Mesocosm Measurements of SAV Growth and Response to NOx

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Osborne Lab - Mesocosm studies with SAV; Respirometry



Adapted from M Cohen

Initial Observation on Wekiva River



Nitrate concentration decreases

Visual indicators of plant vigor appear to increase downstream as nitrate concentration decreases



Proposed Mechanism of Inhibition



Mesocosm Work-plan

Hypotheses to test:

- H₁- Nitrate inhibition (N overload)
- H₂- Reduced DO inhibits growth
- H₃- loss of grazers- increases epiphytic algal load)
- H_a- multiple stressor activities (combination of all)



Experimental Design



Four Mesocosm Treatments 0.1, 0.5, 1, 5 mg L^{-1} NO₃-N 6 month growth experiment



3 replicate tanks with 10 individuals of both *V.americana* and *S.Kurziana* n=30 indiv. per treatment Analyses:

-Nitrate reductase activity
-Amino-acid concentration
-Biometrics (length, width)
-Root/shoot ratios (mass)
-tissue NH₄+
-aerenchyma structure
-cellular starch storage



Mesocosm water source: Silver Springs c/o SJRWMD

Preliminary Results





NRA in V. americana





1.0 mg L⁻¹ NO₃-N

0.1 mg L⁻¹ NO₃-N



N=12

mean 11.0 (±2.5)

mean 17.8 (±2.8)

Interim results presented at UF/SJRWMD CRISPS Annual Meeting- Sept 1, 2015

Physiological Responses

Decomposition of aerenchyma tissues under elevated NOx

Potential additive effect of low DO

Symptoms can be similar- will tease apart in phase II of mesocosm experiments





Future Work - Mesocosms

- 1) Algal Shear Stress Assessment- round tanks (Fall 2015)
- 2) NOx and DO factorial experiment (Winter 2016- Fall 2016)
- 3) Micronutrient availability experiments (Winter 2015- Fall 2016)

Oxygen Stress on Herbivores



Hypotheses: H₁- Nitrate concentration inhibits grazer communities H₂- Reduced DO extirpates grazers (snails)





Future Work - Respirometry

- 1) Four (+) additional gastropod species (Summer 2016)
- 2) NOx influence on Critical Oxygen Levels (Summer 2016)



Elimia floridensis

Tarebia granifera

Questions?

