Decrease of Eurasian Water Milfoil at the North End of Cayuga Lake: Possible Roles of Native Plants

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Lake Issues

81% weeds
67% algal blooms
45% boat speed
39% water borne bacteria
28% lake level
28% cottage density
25% poor fishing

Eurasian Water Milfoil

(From Dr. Bruce Gilman)
Collapse of Eurasian water milfoil at North End

Baston and Ross 1975
Johnson et al. 2001
Other records & observations
And ours…
2008 Cayuga Lake Survey Sties
Aquatic Plants in Cayuga Lake (13)

Plant Density (g/rake)

- **North End**
- **South End**

Species: Filamentous algae, White water, Stonewort, Richardson’s, Curly-leaf pondweed, Coontail, Eelgrass, Elodea, Flat stem pondweed, Eurasian water milfoil, Slender naiad, Sago pondweed, Water stargrass.
Water Stargrass
One Possible Reason

Northwest Cayuga Lake

Acentria recorded in lake - 1991

(From Robert Johnson)
Other Possible Causes - Allelopathy?

![Bar chart showing plant density (g/rake) for different species.]

- Filamentous algae
- White water
- Stonewort
- Richardson’s Pondweed
- Coontail
- Eelgrass
- Elodea
- Flat Stem Pondweed
- Eurasian Water Milfoil
- Slender Naiad
- Sago Pondweed
- Water Stargrass

North End
3 sets of Greenhouse Experiments

- Direct Competition
- Allelopathy of Eurasian milfoil
- Allelopathy of Stargrass
1. Direct Competition

- Stargrass
- Milfoil

Stem Length (cm)

- Stargrass-start
- Stargrass-end
- Milfoil-start
- Milfoil-end

- Alone
- Coexist

* indicates a statistically significant difference.
1. Direct Competition

Plant Dry Biomass (g)

- **Alone**
- **Coexist**

**Stargrass**

**Milfoil**

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2 – Allelopathic Effects of Eurasian Milfoil on Stargrass
3 – Allelopathic Effects of Stargrass on Eurasian Milfoil
Summary of Experiment Results

• When two species grow together, growth of stargrass was stimulated and there was no change in milfoil;
• Higher concentration of milfoil extracts decreased biomass of stargrass but lower concentration tended to increase its biomass;
• Higher concentration of stargrass extracts decreased milfoil biomass and lower concentration did not have any effects on milfoil.
Linking Experiments with Field Observations

Plant Density (g/rake)

- North End
- South End

- Filamentous algae
- White water
- Stonewort
- Richardson’s
- Curly-leaf pondweed
- Coontail
- Eelgrass
- Elodea
- Flat stem pondweed
- Eurasian water milfoil
- Slender naiad
- Sago pondweed
- Water stargrass
Linking Experiments with Field Observations

![Bar chart showing plant density (g/rake) for Eurasian water milfoil and Water stargrass at North End and South End.](chart.png)
Conclusions

- Interactions between native stargrass and invasive Eurasian milfoil do exist;
- The interactions may be partly responsible for decrease of Eurasian milfoil at North End of Cayuga Lake;
- The interactions may affect their distributions in both North and South ends of Cayuga Lake;
- Important implications for native plant restoration and invasive plant control.
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