GH versus lab

Columbia River

* GH samples:
  + Incubated under full spectrum lights in the WSU-TC greenhouse
  + GPP temp began at 24-27C, ended at 35-37C
  + CR temp began at 23-26C, ended at 22-23 C (kept in dark cooler)
* Lab samples:
  + Incubated under fluorescent light in East 113
  + GPP temp began at 25C, ended at 21C
  + CR temp began at 24C, ended at 21 C

CR results



Clearly some different patterns with absolute values! But no statistically significant differences.

2-way ANOVA on GH: no significant difference (insufficient reps for interaction - 2 reps of N, 3 of NP, 4 of P)

Df Sum Sq Mean Sq F value Pr(>F)

N 1 78.93 78.93 4.146 0.0691 .

P 1 5.24 5.24 0.275 0.6113

Residuals 10 190.36 19.04

2-way ANOVA on Lab: no significant difference

Df Sum Sq Mean Sq F value Pr(>F)

N 1 56.6 56.57 2.049 0.178

P 1 54.4 54.39 1.970 0.186

N:P 1 4.9 4.89 0.177 0.681

Residuals 12 331.3 27.61



NRR show similar patterns, with treatments not different from each other. Looks like P >1 in GH, but not significantly different from other treatments (p = 0.11)

GPP Results



Wide difference in magnitude! But similar patterns.

2-way ANOVA on GH: REALLY no difference

\*but only one replicate of P\*

Df Sum Sq Mean Sq F value Pr(>F)

N 1 0.0 0.01 0.000 0.992

P 1 0.3 0.28 0.005 0.944

N:P 1 28.1 28.08 0.515 0.489

Residuals 10 545.0 54.50

2-way ANOVA on lab: no difference

Df Sum Sq Mean Sq F value Pr(>F)

N 1 7.38 7.382 1.853 0.195

P 1 0.13 0.128 0.032 0.860

N:P 1 7.31 7.306 1.834 0.197

Residuals 14 55.79 3.985



None of the NRRs different from each other.

Chlorophyll-a Results



\*note: only one replicate of P in the greenhouse!\*

Df Sum Sq Mean Sq F value Pr(>F)

N 1 0.0213 0.0213 0.130 0.72597

P 1 0.0060 0.0060 0.036 0.85241

N:P 1 2.1047 2.1047 12.838 0.00499 \*\*

Residuals 10 1.6395 0.1639

Lab results

Df Sum Sq Mean Sq F value Pr(>F)

N 1 0.447 0.447 1.842 0.196174

P 1 4.702 4.702 19.361 0.000605 \*\*\*

N:P 1 0.105 0.105 0.431 0.521934

Residuals 14 3.400 0.243

Either NP co-limitation (GH) or P limitation (lab). But with only one rep of P in the GH, it's a little hard to make sense of it. Generally the same patterns, though.



Both sites show differences, with GH having P>NP and lab NP>N.

GH:

Df Sum Sq Mean Sq F value Pr(>F)

nutrient 2 5.014 2.5068 3.424 0.0843 .

Residuals 8 5.857 0.7322

$nutrient

diff lwr upr p adj

NP-N -0.7546569 -2.3010276 0.7917138 0.3880907

P-N 1.6098344 -1.0685582 4.2882269 0.2570699

P-NP 2.3644913 -0.3139013 5.0428838 0.0818332

Lab:

Df Sum Sq Mean Sq F value Pr(>F)

nutrient 2 15.44 7.722 6.142 0.0146 \*

Residuals 12 15.09 1.257

$nutrient

diff lwr upr p adj

NP-N 2.485445 0.5935842 4.3773055 0.0111979

P-N 1.252230 -0.6396303 3.1440910 0.2222316

P-NP -1.233214 -3.1250751 0.6586462 0.2313154