	P2	10	35.9230	13.9529	4.4123
JAM_24	P1	10	66.0540	10.3949	3.2872
	P2	10	67.7900	11.0204	3.4850
JAM_36	P1	10	76.6840	15.5046	4.9030
	P2	10	74.8330	17.5257	5.5421
JAM_48	P1	10	77.7820	12.7994	4.0475
	P2	10	82.6150	8.2485	2.6084
JAM_60	P1	10	102.4730	9.9957	3.1609
	P2	10	120.1300	26.9945	8.5364
JAM_72	P1	10	107.3240	28.6249	9.0520
	P2	10	124.0760	15.9219	5.0350
JAM_84	P1	10	131.3290	28.8373	9.1192
	P2	10	139.2430	17.8182	5.6346
JAM_96	P1	10	84.4660	17.7474	5.6122
	P2	10	134.5990	26.8638	8.4951
JAM_108	P1	10	98.9140	24.2243	7.6604
	P2	10	140.5620	32.2662	10.2035
JAM_120	P1	10	98.2790	28.1043	8.8874
	P2	10	111.2500	21.6301	6.8400
JAM_132	P1	10	96.5370	10.7131	3.3878
	P2	10	114.4740	11.6465	3.6829
JAM_144	P1	10	107.0550	29.5494	9.3443
	P2	10	154.0170	38.1717	12.0709
JAM_156	P1	10	110.8000	34.9218	11.0432
	P2	10	136.2220	45.0234	14.2376
JAM_168	P1	10	122.4000	42.6972	13.5020
	P2	10	167.7430	40.3341	12.7548
JAM_180	P1	10	92.5620	31.0273	9.8117
	P2	10	118.4930	19.7734	6.2529
JAM_192	P1	10	85.8190	21.6231	6.8378
	P2	10	115.8640	32.2182	10.1883
JAM_204	P1	10	84.1260	16.0390	5.0720
	P2	10	88.6850	25.1073	7.9396
JAM_216	P1	10	52.6200	14.1346	4.4697
	P2	10	62.3640	28.9240	9.1466
JAM_228	P1	10	52.6550	14.5212	4.5920
	P2	10	62.2320	27.8565	8.8090
JAM_240	P1	10	51.7610	22.0806	6.9825
	P2	10	54.6120	9.4072	2.9748



JAM_60	Equal variances assumed	10.612	.004	1.940	18	.068	17.6570	9.1028	-1.4674	36.7814
	Equal variances not assumed			1.940	11.422	.078	17.6570	9.1028	-2.2882	37.6022
JAM_72	Equal variances assumed	7.807	.012	1.617	18	.123	16.7520	10.3581	-5.0095	38.5135
	Equal variances not assumed			1.617	14.082	.128	16.7520	10.3581	-5.4516	38.9556
JAM_84	Equal variances assumed	3.149	.093	.738	18	.470	7.9140	10.7195	-14.6069	30.4349
	Equal variances not assumed			.738	14.998	.472	7.9140	10.7195	-14.9344	30.7624
JAM_96	Equal variances assumed	5.212	.035	4.924	18	.000	50.1330	10.1815	28.7424	71.5236
	Equal variances not assumed			4.924	15.599	.000	50.1330	10.1815	28.5039	71.7621
JAM_108	Equal variances assumed	1.053	.318	3.264	18	.004	41.6480	12.7590	14.8423	68.4531
	Equal variances not assumed			3.264	16.700	.005	41.6480	12.7590	14.6918	68.6041
JAM_120	Equal variances assumed	.002	.966	2.300	18	.034	20.7400	9.0173	1.7955	39.6811
	Equal variances not assumed			2.300	17.600	.034	20.7400	9.0173	1.7645	39.7111

JAM_132	Equal variances assumed Equal variances not assumed	.286	.599	3.584	18	.002	17.9370	5.0041	7.4237	28.4503
JAM_144	Equal variances assumed Equal variances not assumed	.718	.408	3.076	18	.007	46.9620	15.2651	14.8911	79.0329
JAM_156	Equal variances assumed Equal variances not assumed	13.686	.002	2.963	18	.008	36.8990	12.4542	10.7338	63.0642
JAM_168	Equal variances assumed Equal variances not assumed	.184	.673	2.441	18	.025	45.3430	18.5739	6.3208	84.3652
JAM_180	Equal variances assumed Equal variances not assumed	2.238	.152	2.229	18	.039	25.9310	11.6348	1.4872	50.3748
				2.229	15.275	.041	25.9310	11.6348	1.1709	50.6911

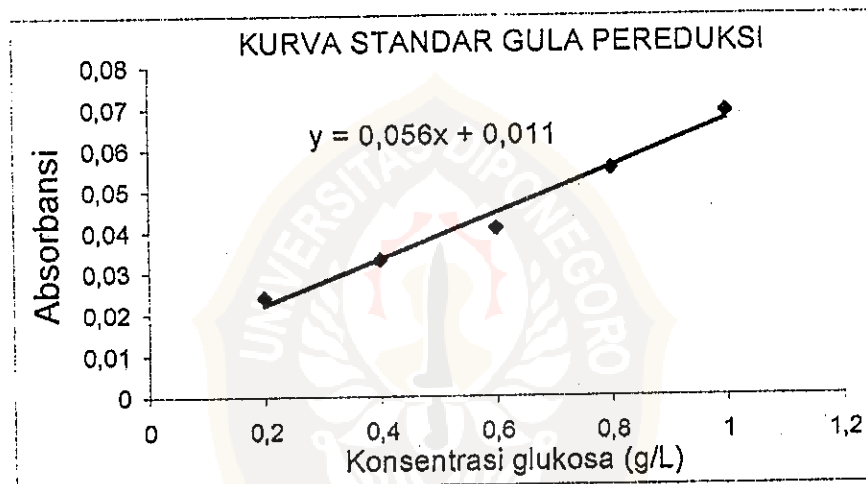
JAM_192	Equal variances assumed	5.435	.032	2.449	18	.025	30.0450	12.2702	4.2663	55.8237
	Equal variances not assumed			2.449	15.740	.026	30.0450	12.2702	3.9985	56.0915
JAM_204	Equal variances assumed	2.641	.122	.484	18	.634	4.5590	9.4214	-15.2346	24.3526
	Equal variances not assumed			.484	15.297	.635	4.5590	9.4214	-15.4884	24.6064
JAM_216	Equal variances assumed	1.021	.326	.957	18	.351	9.7440	10.1803	-11.6440	31.1320
	Equal variances not assumed			.957	13.067	.356	9.7440	10.1803	-12.2378	31.7258
JAM_228	Equal variances assumed	.935	.346	.964	18	.348	9.5770	9.9340	-11.2936	30.4476
	Equal variances not assumed			.964	13.555	.352	9.5770	9.9340	-11.7952	30.9492
JAM_240	Equal variances assumed	5.289	.034	.376	18	.712	2.8510	7.5898	-13.0945	18.7965
	Equal variances not assumed			.376	12.163	.714	2.8510	7.5898	-13.6612	19.3632

### Lampiran 9. Kurva standar untuk penghitungan konsentrasi glukosa

Tabel 16. Analisis regresi dan korelasi larutan glukosa standar untuk perhitungan gula pereduksi.

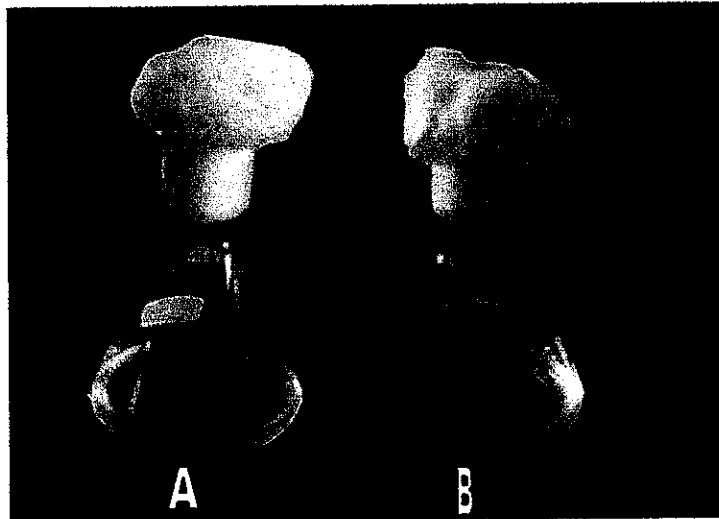
X Konsentrasi glukosa (g/L)	Y Absorbansi
0,2	0,0241
0,4	0,0334
0,6	0,0410
0,8	0,0555
1,0	0,0691

Gambar 04. Kurva standar gula pereduksi

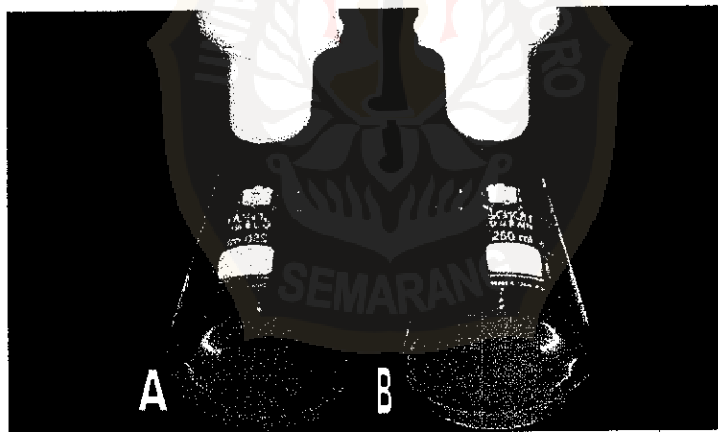




Lampiran 10. Gambar pertumbuhan *Rhodotorula mucilaginosa* UICC Y-18



Gambar 05. Pertumbuhan *R. mucilaginosa* UICC Y-18 pada awal inkubasi dengan sistem fermentasi *batch* (A) dan *fed batch* (B)



Gambar 06. Pertumbuhan *R. mucilaginosa* UICC Y-18 pada waktu inkubasi 120 jam dengan sistem fermentasi *batch* (A) dan *fed batch* (B)