Toward halo-thermal cultivation of Cyanobacterium *aponinum* using wastewater for C-phycocyanin production and reducing carbon emission

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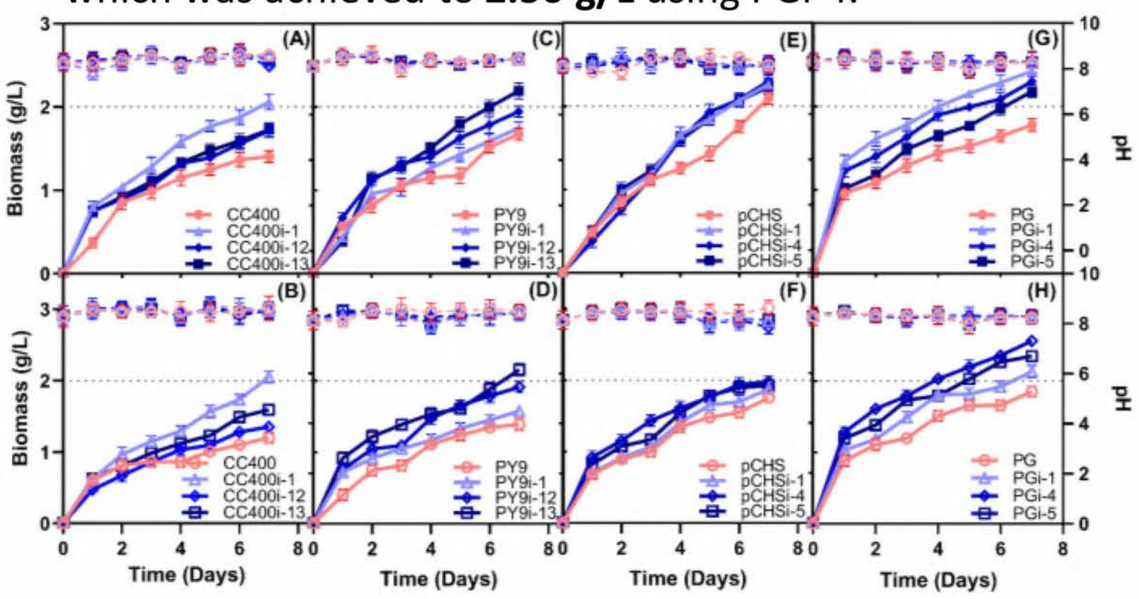
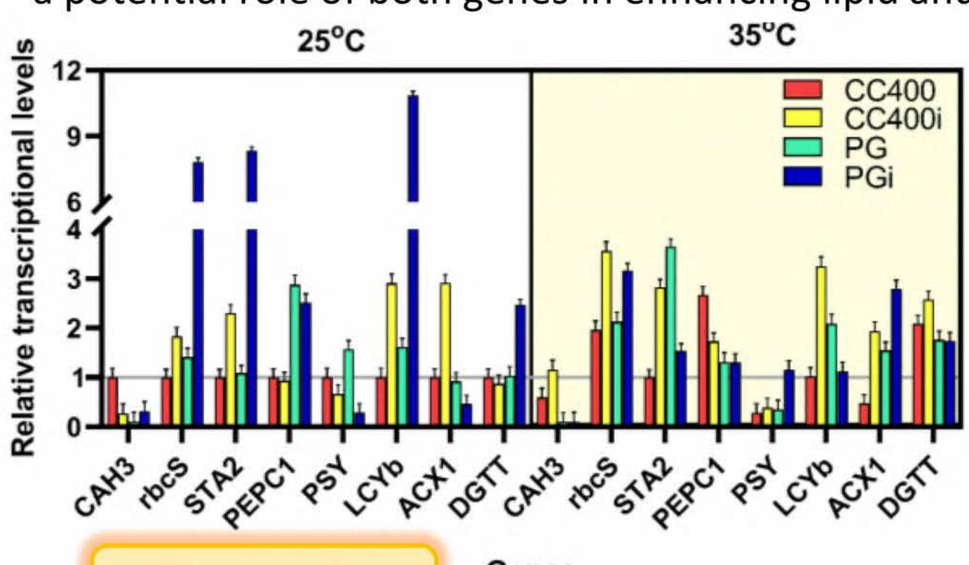
Result

Biomass: Among the different strains, the PG and PGi exhibited a remarkable improvement in growth at 35°C, which was achieved to **2.56 g/L** using PGi-4.



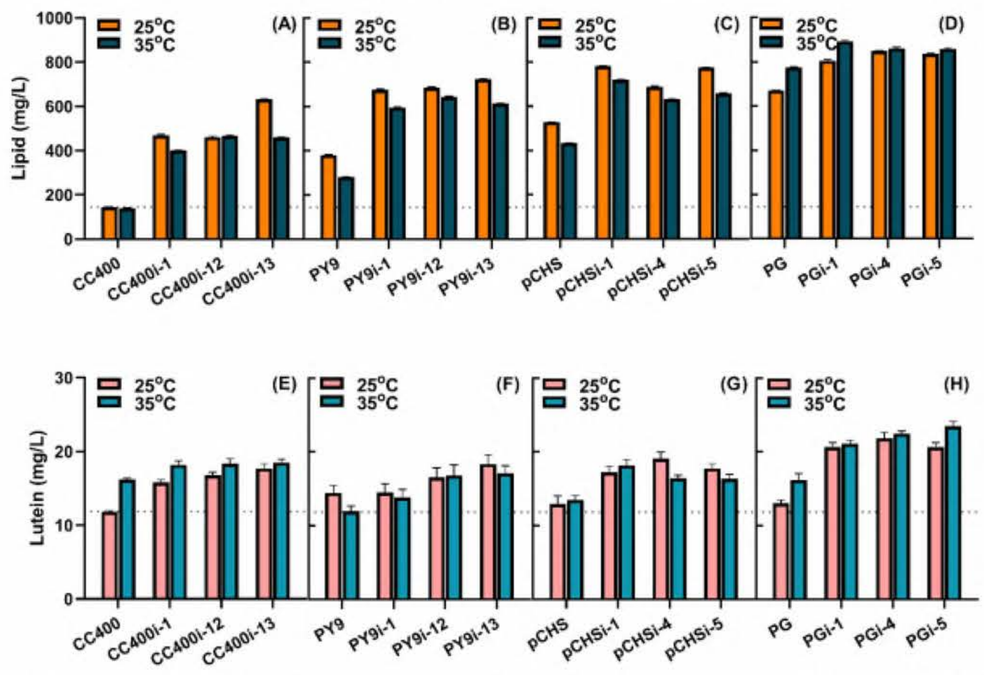
Transcriptional level: At 25°C, the expression of LCYb and DGTT1 genes in PGi strain were significantly improved by **10.86 and 2.47-fold** compared to that in CC400, indicating a potential role of both genes in enhancing lipid and lutein.



Highlight

1. Chaperone and CRISPRi were first applied in algae under thermophilic condition.
2. Transcriptional result depicts temperature and CRISPRi effects on algal metabolism.
3. PGi strain showed 2.56 g/L, 23.5 and 893 mg/L of biomass, lutein and lipid at 35°C.
4. PGi strain had 1.08 g-CO_2/g-DCW of CO_2 assimilation ability in mixotrophic culture.

Lutein and lipid content: The PG and PGi strains exhibited lutein contents of 13.0 and **21.0 mg/L** at 25°C, the lutein contents increased to 16.2 and **22.3 mg/L**.



CO_2 assimilation: both PG and PGi demonstrated higher CO_2 assimilation rates, reaching 0.841 and **1.08 g-CO_2/g-DCW** after cultivation, respectively.

Strains	Biomass (g/L)	Carbon (%)	CO_2 assimilation (g-CO_2/g-DCW)
CC400	1.20	49.62	0.536
CC400i	1.67	49.97	0.910
PY9	1.39	49.43	0.705
PY9i	1.88	49.07	0.980
pCHS	1.75	51.41	1.005
pCHSi	1.93	46.52	0.908
PG	1.85	45.64	0.841
PGi	2.34	47.58	1.087

Experience

A PhD offers in-depth exploration of interests, peer collaboration, and extensive paper study. Despite its demands, navigating thesis work and experiments hones invaluable skills. Ultimately, it cultivates resilience, discipline, and excellence. I am grateful to my professor and scholarship for their unwavering support.