

Supplementary Information

This is a supplementary information of the article: <https://doi.org/10.61435/ijred.2026.61637>

Figure S1. GC-FID representative chromatogram of *E. gracilis* cultured at 500 lux.

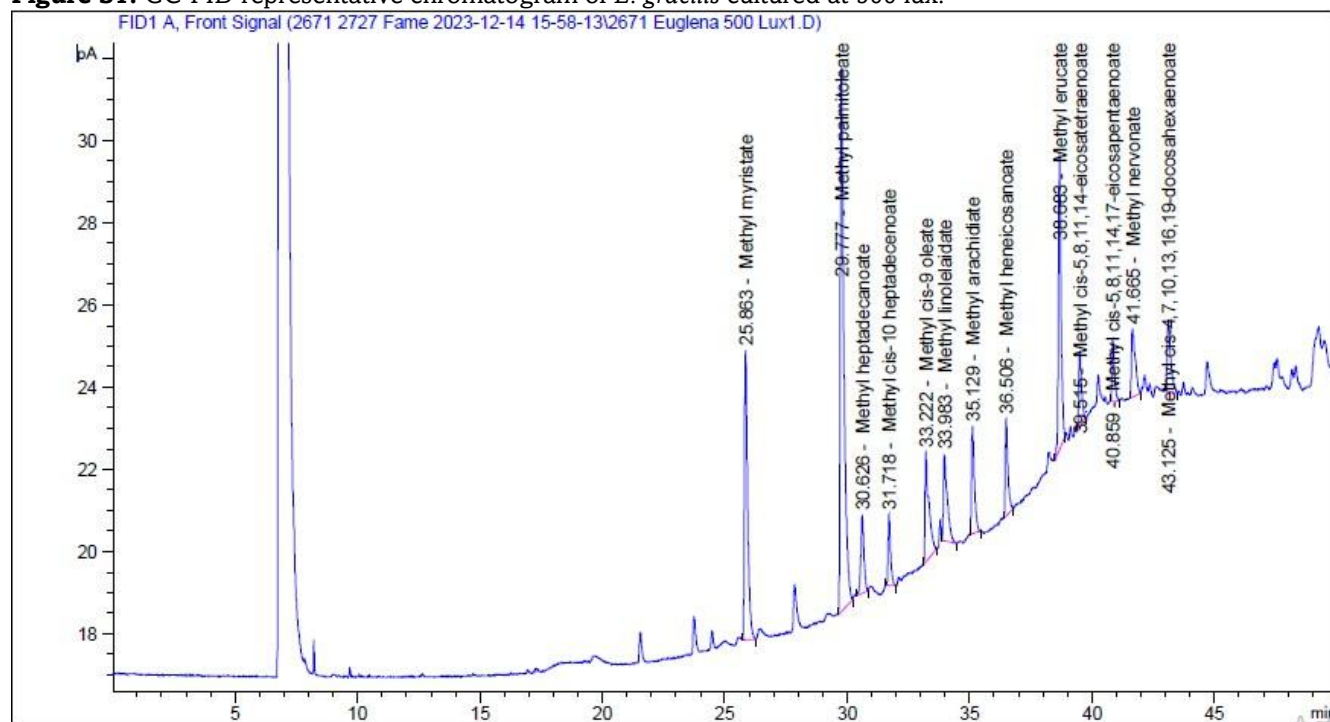


Figure S2. GC-FID representative chromatogram of *E. gracilis* cultured at 2,100 lux.

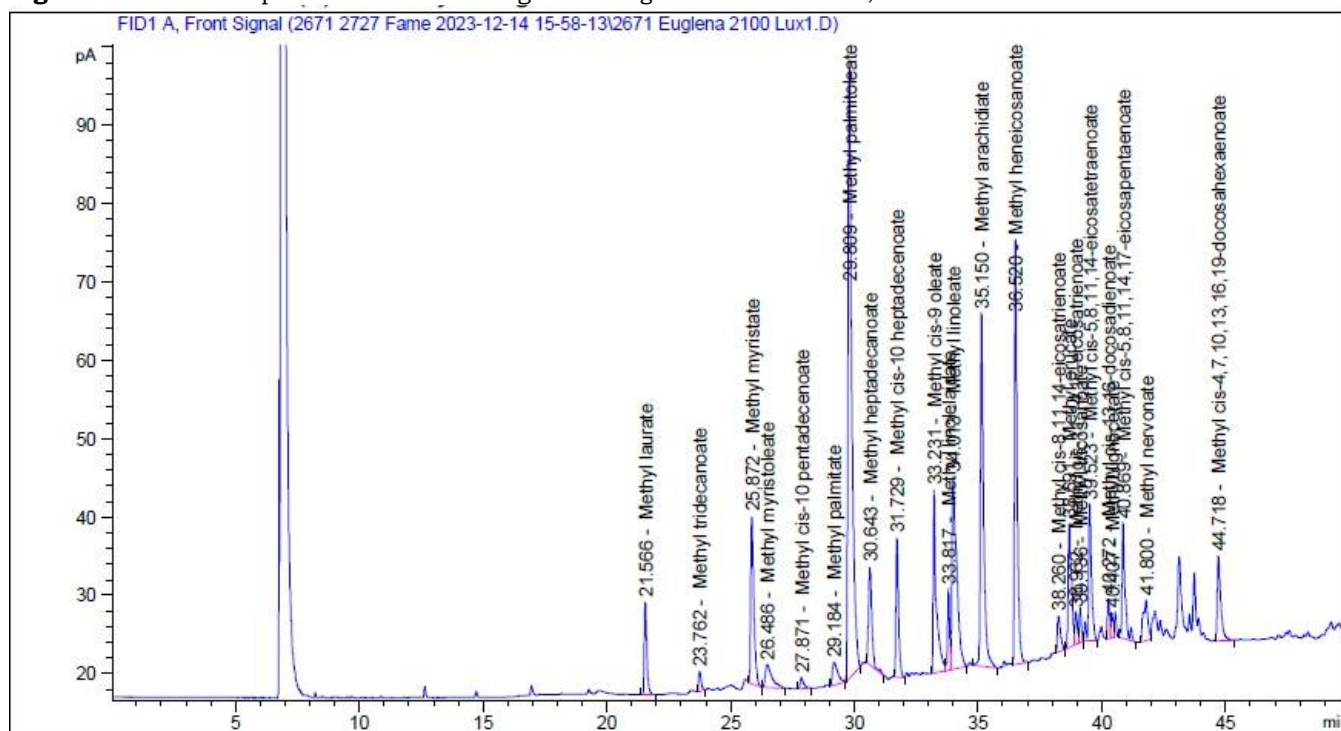


Figure S3. GC-FID representative chromatogram of *E. gracilis* cultured at 4,500 lux.

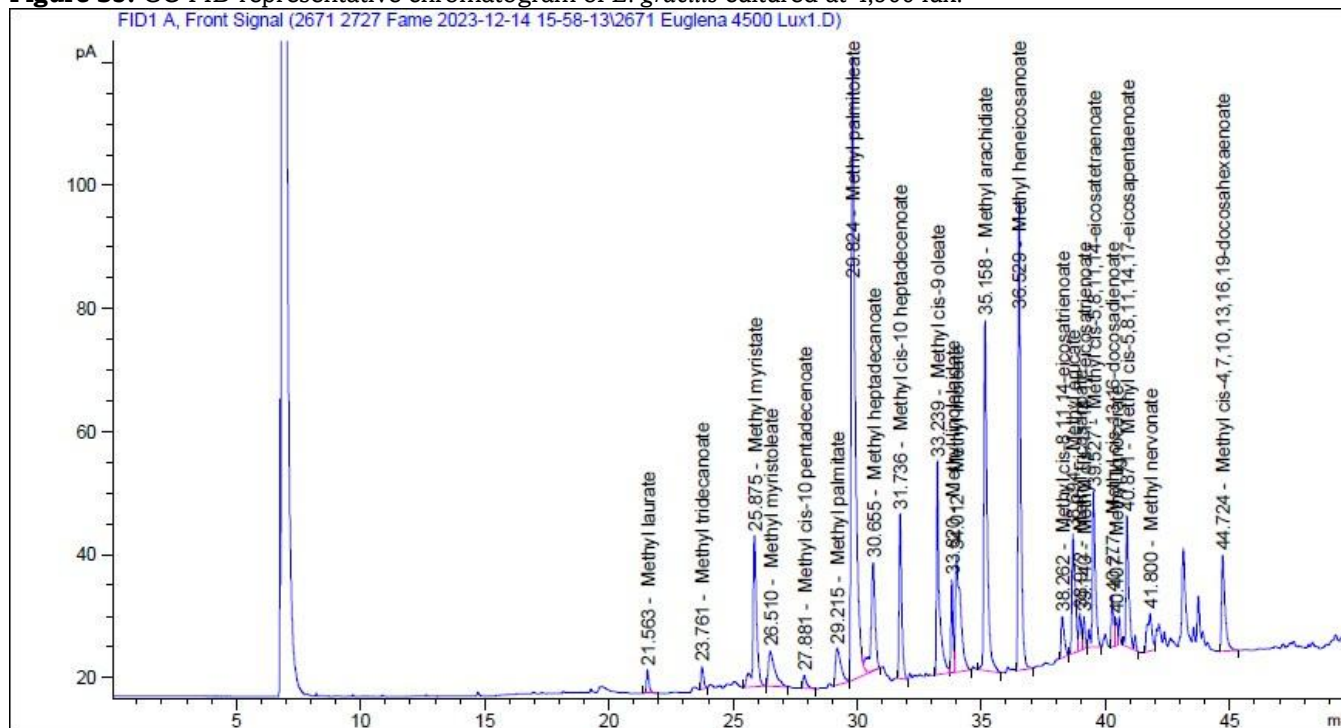
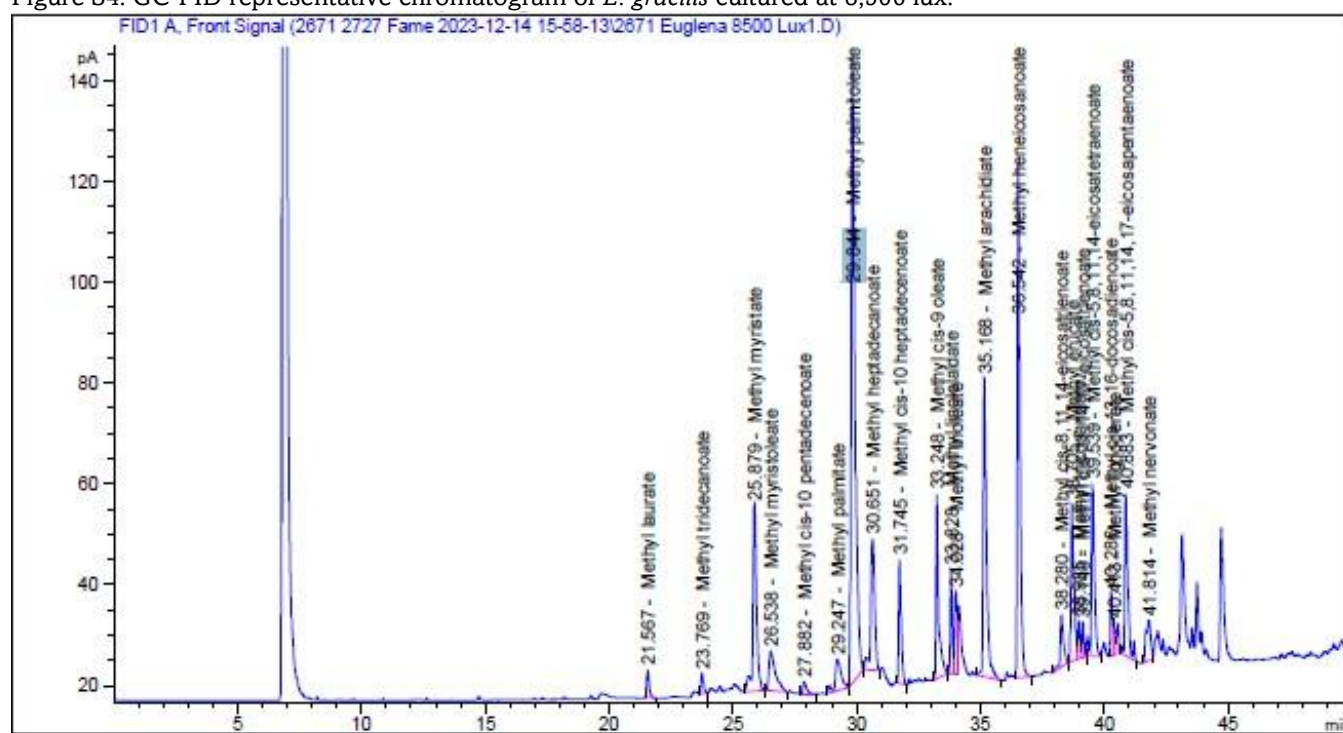


Figure S4. GC-FID representative chromatogram of *E. gracilis* cultured at 8,500 lux.



Supplementary Table S1. Retention times from the GC-FID analysis of *E. gracilis* cultured at 500 lux

FAME 500 Lux						
No	Name	Formula	Area (%)	Retention Time (1)	Retention Time (2)	Retention Time (3)
1	Methyl myristate	C ₁₄ H ₂₈ O ₂	14.805	25.863	25.863	25.863
2	Methyl heptadecanoate	C ₁₈ H ₃₆ O ₂	3.995	30.626	30.629	30.628
3	Methyl arachidate	C ₂₁ H ₄₂ O ₂	4.995	35.129	35.128	35.129
4	Methyl heneicosanoate	C ₂₂ H ₄₄ O ₂	4.285	36.506	36.506	36.506
5	Methyl palmitoleate	C ₁₇ H ₃₂ O ₂	32.46	29.777	29.780	29.779
6	Methyl cis-10-heptadecenoate	C ₁₈ H ₃₄ O ₂	2.9	31.718	31.721	31.720
7	Methyl cis-9-oleate	C ₁₉ H ₃₆ O ₂	6.98	33.222	33.225	33.224
8	Methyl linolelaidate	C ₁₉ H ₃₄ O ₂	3.045	33.983	33.809	33.896
9	Methyl erucate	C ₂₃ H ₄₄ O ₂	12.405	38.683	38.68	38.683
10	Methyl cis-5,8,11,14-eicosatetraenoate	C ₂₁ H ₃₄ O	3.285	39.515	39.510	39.513
11	Methyl cis-5,8,11,14,17-eicosapentaenoate	C ₂₁ H ₃₂ O	2.605	38.953	38.953	38.953
12	Methyl nervonate	C ₂₅ H ₄₈ O ₂	4.265	41.665	41.666	41.666
13	Methyl cis-4,7,10,13,16,19-docosahexaenoate	C ₂₃ H ₃₄ O ₂	3.98	43.125	43.126	43.126

Supplementary Table S2. Retention times from the GC-FID analysis of *E. gracilis* cultured at 2,100 lux

FAME 2,100 Lux						
No	Name	Formula	Area (%)	Retention Time (1)	Retention Time (2)	Retention Time (3)
1	Methyl laurate	C ₁₃ H ₂₆ O ₂	1.61	21.566	21.564	21.565
2	Methyl tridecanoate	C ₁₄ H ₂₈ O ₂	0.515	23.762	23.759	23.761
3	Methyl myristate	C ₁₅ H ₃₀ O ₂	5.345	25.872	25.868	25.870
4	Methyl palmitate	C ₁₇ H ₃₄ O ₂	1.48	29.184	29.197	29.191
5	Methyl heptadecanoate	C ₁₈ H ₃₆ O ₂	3.71	30.643	30.647	30.645
6	Methyl arachidate	C ₂₁ H ₄₂ O ₂	10.99	35.150	35.149	35.150
7	Methyl heneicosanoate	C ₂₂ H ₄₄ O ₂	11.35	36.520	36.524	36.522
8	Methyl tricosanoate	C ₂₄ H ₄₈ O ₂	0.67	39.136	39.136	39.136
9	Methyl lignocerate	C ₂₅ H ₅₀ O ₂	0.64	40.407	40.407	40.407
10	Myristoleic acid methyl ester	C ₁₅ H ₂₈ O ₂	1.835	26.486	26.498	26.492
11	Methyl cis-10-pentadecenoate	C ₁₆ H ₃₀ O ₂	0.39	27.871	27.870	27.871
12	Methyl palmitoleate	C ₁₇ H ₃₂ O ₂	24.165	29.809	29.806	29.808
13	Methyl cis-10-heptadecenoate	C ₁₈ H ₃₄ O ₂	3.805	31.729	31.731	31.730
14	Methyl cis-9-oleate	C ₁₉ H ₃₆ O ₂	5.74	33.231	33.235	33.233
15	Methyl linolelaidate	C ₁₉ H ₃₄ O ₂	1.63	33.817	33.817	33.817
16	Methyl linoleate	C ₁₉ H ₃₄ O ₂	5.745	34.013	34.006	34.010
17	Methyl cis-8,11,14-eicosatrienoate	C ₂₁ H ₃₆ O ₂	1.305	38.260	38.255	38.258
18	Methyl cis-11,14,17-eicosatrienoate	C ₂₁ H ₃₆ O ₂	0.77	38.962	38.968	38.965
19	Methyl erucate	C ₂₃ H ₄₄ O ₂	4.27	38.691	38.693	38.692
20	Methyl cis-5,8,11,14-eicosatetraenoate	C ₂₁ H ₃₄ O	4.265	39.523	39.522	39.523
21	Methyl cis-13,16-docosadienoate	C ₂₃ H ₄₂ O ₂	0.91	40.272	40.277	40.275
22	Methyl cis-5,8,11,14,17-eicosapentaenoate	C ₂₁ H ₃₂ O	3.475	40.869	40.868	40.869
23	Methyl nervonate	C ₂₅ H ₄₈ O ₂	2.21	41.800	41.799	41.800
24	Methyl cis-4,7,10,13,16,19-docosahexaenoate	C ₂₃ H ₃₄ O ₂	3.295	44.718	44.724	44.721

Supplementary Table S3. Retention times from the GC-FID analysis of *E. gracilis* cultured at 4,500 lux

FAME 4,500 Lux						
No	Name	Formula	Area (%)	Retention Time (1)	Retention Time (2)	Retention Time (3)
1	Methyl laurate	C ₁₃ H ₂₆ O ₂	1.01	21.563	21.566	21.565
2	Methyl tridecanoate	C ₁₄ H ₂₈ O ₂	0.49	23.761	23.765	23.763
3	Methyl myristate	C ₁₅ H ₃₀ O ₂	5.45	25.875	25.877	25.876
4	Methyl palmitate	C ₁₇ H ₃₄ O ₂	1.77	29.215	29.209	29.212
5	Methyl heptadecanoate	C ₁₈ H ₃₆ O ₂	3.57	30.655	30.647	30.651
6	Methyl arachidate	C ₂₁ H ₄₂ O ₂	11.125	35.158	35.158	35.158
7	Methyl heneicosanoate	C ₂₂ H ₄₄ O ₂	10.685	36.529	36.526	36.528
8	Methyl tricosanoate	C ₂₄ H ₄₈ O ₂	0.82	38.972	38.972	38.972

9	Methyl lignocerate	C ₂₅ H ₅₀ O ₂	0.63	40.407	40.407	40.407
10	Myristoleic acid methyl ester	C ₁₅ H ₂₈ O ₂	1.905	26.510	26.514	26.512
11	Methyl cis-10-pentadecenoate	C ₁₆ H ₃₀ O ₂	0.42	27.881	27.875	27.878
12	Methyl palmitoleate	C ₁₇ H ₃₂ O ₂	25.365	29.824	29.823	29.824
13	Methyl cis-10-heptadecenoate	C ₁₈ H ₃₄ O ₂	3.445	31.736	31.734	31.735
14	Methyl cis-9-oleate	C ₁₉ H ₃₆ O ₂	4.275	33.239	33.238	33.239
15	Methyl linolelaidate	C ₁₉ H ₃₄ O ₂	1.505	33.820	33.818	33.819
16	Methyl linoleate	C ₁₉ H ₃₄ O ₂	8.705	34.012	34.013	34.013
17	Methyl cis-8,11,14-eicosatrienoate	C ₂₁ H ₃₆ O ₂	1.16	38.262	38.263	38.263
18	Methyl cis-11,14,17-eicosatrienoate	C ₂₁ H ₃₆ O ₂	0.615	39.140	39.139	39.140
19	Methyl erucate	C ₂₃ H ₄₄ O ₂	3.655	38.694	38.695	38.695
20	Methyl cis-5,8,11,14-eicosatetraenoate	C ₂₁ H ₃₄ O	4.255	39.527	39.526	39.527
21	Methyl cis-13,16-docosadienoate	C ₂₃ H ₄₂ O ₂	0.97	40.277	40.274	40.276
22	Methyl cis-5,8,11,14,17-eicosapentaenoate	C ₂₁ H ₃₂ O	3.445	40.871	40.871	40.871
23	Methyl nervonate	C ₂₅ H ₄₈ O ₂	1.68	41.800	41.803	41.802
24	Methyl cis-4,7,10,13,16,19-docosaheptaenoate	C ₂₃ H ₃₄ O ₂	3.165	44.724	44.725	44.725

Supplementary Table S4. Retention times from the GC-FID analysis of *E. gracilis* cultured at 6,000 lux

FAME 6,000 Lux						
No	Name	Formula	Area (%)	Retention Time (1)	Retention Time (2)	Retention Time (3)
1	Methyl laurate	C ₁₃ H ₂₆ O ₂	1.295	21.567	21.575	21.571
2	Methyl tridecanoate	C ₁₄ H ₂₈ O ₂	0.51	23.763	23.775	23.769
3	Methyl myristate	C ₁₅ H ₃₀ O ₂	6.59	25.874	25.886	25.880
4	Methyl heptadecanoate	C ₁₈ H ₃₆ O ₂	5.855	30.651	30.658	30.655
5	Methyl arachidate	C ₂₁ H ₄₂ O ₂	10.355	35.161	35.167	35.164
6	Methyl heneicosanoate	C ₂₂ H ₄₄ O ₂	10.23	36.528	36.535	36.532
7	Methyl tricosanoate	C ₂₄ H ₄₈ O ₂	0.665	38.975	38.984	38.980
8	Methyl lignocerate	C ₂₅ H ₅₀ O ₂	0.58	40.406	40.411	40.409
9	Myristoleic acid methyl ester	C ₁₅ H ₂₈ O ₂	2.235	26.507	26.544	26.526
10	Methyl cis-10-pentadecenoate	C ₁₆ H ₃₀ O ₂	0.395	27.890	27.874	27.882
11	Methyl palmitoleate	C ₁₇ H ₃₂ O ₂	26.34	29.826	29.837	29.832
12	Methyl cis-10-heptadecenoate	C ₁₈ H ₃₄ O ₂	3.385	31.736	31.746	31.741
13	Methyl cis-9-oleate	C ₁₉ H ₃₆ O ₂	4.335	33.241	33.249	33.245
14	Methyl linolelaidate	C ₁₉ H ₃₄ O ₂	1.52	33.822	33.829	33.826
15	Methyl linoleate	C ₁₉ H ₃₄ O ₂	7.3	34.019	34.142	34.081
16	Methyl cis-8,11,14-eicosatrienoate	C ₂₁ H ₃₆ O ₂	1.24	38.265	38.276	38.271
17	Methyl cis-11,14,17-eicosatrienoate	C ₂₁ H ₃₆ O ₂	0.585	39.143	39.147	39.145
18	Methyl erucate	C ₂₃ H ₄₄ O ₂	4.435	38.696	38.701	38.699
19	Methyl cis-5,8,11,14-eicosatetraenoate	C ₂₁ H ₃₄ O	4.435	39.527	39.539	39.533

20	Methyl cis-13,16-docosadienoate	C ₂₃ H ₄₂ O ₂	1.05	40.278	40.287	40.283
21	Methyl cis-5,8,11,14,17-eicosapentaenoate	C ₂₁ H ₃₂ O	1.73	40.874	40.567	40.721
22	Methyl nervonate	C ₂₅ H ₄₈ O ₂	1.485	41.690	41.809	41.750
23	Methyl cis-4,7,10,13,16,19-docosahexaenoate	C ₂₃ H ₃₄ O ₂	3.44	44.726	44.736	44.731

Supplementary Table S5. Retention times from the GC-FID analysis of *E. gracilis* cultured at 8,500 lux

FAME 8,500 Lux						
No	Name	Formula	Area (%)	Retention Time (1)	Retention Time (2)	Retention Time (3)
1	Methyl laurate	C ₁₃ H ₂₆ O ₂	3.65	21.567	21.573	21.570
2	Methyl tridecanoate	C ₁₄ H ₂₈ O ₂	0.46	23.769	23.772	23.771
3	Methyl myristate	C ₁₅ H ₃₀ O ₂	7.445	25.879	25.887	25.883
4	Methyl palmitate	C ₁₇ H ₃₄ O ₂	1.67	29.247	29.226	29.237
5	Methyl heptadecanoate	C ₁₈ H ₃₆ O ₂	4.91	30.651	30.650	30.651
6	Methyl arachidate	C ₂₁ H ₄₂ O ₂	9.04	35.168	35.161	35.165
7	Methyl heneicosanoate	C ₂₂ H ₄₄ O ₂	12.01	36.542	36.534	36.538
8	Methyl tricosanoate	C ₂₄ H ₄₈ O ₂	0.86	38.985	38.985	38.985
9	Methyl lignocerate	C ₂₅ H ₅₀ O ₂	0.705	40.413	40.408	40.411
10	Myristoleic acid methyl ester	C ₁₅ H ₂₈ O ₂	1.995	26.524	26.538	26.531
11	Methyl cis-10-pentadecenoate	C ₁₆ H ₃₀ O ₂	0.46	27.882	27.882	27.882
12	Methyl palmitoleate	C ₁₇ H ₃₂ O ₂	24.69	29.844	29.827	29.836
13	Methyl cis-10-heptadecenoate	C ₁₈ H ₃₄ O ₂	3.13	31.745	31.740	31.743
14	Methyl cis-9-oleate	C ₁₉ H ₃₆ O ₂	3.95	33.248	33.244	33.246
15	Methyl linolelaidate	C ₁₉ H ₃₄ O ₂	1.76	33.828	33.825	33.827
16	Methyl linoleate	C ₁₉ H ₃₄ O ₂	5.14	34.028	34.020	34.024
17	Methyl cis-8,11,14-eicosatrienoate	C ₂₁ H ₃₆ O ₂	1.625	38.280	38.273	38.277
18	Methyl cis-11,14,17-eicosatrienoate	C ₂₁ H ₃₆ O ₂	0.65	39.148	39.142	39.145
19	Methyl erucate	C ₂₃ H ₄₄ O ₂	4.33	38.705	38.700	38.703
20	Methyl cis-5,8,11,14-eicosatetraenoate	C ₂₁ H ₃₄ O	4.745	39.539	39.532	39.536
21	Methyl cis-13,16-docosadienoate	C ₂₃ H ₄₂ O ₂	1.275	40.286	40.284	40.285
22	Methyl cis-5,8,11,14,17-eicosapentaenoate	C ₂₁ H ₃₂ O	2.605	40.883	40.880	40.882
23	Methyl nervonate	C ₂₅ H ₄₈ O ₂	1.2	41.814	40.566	41.190
24	Methyl cis-4,7,10,13,16,19-docosahexaenoate	C ₂₃ H ₃₄ O ₂	0.1	44.103	44.103	44.103

Notes for color chart:

Saturated
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