

# **Nanoparticle-mediated Impact on Growth and Fatty Acid Methyl Ester Composition in the Cyanobacterium *Fremyella diplosiphon***

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200NP vs 200NP-	48.79	0.001	* $p < 0.05$
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**Online Resource 1** Tukey Honest Significant Difference post-hoc test values for growth rates comparisons (calculated via least squares fitting methods) of **(a)** wild type (Fd33) and **(b)** halotolerant (HSF33-2) strains in solution with 20, 100, or 200 nm-diameter gold nanoparticles (NPs) over a period of 9 (Fd33) or 11 (HSF33-2) days. Cells grown in absence of AuNPs served as control (C) and gold colloids alone were denoted as AuNP only (NP-).

(a)

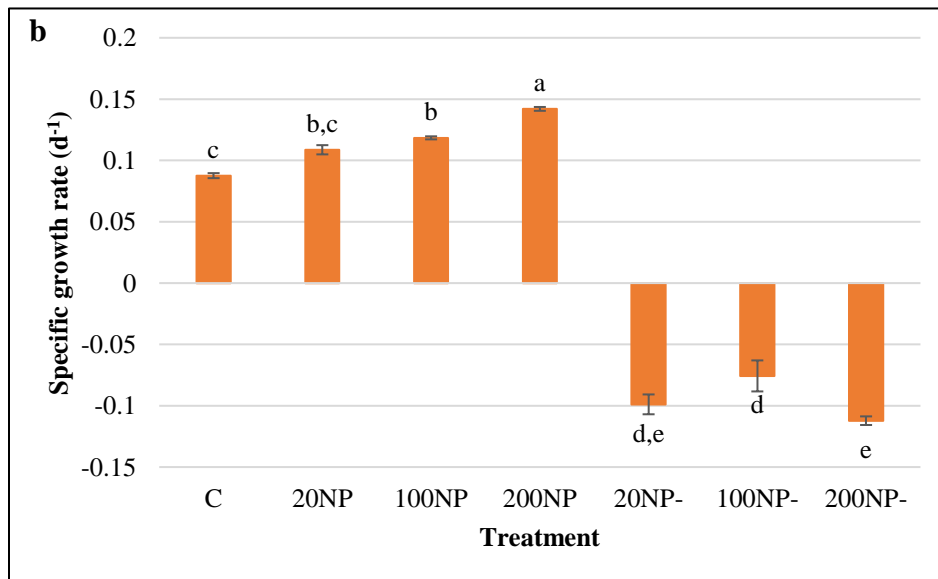
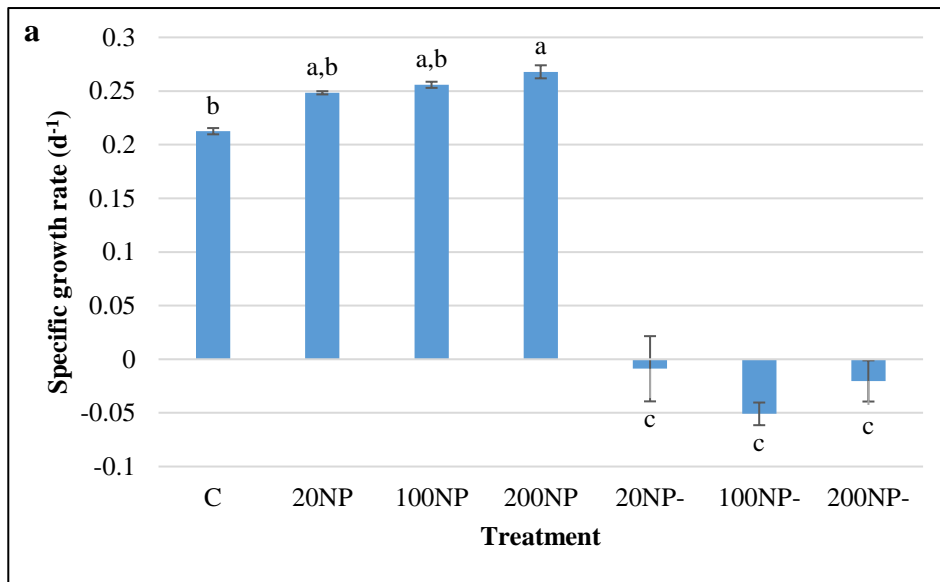
Treatment pairs	Q-statistic	p-value	Inference
C vs 20NP	0.11	0.900	insignificant
C vs 100NP	0.25	0.900	insignificant
C vs 200NP	5.48	0.022	* $p < 0.05$
C vs 20NP-	35.16	0.001	* $p < 0.05$
C vs 100NP-	40.48	0.001	* $p < 0.05$
C vs 200NP-	43.31	0.001	* $p < 0.05$
20NP vs 100NP	0.37	0.900	insignificant
20NP vs 200NP	5.37	0.025	* $p < 0.05$
20NP vs 20NP-	35.28	0.001	* $p < 0.05$
20NP vs 100NP-	40.59	0.001	* $p < 0.05$
20NP vs 200NP-	43.43	0.001	* $p < 0.05$
100NP vs 200NP	5.73	0.016	* $p < 0.05$
100NP vs 20NP-	34.91	0.001	* $p < 0.05$
100NP vs 100NP-	40.23	0.001	* $p < 0.05$
100NP vs 200NP-	43.06	0.001	* $p < 0.05$
200NP vs 20NP-	40.64	0.001	* $p < 0.05$
200NP vs 100NP-	45.96	0.001	* $p < 0.05$

(b)

Treatment pairs	Q-statistic	p-value	Inference
C vs 20NP	0.43	0.900	insignificant
C vs 100NP	3.84	0.166	insignificant
C vs 200NP	4.84	0.049	* $p < 0.05$
C vs 20NP-	16.03	0.001	* $p < 0.05$
C vs 100NP-	20.92	0.001	* $p < 0.05$
C vs 200NP-	23.53	0.001	* $p < 0.05$
20NP vs 100NP	4.27	0.100	insignificant
20NP vs 200NP	5.27	0.029	* $p < 0.05$
20NP vs 20NP-	15.60	0.001	* $p < 0.05$

20NP vs 100NP-	20.49	0.001	* $p<0.05$
20NP vs 200NP-	23.10	0.001	* $p<0.05$
100NP vs 200NP	1.00	0.900	insignificant
100NP vs 20NP-	19.86	0.001	* $p<0.05$
100NP vs 100NP-	24.76	0.001	* $p<0.05$
100NP vs 200NP-	27.37	0.001	* $p<0.05$
200NP vs 20NP-	20.87	0.001	* $p<0.05$
200NP vs 100NP-	25.76	0.001	* $p<0.05$
200NP vs 200NP-	28.37	0.001	* $p<0.05$
20NP- vs 100NP-	4.89	0.046	* $p<0.05$
20NP- vs 200NP-	7.50	0.002	* $p<0.05$
100NP- vs 200NP-	2.61	0.539	insignificant

**Online Resource 2** Specific growth rates ( $\mu$ ) of *Fremyella diplosiphon* (a) wild type (Fd33) and (b) halotolerant (HSF33-2) in solution with 20, 100, or 200 nm-diameter gold nanoparticles (NPs) over a period of 9 (Fd33) or 11 (HSF33-2) days. Cells grown in absence of AuNPs served as control (C) and gold colloids alone were denoted as AuNP only (NP-). Bars represent average growth rates ( $\pm$  standard error) for three biological replicates of each treatment. Different letters above bars indicate significance among treatment means at each time point ( $p < 0.05$ ).



**Online Resource 3** Partitioning of variance for comparison of specific growth rate ( $\mu$ ) in *Fremyella diplosiphon* (a) wild type (Fd33) and (b) halotolerant (HSF33-2) strains using one-way class I analysis of variance.

(a)

Source	Sum of squares (SS)	Degrees of freedom (vv)	Mean square (MS)	F-statistic	<i>p</i> -value
Treatment	0.227	6	0.0378	141.6449	1.03E-11
Error	0.0037	14	0.0003		
Total	0.2307	20			

(b)

Source	Sum of squares (SS)	Degrees of freedom (vv)	Mean square (MS)	F-statistic	<i>p</i> -value
Treatment	0.2296	6	0.0383	385.6742	1.01E-14
Error	0.0014	14	0.0001		
Total	0.231	20			

**Online Resource 4** Tukey Honest Significant Difference post-hoc test values for specific growth rate ( $\mu$ ) comparisons of (a) wild type (Fd33) and (b) halotolerant (HSF33-2) strains in solution with 20, 100, or 200 nm-diameter gold nanoparticles (NPs) over a period of 9 (Fd33) or 11 (HSF33-2) days. Cells grown in absence of AuNPs served as control (C) and gold colloids alone were denoted as AuNP only (NP-).

(a)

Treatment pairs	Q-statistic	p-value	Inference
C vs 20NP	3.791	0.174412	insignificant
C vs 100NP	4.581	0.068266	* $p < 0.05$
C vs 200NP	5.8654	0.013275	* $p < 0.05$
C vs 20NP-	18.7292	0.001005	* $p < 0.05$
C vs 100NP-	17.1341	0.001005	* $p < 0.05$
C vs 200NP-	19.3938	0.001005	* $p < 0.05$
20NP vs 100NP	0.79	0.899995	insignificant
20NP vs 200NP	2.0744	0.73591	insignificant
20NP vs 20NP-	22.5203	0.001005	* $p < 0.05$
20NP vs 100NP-	20.9251	0.001005	* $p < 0.05$
20NP vs 200NP-	23.1849	0.001005	* $p < 0.05$
100NP vs 200NP	1.2844	0.899995	insignificant
100NP vs 20NP-	23.3103	0.001005	* $p < 0.05$
100NP vs 100NP-	21.7151	0.001005	* $p < 0.05$
100NP vs 200NP-	23.9749	0.001005	* $p < 0.05$
200NP vs 20NP-	24.5947	0.001005	* $p < 0.05$
200NP vs 100NP-	22.9995	0.001005	* $p < 0.05$
200NP vs 200NP-	25.2593	0.001005	* $p < 0.05$
20NP- vs 100NP-	1.5952	0.899995	insignificant
20NP- vs 200NP-	0.6646	0.899995	insignificant
100NP- vs 200NP-	2.2598	0.667432	insignificant

(b)

Treatment pairs	Q-statistic	p-value	Inference
C vs 20NP	3.6661	0.200162	insignificant
C vs 100NP	5.3571	0.025553	* $p < 0.05$
C vs 200NP	9.4627	0.001005	* $p < 0.05$
C vs 20NP-	31.6325	0.001005	* $p < 0.05$
C vs 100NP-	28.3925	0.001005	* $p < 0.05$
C vs 200NP-	34.7392	0.001005	* $p < 0.05$
20NP vs 100NP	1.691	0.877545	insignificant
20NP vs 200NP	5.7966	0.014508	* $p < 0.05$
20NP vs 20NP-	35.2986	0.001005	* $p < 0.05$
20NP vs 100NP-	32.0586	0.001005	* $p < 0.05$
20NP vs 200NP-	38.4053	0.001005	* $p < 0.05$
100NP vs 200NP	5.1056	0.04146	* $p < 0.05$
100NP vs 20NP-	36.9896	0.001005	* $p < 0.05$
100NP vs 100NP-	33.7496	0.001005	* $p < 0.05$
100NP vs 200NP-	40.0963	0.001005	* $p < 0.05$
200NP vs 20NP-	41.0952	0.001005	* $p < 0.05$
200NP vs 100NP-	37.8552	0.001005	* $p < 0.05$
200NP vs 200NP-	44.2019	0.001005	* $p < 0.05$
20NP- vs 100NP-	3.24	0.312324	insignificant
20NP- vs 200NP-	3.1067	0.35569	insignificant
100NP- vs 200NP-	6.3467	0.007146	* $p < 0.05$

