



MANAGEMENT & MITIGATION

Chemical control of cyanoHABs

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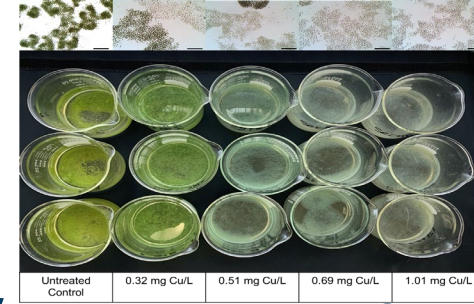
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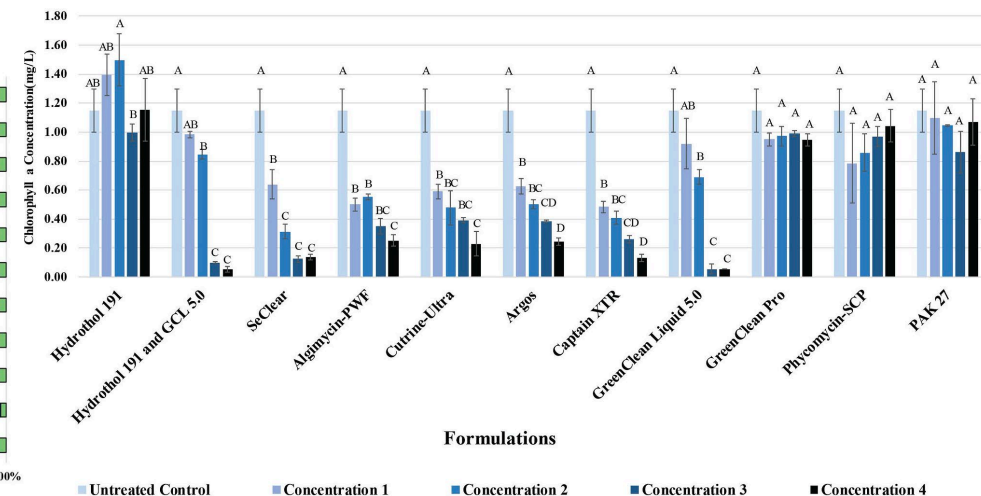
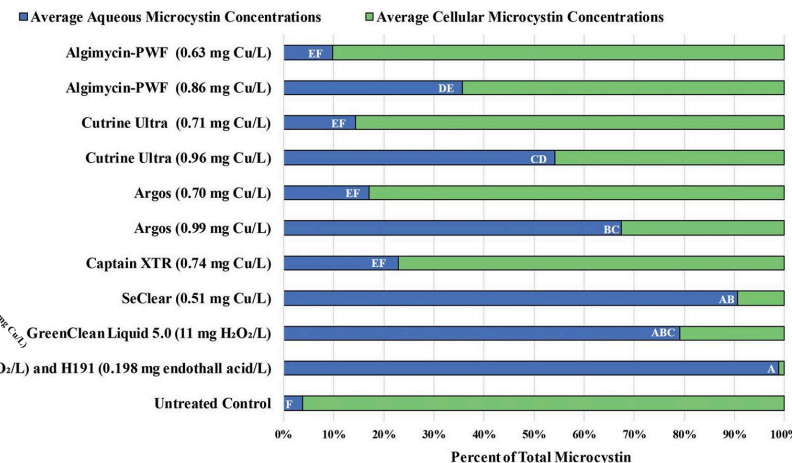
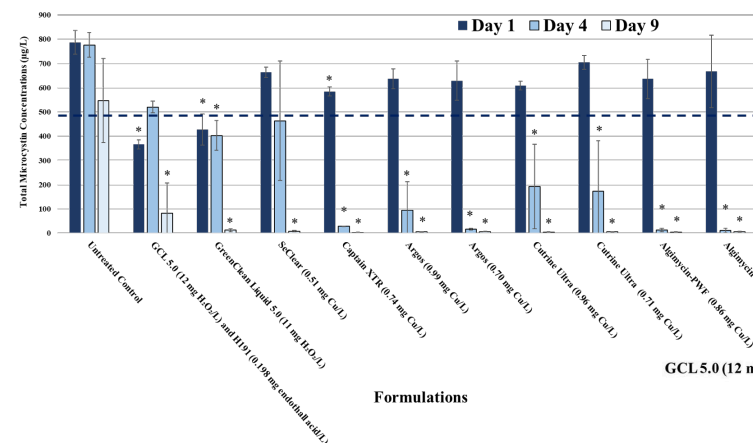
PROJECT SUMMARIES

- **Determine efficacy of 13 & 15 algaecides/ herbicides or combinations on LO *M. aeruginosa*-dominated & *M. wesenbergii*-dominated bloom** (Kinley-Baird et al. 2021; Lefler et al. 2022)
- **Mesocosm trial evaluating PAK[®] 27 in LO** (Pokrzywinski et al. 2022)
- **Stability of 3 H₂O₂-based algaecides to salinity and organic matter** (Hu et al. 2022)
- **Sorption of MC using LMB** (Laughinghouse et al. 2020)
- **Use of pyrolyzed materials for MC sorption** (Frišták et al. 2020)
- **Effect of temp. on efficacy of Cu- & H₂O₂-based algaecides of *Planktothrix* & *Microcystis* blooms** (Taylor et al. in prep)
- ***In situ* effects of PAK[®] 27 on total microbial community structure (non-targets)** (Lefler et al. in prep)

MAJOR TAKEAWAYS

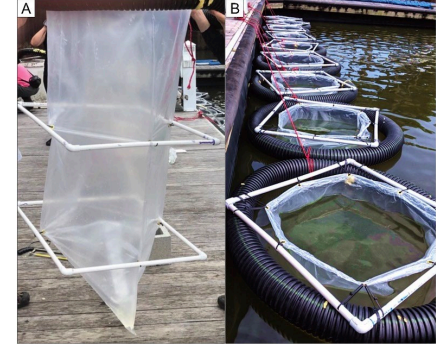


- *M. aeruginosa*: GreenClean Liquid[®] (GCL) 5.0, GCL[®] 5.0 w/ Hydrothol[®] 191 & Cu-based algaecides (Algimycin[®] PWF, Argos, Captain[®] XTR, Cutrine[®] Ultra & SeClear[®]) → **most effective**.
- MCs: **Chelated Cu**-based formulations (Algimycin[®] PWF, Argos, Captain[®] XTR, & Cutrine[®] Ultra) result in **less MC release** post treatment. **High release of MCs** with **H₂O₂**-based formulations.
- *M. wesenbergii*: SeClear[®] and GCL[®] 5.0 w/ Hydrothol[®] 191 → most effective. **Mw is 'tougher' than Ma**.



MAJOR TAKEAWAYS

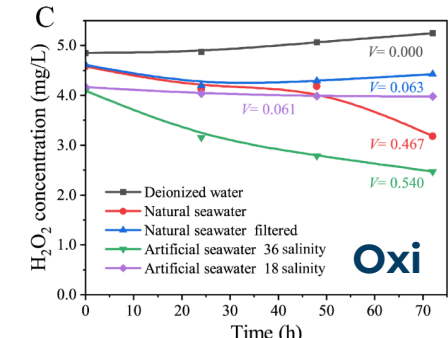
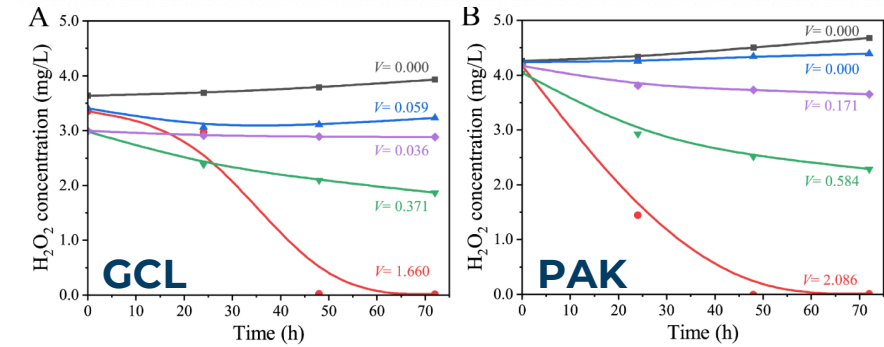
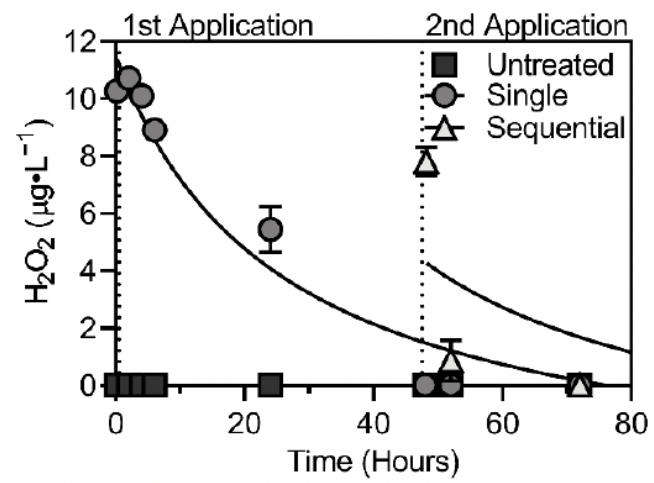
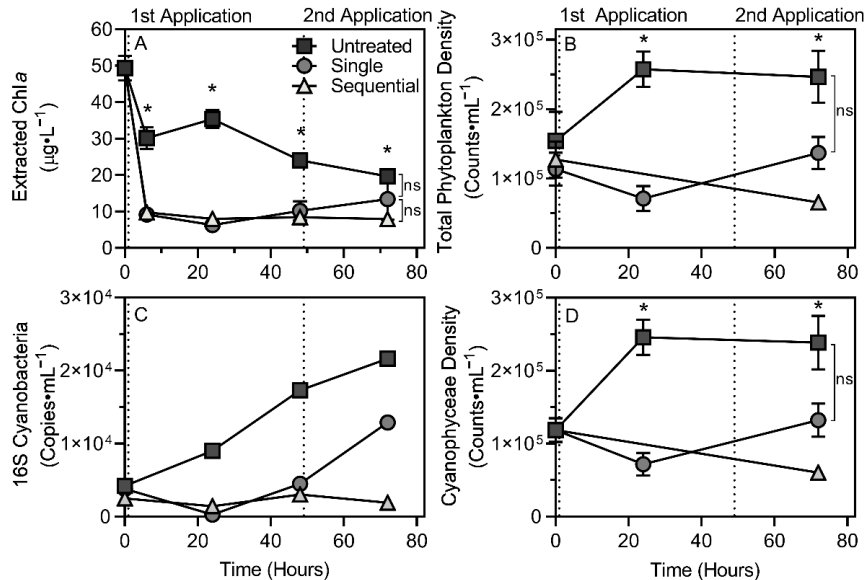
- **LO: Sequential dose** of PAK[®] 27 **necessary** to sustain efficacy in field. Rebound in single dose.
 - 1/2-life of PAK[®] 27 = 19hrs
- **Salinity** & organic matter **impact** stability & decomposition of H₂O₂-based algaecides. → **Oximycin[®] P5** most stable (7.3 day 1/2-life).



Peroxide-based algaecide degradation first-order kinetics model and half-life (day)*.

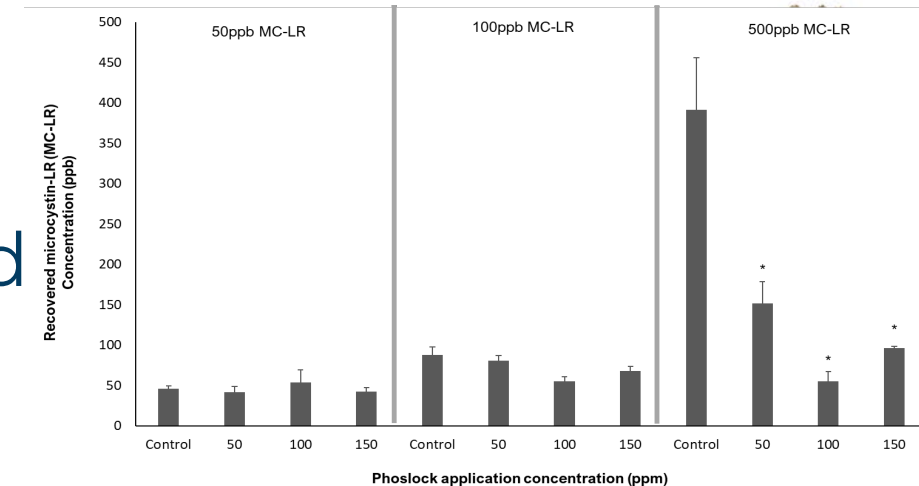
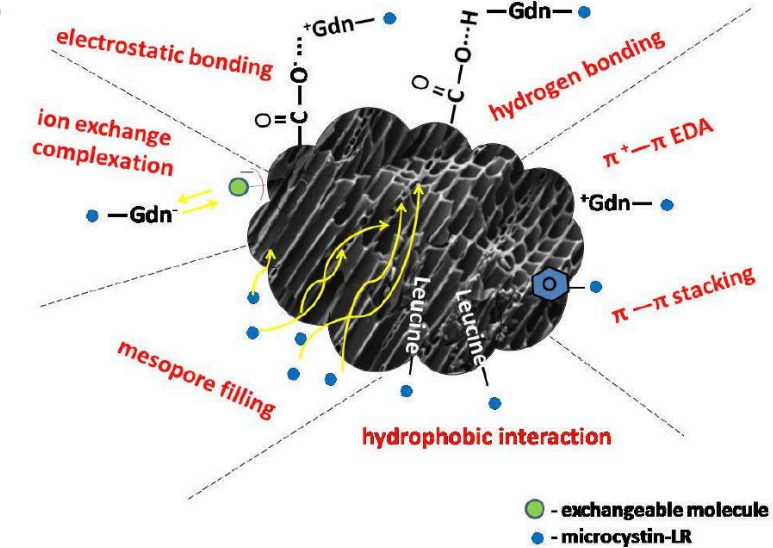
		Natural seawater
GreenClean [®] Liquid 5.0	<i>k</i>	0.662
	<i>T</i> _{1/2}	1.05
	<i>r</i> ²	0.749
PAK [®] 27	<i>k</i>	1.231
	<i>T</i> _{1/2}	0.56
	<i>r</i> ²	0.984
Oximycin [®] P5	<i>k</i>	0.095
	<i>T</i> _{1/2}	7.30
	<i>r</i> ²	0.791

* The algaecide degradation rate did not fit the first-order kinetics model in filtered



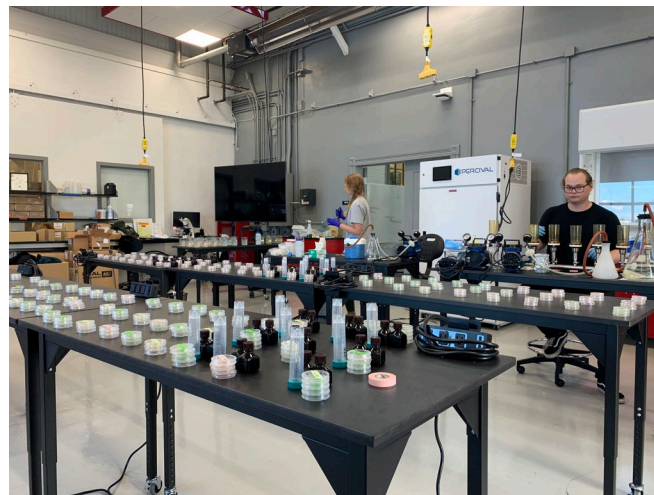
ADDITIONAL RELEVANT INFO

- **LMB** can be used to scrub MC from the water >500ppb. 'Shock 'n lock'
- **Pyrolyzed materials** can be used to sorbe MC.
 - Feedstocks differ in efficacy
- **Non-targets** affected differently
- **Efficacy** of algaecides **differ**, independent of active ingredient
 - H₂O quality, temperature, target species and concentrations, algaecid formulation, dose



RESEARCH PRIORITIES

- **Determine if your management practice will actually achieve the goal of reducing blooms in Lake Okeechobee and what the ramifications are (chemical, biological, ecological, socioeconomic)**
- **Develop blue-green algae control methods**



NEW DATA GAPS

- Not all waters are the same, not all cyanobacteria (& algae) are the same
 - Efficacy of treatment methods differ
- Assess the feasibility for different systems (scale-up and cost)
- Need long-term data on effects of chemical formulations, proposed bacteria, proposed enzymes on environment and non-target organisms.



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 - H. Raymond



**US Army Corps
of Engineers.**

