Table.2 Cyanobacteria are used in the treatment of Dairy effluent

S. No	Order	Family	Species	Nature of form
1	Chroococcales	Chroococcaceae	***Chroococcus turgidus*** (Kutz) Nag.	Coccoid forms
2	Chamaesiphonales	Cyanidiaceae	***Chroococcidiopsis indica*** Desikachary.	Coccoid forms
3	Nostocales	Oscillatoriaceae	***Spirulina platensis*** (Nordst.) Gomont.	Non- heterocystous
4			***Oscillatoria animalis*** Ag.ex Gomont.	Non- heterocystous
5			***Phormidium ambiguum*** Gomont.	Non- heterocystous
6		Nostocaceae	***Cylindrospermum licheniforme*** Kutz ex Born. et Flah.	Heterocystous
7			***Nostoc muscorum*** Ag. ex Born. et Flah.	Heterocystous
8			***Anabaena variabilis*** Kutzing ex Born.et Flah.	Heterocystous
9			***Aulosira laxa*** Kirchner ex Born.et Flah.	Heterocystous
10		Scytonemataceae	***Scytonema multiramosum*** Gardner.	Heterocystous
11			***Tolypothrix distorta*** Kutzing ex Born. et Flah.	Heterocystous
12		Microchaetaceae	***Calothrix membranacea*** Schmidle.	Heterocystous
13	Stigonematales	Stigonemataceae	***Hapalosiphon welwitschii*** W.et G.S. West.	Heterocystous
14			***Fischerella ambigue*** Nag.Gom.	Heterocystous
15			***Stigonema turfaceum*** (Berk.) Cooke ex Born. et Flah.	Heterocystous

Table.3 Physico-chemical parameters of Dairy effluent in untreated and treated with *A. laxa* and *T.distorta*

Sl. No.	Parameters	Before treatment (Control)	*Aulosira laxa*		*Tolypothrix distorta*	
			After treatment	Removal Efficiency (%)	After treatment	Removal Efficiency (%)
1	Appearance	Milky and Grayish black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	15.53 ± 0.28	-89.97	16.83 ± 1.728	-89.13
4	TSS	159.95 ± 1.29	112.5 ± 1.87	-29.66	100.66 ± 5.78	-37.06
5	TDS	1027.16 ± 6.43	430 ± 3.09	-58.13	116.66 ± 14.02	-88.64
6	Total solids	1305.50 ± 3.44	929.33 ± 3.82	-28.81	237.33 ± 255.57	-81.82
7	EC	1579.16 ± 3.86	1047.5 ± 1.87	-33.66	933 ± 2.36	-40.91
8	pH	5.15 ± 0.08	8.65 ± 0.08	+67.96	8.81 ± 0.05	+71.06
9	Alkalinity	551.66 ± 13.01	166.83 ± 4.99	-69.75	106.16 ± 2.1	-80.75
10	Total hardness	790 ± 9.35	180 ± 2.82	-77.21	250.33 ± 33.11	-68.31
11	Calcium	140.33 ± 2.58	42.33 ± 2.58	-69.83	52.16 ± 33.11	-62.83
12	Magnesium	80.16 ± 2.85	20.66 ± 6.34	-74.22	23 ± 2.09	-71.30
13	Sodium	130.83 ± 3.06	103 ± 4.73	-21.27	150 ± 4.89	-14.65
14	Potassium	29.5 ± 2.16	18.66 ± 2.16	-36.74	30.83 ± 2.48	+04.50
15	Iron	9.91 ± 0.31	0.28 ± 0.04	-97.17	0.32 ± 0.02	-96.77
16	Free ammonia	23.51 ± 0.75	1.19 ± 1.08	-94.93	1.38 ± 0.05	-94.13
17	Nitrite	0.14 ± 0.01	0.22 ± 0.02	-57.14	0.25 ± 0.03	+78.57
18	Nitrate	8.66 ± 1.75	7.24 ± 0.73	-16.39	10.83 ± 2.48	+25.05
19	Chloride	231.33 ± 2.16	84.66 ± 3.50	-63.40	93.33 ± 3.55	-59.65
20	Fluoride	0.12 ± 0.01	0.00 ± 0.00	-100.00	0.01 ± 0.008	-91.66
21	Sulphate	71.83 ± 2.48	36.5 ± 4.37	-49.18	38.66 ± 3.55	-46.17
22	Phosphate	12.16 ± 0.71	0.91 ± 0.01	-92.51	0.78 ± 0.02	-93.58
23	Silica	6.61 ± 0.10	5.38 ± 0.04	-18.60	10.65 ± 15.84	-61.11
24	COD	370.33 ± 4.58	115.33 ± 8.04	-68.85	100.83 ± 2.92	-72.77
25	BOD	120.5 ± 1.87	36.66 ± 5.16	-69.57	33.83 ± 3.43	-71.88
26	Oil and Grease	0.17 ± 0.40	0.002 ± 0.003	-98.82	0.001 ± 0.0002	-99.41

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.4 Physico-chemical parameters of Dairy effluent in untreated and treated with *A.laxa and T.distorta*

S. No	Parameters	Before treatment (control)	*Aulosira laxa*		*Tolypothrix distorta*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and grayish black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	15.48 ± 0.33	-90.00	44.45 ± 0.36	-71.30
4	TSS	159.95 ± 1.29	75.5 ± 1.87	-52.79	80.66 ± 4.54	-49.57
5	TDS	1027.16 ± 6.43	913 ± 4.85	-11.11	549.33 ± 3.32	-46.51
6	Total solids	1305.50 ± 3.44	965.33 ± 15.73	-26.05	746.16 ± 5.30	-42.84
7	EC	1579.16 ± 3.86	1384.5 ± 38.04	-12.32	900.66 ± 13.89	-42.96
8	pH	5.15 ± 0.08	8.63 ± 0.33	+67.57	7.72 ± 0.37	+49.90
9	Alkalinity	551.66 ± 13.01	360.16 ± 3.25	-34.71	260.83 ± 12.68	-52.71
10	Total hardness	790 ± 9.35	370.16 ± 6.04	-53.14	185.83 ± 3.43	-76.47
11	Calcium	140.33 ± 2.58	76.33 ± 2.16	-45.60	29.5 ± 3.16	-78.97
12	Magnesium	80.16 ± 2.85	43.83 ± 2.85	-45.32	14.33 ± 3.50	-82.12
13	Sodium	130.83 ± 3.06	99.83 ± 2.71	-23.69	115 ± 6.60	-12.09
14	Potassium	29.5 ± 2.16	20 ± 2.60	-32.20	8.55 ± 2.07	-71.01
15	Iron	9.91 ± 0.31	0.63 ± 0.01	-93.64	0.925 ± 0.02	-90.66
16	Free ammonia	23.51 ± 0.75	14.46 ± 0.22	-38.49	13.40 ± 0.81	-43.00
17	Nitrite	0.14 ± 0.01	0.04 ± 0.02	-71.42	4 ± 1.41	+96.50
18	Nitrate	8.66 ± 1.75	12.5 ± 1.87	+44.34	8.48 ± 0.33	-02.07
19	Chloride	231.33 ± 2.16	159.16 ± 4.26	-31.19	182.16 ± 4.66	-21.25
20	Fluoride	0.12 ± 0.01	0.05 ± 0.002	-58.33	0.07 ± 0.05	-41.66
21	Sulphate	71.83 ± 2.48	51.5 ± 3.08	-28.30	14.16 ± 1.47	-80.28
22	Phosphate	12.16 ± 0.71	5.46 ± 0.01	-55.09	9.37 ± 0.20	-22.94
23	Silica	6.61 ± 0.10	4.81 ± 0.02	-27.23	4.85 ± 0.30	-26.62
24	COD	370.33 ± 4.58	194.66 ± 2.94	-47.43	220.16 ± 3.31	-40.55
25	BOD	120.5 ± 1.87	50.33 ± 5.42	-58.23	61.16 ± 3.31	-49.24
26	Oil & Grease	0.17 ± 0.40	0.006 ± 0.002	-96.47	0.008 ± 0.06	-95.29

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.5 Physico-chemical parameters of Dairy effluent in untreated and treated with *S.platensis and S.multiramosum*

S. No	Parameters	Before treatment (control)	*Spirulina platensis*		*Scytonema multiramosum*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	23.5 ± 1.74	-84.82	41.17 ± 3.68	-73.42
4	TSS	159.95 ± 1.29	54.16 ± 1.47	-66.13	57.66 ± 5.88	-63.95
5	TDS	1027.16 ± 6.43	864.83 ± 4.40	-15.80	848.5 ± 9.79	-17.39
6	Total solids	1305.50 ± 3.44	1020.66 ± 4.13	-21.81	939.16 ± 8.30	-28.06
7	EC	1579.16 ± 3.86	1348.83 ± 5.11	-14.58	1374 ± 39.94	-12.99
8	pH	5.15 ± 0.08	8.2 ± 0.17	-59.22	7.66 ± 0.09	+48.73
9	Alkalinity	551.66 ± 13.01	351.33 ± 17.28	-36.31	251.16 ± 12.33	-54.47
10	Total hardness	790 ± 9.35	220.00 ± 4.00	-72.15	426.66 ± 3.98	-45.99
11	Calcium	140.33 ± 2.58	54.66 ± 2.94	-61.04	74.83 ± 2.31	-46.67
12	Magnesium	80.16 ± 2.85	20.00 ± 2.60	-75.04	38.66 ± 5.04	-51.77
13	Sodium	130.83 ± 3.06	148.5 ± 1.87	+13.50	106.83 ± 4.26	-18.34
14	Potassium	29.5 ± 2.16	18 ± 2.19	-38.98	22.16 ± 2.13	-24.88
15	Iron	9.91 ± 0.31	0.93 ± 0.05	-90.61	6.25 ± 0.04	-36.93
16	Free ammonia	23.51 ± 0.75	6.73 ± 0.06	-71.37	10.65 ± 0.07	-54.70
17	Nitrite	0.14 ± 0.01	0.05 ± 0.01	-64.28	0.10 ± 0.02	-28.57
18	Nitrate	8.66 ± 1.75	6.66 ± 2.16	-23.09	3.93 ± 0.70	-54.61
19	Chloride	231.33 ± 2.16	147.5 ± 4.63	-36.23	176.33 ± 5.71	-23.77
20	Fluoride	0.12 ± 0.01	0.07 ± 0.00	-41.66	0.04 ± 0.01	-66.66
21	Sulphate	71.83 ± 2.48	40.33 ± 7.00	-43.85	40 ± 2.82	-44.31
22	Phosphate	12.16 ± 0.71	4.2 ± 0.02	-65.46	7.83 ± 0.03	-35.60
23	Silica	6.61 ± 0.10	7.68 ± 0.05	+16.18	3.38 ± 0.13	-48.86
24	COD	370.33 ± 4.58	77.83 ± 5.60	-51.89	140 ± 3.03	-62.19
25	BOD	120.5 ± 1.87	24.83 ± 3.25	-79.39	40 ± 3.74	-66.80
26	Oil & Grease	0.17 ± 0.40	0.007 ± 0.00	-95.88	0.0004 ± 0.001	-97.64

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU

Values expressed as mean ± SD

Table.6 Physico-chemical parameters of Dairy effluent in untreated and treated with *O. animalis* and *S. turfaceum*

S. No	Parameters	Before treatment (control)	*Oscillatoria animalis*		*Stigonema turfaceum*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	77.31 ± 0.66	-50.09	36.24 ± 0.74	-76.60
4	TSS	159.95 ± 1.29	73.33 ± 2.58	-54.15	106.16 ± 2.13	-33.62
5	TDS	1027.16 ± 6.43	760.83 ± 6.14	-25.92	896.33 ± 3.97	-12.73
6	Total solids	1305.50 ± 3.44	708.33 ± 5.95	-69.00	1032 ± 4.24	-20.19
7	EC	1579.16 ± 3.86	939.66 ± 3.01	-40.49	1510 ± 2.31	-04.37
8	pH	5.15 ± 0.08	7.92 ± 0.15	+53.78	8.59 ± 0.17	+66.79
9	Alkalinity	551.66 ± 13.01	221.66 ± 2.58	-59.81	379.66 ± 7.28	-31.17
10	Total hardness	790 ± 9.35	125.16 ± 3.43	-84.15	599.5 ± 2.66	-24.11
11	Calcium	140.33 ± 2.58	19.5 ± 1.87	-86.10	100.16 ± 2.56	-28.62
12	Magnesium	80.16 ± 2.85	10.16 ± 1.29	-87.32	56.33 ± 2.58	-29.72
13	Sodium	130.83 ± 3.06	110.33 ± 5.13	-15.66	100.83 ± 3.76	-22.93
14	Potassium	29.5 ± 2.16	7.75 ± 0.93	-73.72	17.5 ± 1.87	-40.67
15	Iron	9.91 ± 0.31	0.25 ± 0.01	-97.47	6.2 ± 0.50	-37.43
16	Free ammonia	23.51 ± 0.75	12.55 ± 0.62	-46.61	2.29 ± 0.18	-90.25
17	Nitrite	0.14 ± 0.01	1.5 ± 1.04	+90.66	0.76 ± 1.09	+81.57
18	Nitrate	8.66 ± 1.75	1.07 ± 0.65	-87.64	9.13 ± 0.37	+05.14
19	Chloride	231.33 ± 2.16	186 ± 5.83	-19.59	190.16 ± 6.46	-17.79
20	Fluoride	0.12 ± 0.01	0.02 ± 0.01	-83.33	0.03 ± 0.01	-75.00
21	Sulphate	71.83 ± 2.48	11.41 ± 1.11	-84.11	13.83 ± 1.47	-80.74
22	Phosphate	12.16 ± 0.71	9.71 ± 0.20	-24.25	9.17 ± 0.03	-38.57
23	Silica	6.61 ± 0.10	6.99 ± 0.08	+05.43	4.06 ± 0.01	-38.57
24	COD	370.33 ± 4.58	185.16 ± 5.56	-50.00	240.33 ± 3.44	-35.10
25	BOD	120.5 ± 1.87	51 ± 8.39	-57.67	79.33 ± 2.94	-33.16
26	Oil & Grease	0.17 ± 0.40	0.005 ± 0.00	-97.05	0.007 ± 0.00	-95.88

Chemical Examination is expressed in mg/l. Electrical conductivity as µS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.7 Physico-chemical parameters of Dairy effluent in untreated and treated with *C. indica* and *H. welwitschii*

S. No	Parameters	Before treatment (control)	*Chroococcidiopsis indica*		*Hapalosiphon welwitschii*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	32.61 ± 0.79	-78.94	27.58 ± 0.410	-82.19
4	TSS	159.95 ± 1.29	103.33 ± 7.60	-35.39	103.33 ± 2.16	-35.39
5	TDS	1027.16 ± 6.43	803.33 ± 119	-21.79	859.66 ± 3.32	-20.92
6	Total solids	1305.50 ± 3.44	116.33 ± 1.86	-11.11	1042 ± 1.47	20.15
7	EC	1579.16 ± 3.86	1438.33 ± 119.94	-08.91	1380.5 ± 2.42	-12.58
8	pH	5.15 ± 0.08	7.29 ± 3.36	+29.35	7.78 ± 0.02	+33.80
9	Alkalinity	551.66 ± 13.01	323.36 ± 4.63	-41.38	327.5 ± 2.07	-40.63
10	Total hardness	790 ± 9.35	298.66 ± 7.99	-62.19	452 ± 4.69	-42.78
11	Calcium	140.33 ± 2.58	69.33 ± 2.65	-50.59	895 ± 1.87	-36.22
12	Magnesium	80.16 ± 2.85	29.13 ± 2.31	-63.66	41.83 ± 1.47	-47.81
13	Sodium	130.83 ± 3.06	80.66 ± 4.03	38.34	89.66 ± 3.93	-68.53
14	Potassium	29.5 ± 2.16	80.66 ± 4.03	-63.42	15.33 ± 1.75	-48.03
15	Iron	9.91 ± 0.31	1.02 ± 0.01	-89.70	0.80 ± 0.01	-91.92
16	Free ammonia	23.51 ± 0.75	4.46 ± 0.06	80.02	1.125 ± 0.01	-95.21
17	Nitrite	0.14 ± 0.01	0.01 ± 0.01	-92.85	0.03 ± 0.01	-78.57
18	Nitrate	8.66 ± 1.75	1.83 ± 0.75	-78.86	1.12 ± 0.02	-87.06
19	Chloride	231.33 ± 2.16	178.66 ± 2.50	16.25	179.16 ± 2.48	-22.55
20	Fluoride	0.12 ± 0.01	0.02 ± 0.008	-83.33	0.05 ± 0.01	-58.33
21	Sulphate	71.83 ± 2.48	19.33 ± 2.94	-73.08	10.35 ± 1.87	-85.38
22	Phosphate	12.16 ± 0.71	12 ± 4.89	-01.31	9.76 ± 0.04	-19.73
23	Silica	6.61 ± 0.10	4.44 ± 0.06	-32.82	5.09 ± 0.02	-22.99
24	COD	370.33 ± 4.58	206.5 ± 3.93	-44.23	160.16 ± 3.54	-56.75
25	BOD	120.5 ± 1.87	72.5 ± 3.01	-39.83	56 ± 1.41	-53.52
26	Oil & Grease	0.17 ± 0.40	0.007 ± 0.00	-95.88	0.0005 ± 0.00	-53.05

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.8 Physico-chemical parameters of Dairy effluent in control and treated with *F. ambigue* and *A.variabilis*

S. No	Parameters	Before treatment (control)	*Fischerella ambigue*		*Anabaena variabilis*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	32.66 ± 2.50	-78.91	50.75 ± 0.51	-67.23
4	TSS	159.95 ± 1.29	15 ± 1.41	-90.62	30.66 ± 2.16	-80.83
5	TDS	1027.16 ± 6.43	879.33 ± 4.26	-14.39	549.33 ± 7.25	-46.51
6	Total solids	1305.50 ± 3.44	895.33 ± 4.45	-31.41	920.16 ± 3.54	-29.51
7	EC	1579.16 ± 3.86	1244.16 ± 2.31	-21.21	1431.1 ± 7.42	-9.37
8	pH	5.15 ± 0.08	8.66 ± 2.16	+68.15	7.66 ± 0.11	+48.73
9	Alkalinity	551.66 ± 13.01	318 ± 3.16	-42.35	255.66 ± 5.35	-53.65
10	Total hardness	790 ± 9.35	320 ± 2.75	-59.49	236.33 ± 7.78	-57.16
11	Calcium	140.33 ± 2.58	75 ± 1.41	-46.55	56.16 ± 4.57	-59.98
12	Magnesium	80.16 ± 2.85	29.66 ± 2.16	-62.99	25.83 ± 4.16	-67.77
13	Sodium	130.83 ± 3.06	119.66 ± 1.63	-08.53	100.16 ± 9.64	-23.44
14	Potassium	29.5 ± 2.16	19.83 ± 1.94	-32.77	16.83 ± 2.92	-42.94
15	Iron	9.91 ± 0.31	0.04 ± 0.01	-99.59	1.11 ± 0.11	-88.79
16	Free ammonia	23.51 ± 0.75	1.11 ± 0.02	-95.27	6.64 ± 0.33	-71.75
17	Nitrite	0.14 ± 0.01	0.07 ± 0.01	-50.00	1.66 ± 0.81	+31.32
18	Nitrate	8.66 ± 1.75	1.83 ± 0.75	-78.86	1.45 ± 0.38	-83.25
19	Chloride	231.33 ± 2.16	179.5 ± 2.88	-22.40	161.83 ± 4.26	-30.04
20	Fluoride	0.12 ± 0.01	0.06 ± 0.01	-50.00	0.03 ± 0.01	-75.00
21	Sulphate	71.83 ± 2.48	54.83 ± 1.47	-23.66	28.83 ± 2.48	-59.86
22	Phosphate	12.16 ± 0.71	1.59 ± 0.05	-86.92	5.8 ± 0.07	-52.30
23	Silica	6.61 ± 0.10	5.9 ± 0.01	-10.74	5.26 ± 0.25	-14.61
24	COD	370.33 ± 4.58	279.33 ± 5.92	-24.57	176.5 ± 9.75	-52.33
25	BOD	120.5 ± 1.87	74.5 ± 1.87	-38.17	56.16 ± 4.70	-53.39
26	Oil & Grease	0.17 ± 0.40	0.004 ± 0.00	-97.64	0.005 ± 0.00	-97.05

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.9 Physico-chemical parameters of Dairy effluent in untreated and treated with *P. ambiguum* and *C. membranacea*

S. No	Parameters	Before treatment (control)	*Phormidium ambiguum*		*Calothrix membranacea*	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	16.43 ± 0.35	-89.39	17 ± 1.78	-89.02
4	TSS	159.95 ± 1.29	38.2 ± 2.36	-76.11	60 ± 2.60	-62.48
5	TDS	1027.16 ± 6.43	800.66 ± 3.01	-22.05	753.66 ± 8.73	-26.62
6	Total solids	1305.50 ± 3.44	599.166 ± 2.31	-54.10	591 ± 3.89	-54.72
7	EC	1579.16 ± 3.86	928.83 ± 3.54	-41.18	926 ± 5.32	-41.36
8	pH	5.15 ± 0.08	7.16 ± 0.81	+39.02	7.32 ± 0.23	+42.13
9	Alkalinity	551.66 ± 13.01	363.16 ± 2.63	-34.16	293.5 ± 2.73	-46.79
10	Total hardness	790 ± 9.35	553.15 ± 2.88	-29.98	373.33 ± 2.80	-52.74
11	Calcium	140.33 ± 2.58	72.83 ± 4.87	-48.10	49.1 ± 3.54	-65.01
12	Magnesium	80.16 ± 2.85	49.83 ± 3.25	-37.83	22 ± 1.78	-72.55
13	Sodium	130.83 ± 3.06	174.66 ± 4.36	-35.50	98.33 ± 6.65	-24.84
14	Potassium	29.5 ± 2.16	10 ± 2.82	-66.10	18.33 ± 2.63	-37.86
15	Iron	9.91 ± 0.31	3.66 ± 0.04	-63.06	1.43 ± 0.04	-85.57
16	Free ammonia	23.51 ± 0.75	1.12 ± 0.02	-95.23	6.70 ± 0.03	-71.50
17	Nitrite	0.14 ± 0.01	0.26 ± 0.03	+85.71	0.22 ± 0.02	-57.14
18	Nitrate	8.66 ± 1.75	0.34 ± 0.01	-96.87	0.911 ± 0.01	-89.48
19	Chloride	231.33 ± 2.16	174.66 ± 3.32	-24.49	183 ± 2.52	-20.89
20	Fluoride	0.12 ± 0.01	0.004 ± 0.00	-96.66	0.006 ± 0.00	-95.00
21	Sulphate	71.83 ± 2.48	34.83 ± 5.15	-51.51	41.16 ± 2.31	-42.69
22	Phosphate	12.16 ± 0.71	4.20 ± 0.02	-65.46	1.92 ± 0.03	-84.21
23	Silica	6.61 ± 0.10	4.85 ± 0.03	-26.62	4.81 ± 0.03	-27.23
24	COD	370.33 ± 4.58	149.66 ± 5.75	-59.58	124.16 ± 5.07	-66.47
25	BOD	120.5 ± 1.87	52.16 ± 3.65	-56.71	60.66 ± 4.54	-40.34
26	Oil & Grease	0.17 ± 0.40	0.003 ± 0.00	-98.23	0.002 ± 0.00	-98.82

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD

Table.10 Physico-chemical parameters of Dairy effluent in untreated and treated with *C. licheniforme* and algal consortium

S. No	Parameters	Before treatment (control)	*Cylindrospermum licheniforme*		Algal consortium	
			After treatment	Removal efficiency (%)	After treatment	Removal efficiency (%)
1	Appearance	Milky and Grayish Black	Green	-	Green	-
2	Odour	Offensive smell	Algal smell	-	Algal smell	-
3	Turbidity	154.91 ± 3.58	10.53 ± 0.16	-93.20	20.58 ± 3.87	-86.71
4	TSS	159.95 ± 1.29	72 ± 1.26	-54.98	121.33 ± 12.16	-24.14
5	TDS	1027.16 ± 6.43	809.33 ± 3.76	-21.20	747.37 ± 31.70	-27.23
6	Total solids	1305.50 ± 3.44	912.5 ± 1.97	-30.10	781.5 ± 12.62	-40.13
7	EC	1579.16 ± 3.86	1091 ± 6.44	-30.91	1035.33 ± 38.02	-34.43
8	pH	5.15 ± 0.08	7.75 ± 0.08	+50.48	8.01 ± 0.49	+55.53
9	Alkalinity	551.66 ± 13.01	317.83 ± 3.25	-42.38	179.66 ± 19.73	-67.43
10	Total hardness	790 ± 9.35	376.83 ± 6.85	-52.30	193.33 ± 5.42	-75.52
11	Calcium	140.33 ± 2.58	89.93 ± 4.70	-35.91	40.83 ± 5.26	-70.90
12	Magnesium	80.16 ± 2.85	35 ± 1.43	-56.33	22 ± 3.03	-72.55
13	Sodium	130.83 ± 3.06	90 ± 5.93	-31.20	149.16 ± 6.21	+14.01
14	Potassium	29.5 ± 2.16	12.5 ± 1.87	-57.62	22.83 ± 3.18	-22.61
15	Iron	9.91 ± 0.31	0.28 ± 0.03	-97.17	0.43 ± 0.04	-95.66
16	Free ammonia	23.51 ± 0.75	1.10 ± 0.01	-95.32	0.53 ± 0.19	-97.74
17	Nitrite	0.14 ± 0.01	0.09 ± 0.01	-35.71	0 ± 0	-100.00
18	Nitrate	8.66 ± 1.75	2.16 ± 1.16	-75.05	5.84 ± 0.51	-32.56
19	Chloride	231.33 ± 2.16	166.33 ± 24.45	-28.09	160.33 ± 8.77	-30.69
20	Fluoride	0.12 ± 0.01	1.01 ± 1.01	-88.11	0.04 ± 0.02	-66.66
21	Sulphate	71.83 ± 2.48	43.33 ± 4.17	-39.67	56.33 ± 7.39	-21.57
22	Phosphate	12.16 ± 0.71	0.72 ± 0.02	-94.07	0.34 ± 0.23	-97.20
23	Silica	6.61 ± 0.10	4.97 ± 0.64	-24.81	5.89 ± 0.23	-10.89
24	COD	370.33 ± 4.58	229.83 ± 16.21	-37.93	141.16 ± 7.80	-61.88
25	BOD	120.5 ± 1.87	75.83 ± 8.61	-37.07	42.66 ± 4.54	-62.59
26	Oil & Grease	0.17 ± 0.40	0.001 ± 0.00	-99.41	0.0003 ± 0.00	-99.82

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU

Values expressed as mean ± SD

Table.11a Growth rate of various Cyanobacteria (coccoid forms) in Dairy effluent (Without added nutrients)

S.No	Name of the algae	Growth rate in (Divisions/day)
1	***Chroococcus turgidus***	0.0224
2	***Chroococcidiopsis indica***	0.0553

Table.11b Growth rate of various Cyanobacteria (filamentous) in Dairy effluent (without added nutrients)

S.No	Growth rate (Divisions/day)		
	Name of the algae	Initial (dry weight/gm)	Final (dry weight/gm)
1	***Spirulina platensis***	0.8000 ± 0.010	1.2067 ± 0.011
2	***Oscillatoria animalis***	1.6100 ± 0.010	2.8400 ± 0.010
3	***Phormidium ambiguum***	1.0033 ± 0.005	3.7933 ± 0.005
4	***Cylindrospermum licheniforme***	1.2000 ± 0.010	2.3600 ± 0.010
5	***Nostoc muscorum***	1.0000 ± 0.00	2.8400 ± 0.010
6	***Anabaena variabilis***	1.4400 ± 0.040	3.6767 ± 0.005
7	***Aulosira laxa***	1.5000 ± 0.010	4.8100 ± 0.010
8	***Scytonema multiramosum***	1.2100 ± 0.010	3.3600 ± 0.010
9	***Tolypothrix distorta***	1.6000 ± 0.010	4.6000 ± 0.010
10	***Calothrix membranacea***	1.5867 ± 0.015	3.8000 ± 0.010
11	***Hapalosiphon welwitschii***	1.2000 ± 0.010	2.4000 ± 0.010
12	***Fischerella ambigue***	1.2000 ± 0.010	2.0500 ± 0.010
13	***Stigonema turfaceum***	1.0900 ± 0.010	2.4600 ± 0.010
14	Algal consortium	1.2033 ± 0.005	3.4000 ± 0.010

Table.12 Physico-chemical parameters of Dairy effluent in untreated and treated with *Aulosira laxa.*

S. No	Parameters	*Aulosira laxa*				
		Before treatment (Control)	**After treatment**	**Removal efficiency (%)**	**F-value**	**P-value**
1	Appearance	Grayish black	Green	-	-	-
2	Odour	Offensive smell	Algal smell	-	-	-
3	Turbidity	154.91 ± 3.58	23.65 ± 0.51	-84.73	7.990	0.018
4	TSS	159.95 ± 1.29	99.16 ± 9.34*	-38.00	3.767	0.081
5	TDS	1027.16 ± 6.43	515 ± 20.72	-49.86	2.150	0.173
6	Total solids	1305.50 ± 3.44	125 ± 3.09	-90.42	0.022	0.884
7	EC	1579.16 ± 3.86	1333 ± 18.93	-15.58	5.780	0.037
8	pH	5.15 ± 0.08	8.48 ± 0.30	+64.66	4.110	0.070
9	Alkalinity	551.66 ± 12.01	161.5 ± 6.41**	-70.72	4.498	0.060
10	Total hardness	790 ± 9.35	204.31 ± 4.54*	-74.13	4.444	0.061
11	Calcium	140.33 ± 2.58	52.83 ± 3 .48*	-62.35	0.760	0.404
12	Magnesium	80.16 ± 2.85	17.83 ± 1.94*	-77.75	0.660	0.436
13	Sodium	130.83 ± 3.06	111.83 ± 4.80*	-14.52	1.418	0.261
14	Potassium	29.5 ± 2.16	18.83 ± 1.47*	-36.16	0.789	0.395
15	Iron	9.91 ± 0.31	0.33 ± 0.03*	-96.67	5.184	0.046
16	Free ammonia	23.51 ± 0.75	3.49 ± 0.24*	-85.52	1.770	0.213
17	Nitrite	0.14 ± 0.01	0.23 ± 0.02	-64.28	0.278	0.610
18	Nitrate	8.66 ± 1.75	9.56 ± 1.10*	+10.39	1.008	0.339
19	Chloride	231.33 ± 2.16	8.88 ± 0.49	-96.16	0.760	0.404
20	Fluoride	0.12 ± 0.01	0.00 ± 0.00*	-93.33	13.838	0.004
21	Sulphate	71.83 ± 2.48	34 ± 2.89*	-52.66	0.316	0.586
22	Phosphate	12.16 ± 0.71	84.33 ± 4.13	+85.58	12.041	0.006
23	Silica	6.61 ± 0.10	5.34 ± 0.39	-19.21	6.391	0.030
24	COD	370.33 ± 4.58	112.66 ± 8.04	-69.57	2.991	0.114
25	BOD	120.5 ± 1.87	42.16 ± 3.54	-65.01	3.453	0.093
26	Oil and Grease	0.17 ± 0.40	0.01 ± 0.1*	-99.41	6.244	0.032

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.13 Physico-chemical parameters of Dairy effluent in untreated and treated with *Tolypothrix distorta*

S. No	Parameters	*Tolypothrix distorta*				
		Before treatment (Control)	After treatment	Removal efficiency (%)	F-value	P-value
1	Appearance	Grayish black	Green	-	-	-
2	Odour	Offensive smell	Algal smell	-	-	-
3	Turbidity	154.91 ± 3.58	21.16 ± 1.47	-86.34	3.251	0.102
4	TSS	159.95 ± 1.29	132 ± 5.09	-17.47	7.689	0.020
5	TDS	1027.16 ± 6.43	101.66 ± 2.25**	90.10	1.461	0.255
6	Total solids	1305.50 ± 3.44	119.83 ± 3.71**	-90.82	0.078	0.786
7	EC	1579.16 ± 3.86	755 ± 7.42	-52.18	5.923	0.035
8	pH	5.15 ± 0.08	8.35 ± 0.27	+62.13	26.654	0.000
9	Alkalinity	551.66 ± 12.01	203.33 ± 2.50*	-63.14	14.922	0.003
10	Total hardness	790 ± 9.35	198.33 ± 2.42	-74.89	10.625	0.009
11	Calcium	140.33 ± 2.58	49.66 ± 3.88*	-64.61	0.978	0.346
12	Magnesium	80.16 ± 2.85	23.5 ± 2.58*	-70.68	0.000	1.000
13	Sodium	130.83 ± 3.06	145 ± 4*	+10.83	0.212	0.655
14	Potassium	29.5 ± 2.16	28.66 ± 2.80	-02.84	0.988	0.344
15	Iron	9.91 ± 0.31	0.33 ± 0.02*	-96.67	6.147	0.033
16	Free ammonia	23.51 ± 0.75	0.96 ± 0.02*	-95.91	4.223	0.067
17	Nitrite	0.14 ± 0.01	0.38 ± 0.09	+63.15	20.607	0.001
18	Nitrate	8.66 ± 1.75	7 ± 1.41*	-19.16	0.385	0.549
19	Chloride	231.33 ± 2.16	91.33 ± 2.94*	-60.51	0.978	0.346
20	Fluoride	0.12 ± 0.01	0.04 ± 0.07*	-66.66	3.668	0.084
21	Sulphate	71.83 ± 2.48	39.5 ± 2.88*	-45.00	0.102	0.756
22	Phosphate	12.16 ± 0.71	1.15 ± 0.41*	-90.54	1.495	0.249
23	Silica	6.61 ± 0.10	4.66 ± 1.21*	-29.50	18.940	0.001
24	COD	370.33 ± 4.58	20.83 ± 2.04	-67.37	2.108	0.177
25	BOD	120.5 ± 1.87	40.16 ± 5.07	-66.67	2.225	0.167
26	Oil and Grease	0.17 ± 0.40	0.001 ± 0.00*	-99.41	6.236	0.062

Chemical Examination is expressed in mg/l. Electrical conductivity as μS/cm, Turbidity as NTU.

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.14 Effect of Cyanobacteria in the reduction of heavy metals

S. No	Heavy metals	Before treatment (Control-(mg/L)	After treatment with *A.laxa* (mg/L)	Removal efficiency (%)	After treatment with *T.distorta* (mg/L)	Removal efficiency (%)
1	Copper	1.34 ± 0.001	0.006 ± 0.004**	-99.55	0.007 ± 0.001**	-99.47
2	Total Chromium	0.02 ± 0.001	0.006 ± 0.001*	-70.00	0.011 ± 0.001*	-45.00
3	Zinc	0.02 ± 0.0005	0.007 ± 0.001*	-65.00	0.005 ± 0.001*	-75.00
4	Lead	0.04 ± 0.0005	0.03 ± 0.0005	-25.00	0.02 ± 0.001*	-50.00
5	Nickel	0.17 ± 0.001	0.03 ± 0.0005*	-82.35	0.01 ± 0.001*	-94.11
6	Cadmium	0.23 ± 0.005	0.01 ± 0.0005*	-95.65	0.002 ± 0.001*	-99.13
7	Arsenic	0.05 ± 0.001	0.02 ± 0.0005	-60.00	0.01 ± 0.001*	-80.00
8	Mercury	0.06 ± 0.001	0.04 ± 0.001	-33.33	0.03 ± 0.0003*	-50.00
	F-Value	5.565	2.053		0.057	
	P-Value	0.078	0.225		0.823	

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.15 Bacteriological examination of Dairy effluent

S.No	Parameters	Control	Treated with *Aulosira laxa*	Treated with *Tolypothrix distorta*
1	Standard plate count/1ml	15000 ± 1.52	17000 ± 1.00	140 ± 1.52
2	Total coli form count /100 ml	110000 ± 772.63	2100 ± 1.00	270 ± 1.00
3	Faecal ***Streptococci*** count/100 ml	700 ± 638.17	300 ± 1.52	20 ± 1.00
4	Faecal coli form count/100 ml	-	500 ± 1.52	70 ± 2.00

Values expressed as mean ± SD

Table.16 FT-IR Spectral assignments of Dairy effluent

Untreated effluent		**Treated with *Aulosira laxa***		**Treated with *Tolypothrix distorta***	
Assignment	**Group Frequency Wave number (cm^{-1})**	**Assignment**	**Group Frequency Wave number (cm^{-1})**	**Assignment**	**Group Frequency Wave number (cm^{-1})**
Intermolecular H Bonds	3385	Intermolecular H Bonds	3361	OH stretching vibrations	3962
C=-CH (terminal)	2135	C=-CH (terminal)	2136	OH stretching vibrations	3909
Amide I band	1644	Amide I band	1646	OH stretching vibrations	3892
Aromatic CH-bending	735	-CH=CH-(cis)	728	Aromatic C-H Bending (strong)	3408
		Aliphatic bromo compounds, CBr stretch	615	Alkynyl –C-H	2132
				Amide I band	1656
				Benzene 1, 2, 4 tri sub (strong weak)	866

Table.17 Pigment composition of Cyanobacteria biomass

S. No	Pigment Composition*	*Aulosira laxa* (Control)	Effluent Treated with *Aulosira laxa*	*Tolypothrix distorta* (Control)	Effluent Treated with *Tolypothrix distorta*
1	Chlorophyll	0.510 ± 0.01	0.300 ± 0.01*	0.480 ± 0.01	0.300 ± 0.01*
2	Carotenoids	0.180 ± 0.08	0.080 ± 0.001*	0.190 ± 0.01	0.100 ± 0.02*
F-value		12.045	3.141	0.000	0.000
P-value		0.026	0.151	1.000	1.000

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.18 Biochemical composition of Cyanobacteria biomass

S.No	Biochemical Composition*	*Aulosira laxa* (Control)	Effluent Treated with *Aulosira laxa*	*Tolypothrix distorta* (Control)	Effluent Treated with *Tolypothrix distorta*
1	Carbohydrates	9.71 ± 0.01	18.7 ± 0.01	7.64 ± 0.02*	20.12 ± 0.01
2	Proteins	7.16 ± 0.01*	8.11 ± 0.01	7.78 ± 0.02	8.11 ± 0.01
3	Lipids	1.31 ± 0.01	1.51 ± 0.01	0.92 ± 0.01*	1.64 ± 0.01
F-Value		1.724	0.567	3.388	2.649
P-Value		0.259	0.493	0.139	0.179

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.19 Amino acid composition of Cyanobacteria biomass before and after treatment

S. No	Amino acids*	*Aulosira laxa* (Control)	Effluent Treated with *Aulosira laxa*	*Tolypothrix distorta* (Control)	Effluent Treated with *Tolypothrix distorta*
1	Isoleucine	332.3 ± 0.30*	743.46 ± 0.40*	831.53 ± 0.51	764.46 ± 0.25
2	Leucine	113.63 ± 0.25*	845.0 ± 1.0	139.6 ± 0.26*	864.46 ± 3.78
3	Valine	333.0 ± 1.0*	898.4 ± 0.20	123.7 ± 0.26*	903.36 ± 0.30
4	Lysine	343.23 ± 0.25	128.33 ± 0.76*	391.56 ± 0.25	153.33 ± 0.25*
5	Phenylalanine	783.5 ± 0.10	322.23 ± 0.32	203.26 ± 0.15	345.66 ± 0.20
6	Methionine	878. 86 ± 0.51	911.56 ± 0.35	401.53 ± 0.32*	931.26 ± 0.20
7	Tryptophan	83.2 ± 0.52*	320.56 ± 0.25	193.43 ± 0.25*	340.53 ± 0.30
8	Threonine	119.43 ± 0.15*	410.53 ± 0.05	193.36 ± 0.25*	435.33 ± 0.37
9	Histidine	119.46 ± 0.15	911.2 ± 0.1	212.46 ± 5.96*	934.2 ± 0.34
Total Essential Amino acids		**38.32**	**53.04**	**48.42**	**47.22**
10	Arginine	113.46 ± 0.40*	574.3 ± 0.26	293.3 ± 0.1*	564.43 ± 0.40
11	Tyrosine	334. 16 ± 0.05	463.53 ± 0.28	145.5 ± .26**	445.36 ± 0.37
12	Cystine	135.66 ± 0.32	206.43 ± 0.35	403.36 ± 0.20	221.56 ± 0.50*
13	Alanine	303.83 ± 0.56	115.53 ± 0.32*	392.36 ± 0.25	132.26 ± 0.50*
14	Asparagine	213.33 ± 0.20*	773.46 ± 0.40	342.5 ± 0.5*	796.0 ± 1.0
15	Glutamic acid	763.46 ± 0.30	634.66 ± 0.20	113.33 ± 0.30	652.0 ± 0.05
16	Glycine	204.10 ± 0.87*	498.3 ± 0.3	405.56 ± 0.30	501.5 ± 0.70
17	Proline	202.93 ± 0.56	913.20 ± 0.23	293.53 ± 0.40*	932.56 ± 0.20
18	Serine	967.10 ± 0.52	325.4 ± 0.45*	295.46 ± 3.84	356.33 ± 0.32
19	Aspartic acid	376.30 ± 0.30*	545.66 ± 0.20	405.16 ± 0.15	574.63 ± 0.46
20	Glutamine	113.33 ± 0.30	135.53 ± 0.30	324.53 ± 0.35*	152.33 ± 0.35*
Total Non Essential Amino acids		**61.68**	**46.96**	**51.58**	**52.78**
F-Value		0.587	0.336	0.205	0.442
P-Value		0.348	1.196	2.286	0.727

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.20 Quantitative analysis of vitamins of *Aulosira laxa* and *Tolypothrix distorta*

S. No	Vitamins*	*Aulosira laxa* (Control)	Effluent Treated with *Aulosira laxa*	*Tolypothrix distorta* (Control)	Effluent Treated with *Tolypothrix distorta*
1	Vitamin A	0.24 ± 0.001	0.03 ± 0.003*	0.03 ± 0.003	0.032 ± 0.00
2	Vitamin B1	0.33 ± 0.0002	0.56 ± 0.002	0.40 ± 0.0003	0.59 ± 0.0002
3	Vitamin B2	0.10 ± 0.0001	0.43 ± 0.001	0.29 ± 0.003*	0.46 ± 0.0001
4	Vitamin B3	0.01 ± 0.0001*	0.10 ± 0.0001	0.003 ± 0.0001*	0.12 ± 0.0004
5	Vitamin B5	0.30 ± 0.0001	0.45 ± 0.0001	0.34 ± 0.0003	0.47 ± 0.0001
6	Vitamin B6	0.20 ± 0.0002	0.37 ± 0.02	0.19 ± 0.0002*	0.40 ± 0.00001
7	Vitamin B12	0.01 ± 0.0001	0.01 ± 0.00	0.01 ± 0.001	0.01 ± 0.001
8	Vitamin C	2.43 ± 0.02*	8.32 ± 0.01	2.34 ± 0.001	9.31 ± 0.01
9	Biotin	0.01 ± 0.0001*	0.30 ± 0.00	0.01 ± 0.0001*	0.32 ± 0.0003
10	Folic acid	0.33 ± 0.0002*	1.35 ± 0.01	0.41 ± 0.0003	1.35 ± 0.02
11	Coline	3.42 ± 0.02	5.64 ± 0.03	3.91 ± 0.003	6.33 ± 0.03
12	Nicotinic acid	0.11 ± 0.0002	0.45 ± 0.00	0.10 ± 0.002*	0.47 ± 0.0002
F-Value		0.400	0.000	12.832	10.606
P-Value		0.561	1.000	0.023	0.031

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.21 Mineral composition of *Aulosira laxa* and *Tolypothrix distorta*

S.No	Mineral Composition*	*Aulosira laxa* (Control)	Treated with *Aulosira laxa*	*Tolypothrix distorta* (Control)	Treated with *Tolypothrix distorta*
1	Nitrogen	811.33 ± 0.25	927.53 ± 0.15	7982.33± 1.52	8431 ± 0.10*
2	Phosphorus	123.46 ± 0.05	206.53 ± 0.15	136.46 ± 0.20*	207.55 ± 0.05
3	Potassium	156.50 ± 0.26*	207.43 ± 0.15	148.33 ± 0.15*	207.56 ± 0.05
4	Iron	3.43 ± 0.02	7.53 ± 0.01	3.89 ± 0.02*	8.22 ± 0.01
5	Zinc	13.32 ± 0.02*	17.84 ± 0.02	14.55 ± 0.005	18.43 ± 0.02
6	Magnesium	34.40 ± 0.08	37.77 ± 0.02	23.64 ± 0.01	38.7 ± 0.02
7	Copper	2.11 ± 0.00*	5.29 ± 0.05	3.05 ± 0.002	4.32 ± 0.02
8	Sulphur	3.45 ± 0.00*	8.35 ± 0.00	2.91 ± 0.01*	15.64 ± 0.03
	F-Value	2.64	0.492	3.571	0.026
	P-Value	0.179	0.522	0.132	0.879

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.22 Antibacterial activity of Cyanobacteria methanolic extracts against Gram-positive and Gram-negative bacteria presented by inhibition zone diameter (in mm) and antimicrobial index (in parentheses).

Bacteria	Concentration (µg)	Zone of inhibition of the sample (mm)			
		***Aulosira laxa* (Control)**	**Treated *Aulosira laxa***	***Tolypothrix distorta* (Control)**	**Treated *Tolypothrix distorta***
B.subtilis	500	-	9 (75%)	-	10.33 ± 0.57 (66.66%)
	750	-	-	-	11.33 ± 0.57 (73.33%)
	1000	10.00 ± 1.00 (76.92%)	9.00 ± 1.00 (75%)	-	12.00 ± 0.57 (80%)
Positive control (mm) Ampicillin		13.00 ± 1.00 **(100%)**	12.00 ± 1.00 **(100%)**	11.00 ± 1.00 **(100%)**	15.00 ± 1.00 **(100%)**
S.aureus	500	-	-	-	10.00 ± 0.25 (47.61%)
	750	-	-	-	11.00 ± 0.28 (52.38%)
	1000	8.00 ± 1.00 (40%)	9.00 ± 1.00 (42.85%)	-	13. 00 ± 1.00 (61.90%)
Positive control (mm) Ampicillin		20.00 ± 1.00 **(100%)**	21.00 ± 0.57 **(100%)**	22.00 ± 0.57 **(100%)**	21.00 ± 0.57 **(100%)**
P.aeruginosa	500	-	-	-	-
	750	-	-	-	-
	1000	-	-	-	7.00 ± 1.00 (26.92%)
Positive control (mm) Ampicillin		20.00 ± 1.00 **(100%)**	20.00 ± 1.00 **(100%)**	23.00 ± 1.00 **(100%)**	26.00 ± 0.57 **(100%)**
E.coli	500	-	-	-	-
	750	-	-	-	-
	1000	-	-	-	-
Positive control (mm) Ampicillin		27.00 ± 1.00 **(100%)**	27.00 ± 0.57 **(100%)**	28.00 ± 1.00 **(100%)**	29.00 ± 0.57 **(100%)**

Values expressed as mean ± SD

Table.23 IC_{50} values of standard and experimental algae on free radical scavenging system.

S.No	Standard/Experimental Algae	Free radical scavenging IC_{50} value (μg/mg)	
		DPPH	**ABTS**
1	BHT	33	32.5
2	L-Ascorbic acid	73	45.1
3	***Aulosira laxa***	45.21 ± 0.049	44.57 ± 0.035
4	***Tolypothrix distorta***	44.44 ± 0.084	74.41 ± 0.042
5	Treated with ***Aulosira laxa***	34.63 ± 0.077	48.37 ± 0.021
6	Treated with ***Tolypothrix distorta***	29.25 ± 0.021	57.54 ± 0.056

Values expressed as mean ± SD

Table.24 Effect of Dairy effluent on seed germination in *P. mungo*

Effluent Concentration	No. of Seeds	Germination Percentage			
		Control	Untreated Effluent	Treated with *A. laxa*	Treated with *T. distorta*
25%	25	96	40	32	44
50%	25	96	36	40	64
75%	25	96	-	48	72
100%	25	96	-	92	96

Table.25 Effect of untreated and treated Dairy effluent on early seedling growth in *P. mungo*.

Irrigation Period	Treatment	Shoot* length (cm)	Leaf* area (cm)
3rd day	Control	70.2 ± 0.1	15.8 ± 0.1
	Effluent	67.4 ± 0.1	10.83 ± 0.05
	Treated with ***A.laxa***	96.23 ± 0.25*	16.43 ± 0.05
	Treated with ***T.distorta***	97.53 ± 0.30*	19.36 ± 0.2*
5th day	Control	85.60 ± 0.10	15.16 ± 0.15
	Effluent	84.33 ± 0.05	11.9 ± 0.1
	Treated with ***A.laxa***	122.3 ± 0.3*	23.8 ± 0.1*
	Treated with ***T.distorta***	116.23 ± 0.25*	22.5 ± 0.1*
7th day	Control	97.23 ± 0.15	15.56 ± 0.15
	Effluent	94.4 ± 0.01	13.9 ± 0.1
	Treated with ***A.laxa***	145.5 ± 0.26	26.26 ± 0.20*
	Treated with ***T.distorta***	116.23 ± 0.25*	26.40 ± 0.1*

Values expressed as mean ± SD as student t -test at P<0.05% level.
*Significant, **highly significant

Table.26 Effect of algal filtrates on photosynthetic pigments of *P.mungo*

S. No	Pigment Composition	Control	Untreated Effluent	Effluent treated with *A. laxa*	Effluent treated with *T.distorta*
1	Chlorophyll	1.486 ± 0.00	0.014 ± 5.77*	1.509 ± 0.00	1.542 ± 0.00
2	Carotenoids	0.310 ± 0.19	0.190 ± 0.00*	0.450 ± 0.00	0.490 ± 0.00
F- Value		1.362	2.495	00	1.143
P- Value		0.308	0.189	1.000	0.345

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.27 Effect of algal filtrates on Biochemical composition of *P.mungo*

S. No	Biochemical Composition*	Control	Untreated Effluent	Effluent treated with *A. laxa*	Effluent treated with *T.distorta*
1	Carbohydrates	12.87 ± 0.01	10.54 ± 0.02*	15.03 ± 0.01	26.44 ± 0.01
2	Proteins	3.40 ± 0.001	2.79 ± 0.02	3.73 ± 0.00	4.10 ± 0.00
3	Lipids	0.56 ± 0.51*	0.51 ± 0.01*	0.81 ± 0.01	0.95 ± 0.01
F- Value		2.880	9.846	7.000	9.680
P- Value		0.165	0.035	0.057	0.036

*Dry wt (mg/g)

Values expressed as mean ± SD as student t -test at P<0.05% level.

*Significant, **highly significant

Table.28 Effect of algal filtrates on mineral composition of *P. mungo*.

S. No	Minerals*	Black Gram (Control)	Black Gram (Effluent)	Black Gram (Treated with *A.laxa)*	Black Gram (Treated with *T. distorta)*
1	Nitrogen	67.5 ± 0.1	245.5 ± 0.1**	298.33 ± 0.15**	365.44 ± 0.15**
2	Phosphorus	45.5 ± 0.1	123.3 ± 0.1*	156.6 ± 0.26*	167.8 ± 0.1*
3	Potassium	41.53 ± 0.15	89.33 ± 0.15*	99.5 ± 0.1*	98.2 ± 0.1*
4	Iron	8.98 ± 0.01	60.55 ± 0.01*	11.28 ± 0.01	34.05 ± 0.02*
5	Zinc	7.87 ± 0.01	3.7 ± 0.1	4.25 ± 0.13	12.77 ± 0.01*
6	Magnesium	12.23 ± 0.20	37.2 ± 6.49*	37.8 ± 0.1*	67.8 ± 0.1*
7	Copper	17.66 ± 0.15*	3.33 ± 0.01	4.35 ± 0.01	5.66 ± 0.01
8	Sulphur	1.89 ± 0.01	0.98 ± 0.01	1.44 ± 0.01	2.01 ± 0.01
	F-value	0.727	16.697	2.462	1.903
	P-value	0.442	0.017	0.192	0.240

*****Dry wt (mg/g)

Values expressed as mean ± SD as student t-test at P<0.05% level.

*Significant, **highly significant

Table.29 Percentage of survival of *Hypophthalmicthys molitrix* exposed to untreated and treated Dairy effluent.

S. No	Exposure time (in days)	No. of fish exposed	% of Survival			
			Control	Effluent conc. (25%)	Treated with *A.laxa*	Treated with *T.distorta*
1	1	10	100	0	80	90
2	3	10	100	0	80	90
3	5	10	100	50	90	100
4	7	10	100	50	100	100

Table.30 Physico-chemical characteristics of Dairy effluent during the experiment

S.No	Parameters*	Untreated effluent (Control)	Effluent Treated with *A. laxa*	Effluent treated with *T.distorta*	BIS Limit is 2490-2009
1	Temperature	30	28	28	26-28
2	Turbidity	154.1	23.6	22	≤ 50
3	Total solids	1304	128	117	1200
4	pH	5.15	8.48	8.61	76.-7.8
5	Dissolved oxygen	4.0	6.4	6.8	7.0-7.6
6	Total alkalinity	550	160	206	160-184
7	Total hardness	800	210	200	146-168
8	Calcium	140	52	50	30-36
9	Magnesium	80	19	46	18-20
10	Sodium	130	10	148	26-28
11	Potassium	30	18	28	2-5.4
12	Nitrate	8	10	8	-
13	Phosphate	12	33	1	1
14	COD	370	106	120	-
15	BOD	120	40	40	40

***All the values are expressed in mg/L except pH and temperature**

Table.31 Effect of Dairy effluent on length of *Hypophthalmicthys molitrix*

S. No	Treatment (Days)	Control*	Effluent*	Effluent treated with A. *laxa**	Effluent treated with *T.distorta* *
1	Day 1	3.53 ± 0.05	3.90 ± 0.01	3.66 ± 0.11	4.06 ± 0.05*
2	Day 3	3.53 ± 0.11	3.93 ± 0.05	3.66 ± 0.11	4.20 ± 0.1*
3	Day 5	3.63 ± 0.05	3.83 ± 0.23	3.83 ± 0.05	4.23 ± 0.05*
4	Day 7	3.63 ± 0.05	3.53 ± 0.37	3.83 ± 0.26	4.30 ± 0.1*
F- Value		2.880	9.846	7.000	9.680
P- Value		0.165	0.035	0.057	0.036

*length (cm)
Values expressed as mean ± SD as student t -test at the 0.05% level.
*Significant, **highly significant

Table.32 Effect of Dairy effluent on width of *Hypophthalmicthys molitrix*

S. No	Treatment (Days)	Control*	Effluent*	Effluent treated with A. *laxa**	Effluent treated with *T.distorta* *
1	Day 1	0.83 ± 0.05	0.86 ± 0.005	0.93 ± 0.05	0.83 ± 0.05
2	Day 3	0.89 ± 0.05	0.86 ± 0.005	1.03 ± 0.05	1.03 ± 0.05
3	Day 5	1.03 ± 0.05	0.86 ± 0.75	1.03 ± 0.05	1.13 ± 0.05
4	Day 7	1.03 ± 0.05	0.80 ± 0.00	1.13 ± 0.05*	1.16 ± 0.1
P-value		0.016	1.000	1.000	0.048
F-value		16.00	00	00	4.53

*width (cm)
Values expressed as mean ± SD as student t -test at the 0.05% level.
*Significant, **highly significant

Table.33 Effect of Dairy effluent on weight of fish *Hypophthalmicthys molitrix*

S.No	Treatment (Days)	Control*	Effluent*	Effluent treated with A. *laxa**	Effluent treated with *distorta* *
1	Day 1	1.45 ± 0.005	1.24 ± 0.01	1.05 ± 0.47*	1.30 ± 0.1*
2	Day 3	1.47 ± 0.01	1.36 ± 0.20	1.09 ± 0.01*	1.34 ± 0.02*
3	Day 5	1.47 ± 0.01	1.36 ± 0.20	1.10 ± 0.01	1.36 ± 0.01*
4	Day 7	1.48 ± 0.01	1.23 ± 0.05	1.12 ± 0.005	1.37 ± 0.01*
	P-value	0.567	0.017	0.136	0.041
	F-value	0.400	15.59	3.481	8.834

* Wet weight (g)
Values expressed as mean ± SD as student t-test at the 0.05% level.
*Significant, **highly significant

Table.34 Biochemical composition of *Hypophthalmicthys molitrix* when exposed to Dairy effluent

S.No	Biochemical composition*	Control	Effluent	Effluent treated with A. *laxa**	Effluent treated with *T. disotra**
1	Carbohydrates	2.45 ± 0.01	2.16 ± 0.01	6.12 ± 0.01	7.52 ± 0.01*
2	Proteins	2.03 ± 0.01	5.22 ± 0.005*	12.41 ± 0.01*	6.44 ± 0.01*
3	Lipids	2.05 ± 0.01	0.48 ± 0.01	1.46 ± 0.01	2.29 ± 0.005*
F-value		1.681	0.643	0.847	2.632
P-Value		0.265	0.468	0.409	0.180

*Dry wt (mg/g)
Values expressed as mean ± SD as student t -test at the 0.05% level.
*Significant, **highly significant

Table.35 Physico-chemical parameters, Dairy effluent and the Impact of cyanobacterial Treatment.

S. No	Parameters*	BIS Limit is 2490-2009	Untreated effluent	Treated with *Aulosria laxa*	Treated with *Tolypothrix distorta*	Remarks
1	pH	5.5-9	5.15 ± 0.08	8.65 ± 0.08	8.81 ± 0.05	Within the standard
2	TDS	2100	1027.16 ± 6.43	430 ± 3.09	116.66 ± 14.02	Within the standard
3	Electrical conductivity	NM	1579.16 ± 3.86	1047.5 ± 1.87	933 ± 2.36	Within the standard
4	Calcium	200	140.33 ± 2.58	42.33 ± 2.58	52.16 ± 3.48	Within the standard
5	Magnesium	30-100	80.16 ± 2.85	20.66 ± 6.34	23 ± 2.09	Within the standard
6	Sodium	NM	130.83 ± 3.06	103 ± 4.73	150 ± 4.89	Within the standard
7	Potassium	NM	29.50 ± 2.16	18.66 ± 2.16	30.83 ± 2.48	Within the standard
8	Nitrate	100	8.66 ± 1.75	7.24 ± 0.73	10.83 ± 2.48	Within the standard
9	Chloride	1000	231.33 ± 2.16	84.66 ± 3.50	93.33 ± 3.55	Within the standard
10	Sulphate	1000	71.83 ± 2.48	36.5 ± 4.37	38.66 ± 3.55	Within the standard
11	COD	250	370.33 ± 4.58	115.33 ± 8.04	100.83 ± 2.92	Within the standard
12	BOD	50	120.50 ± 1.87	36.66 ± 5.16	33.83 ± 3.43	Within the standard

***All the values are expressed in mg/L except pH and Electrical conductivity.**