

Evaluation of algaecides to eliminate *Phytophthora* spp. from naturally-infested streams in South Carolina

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Introduction/Problem

- Spread of *P. ramorum* continues
 - Infested plant nurseries in SE -> risk of spread to forests
- Need mitigation strategies to prevent escape from infested nurseries—particularly in water
- Can registered algaecides be used as a mitigation strategy to treat waterways infested with species of *Phytophthora*?
- Previous studies (G.C. Colburn):
 - K-Tea™ [Cu(OH)₂] & Captain™ [CuCO₃]
 - Zoospores: not detected 0.5-1 h after exposure
 - Sporangia: not detected 4 h after exposure
 - Chlamydospores: not detected 8 h after exposure



Objectives

- Determine efficacy of four algaecides to propagules of *Phytophthora* in naturally-infested water
 - K-Tea – A.I. = copper hydroxide
 - Captain – A.I. = copper carbonate
 - Algimycin – A.I. = copper citrate
 - GreenClean Liquid – A.I. = hydrogen dioxide
- Seasonal temperature changes in water
- Seasonal variation in *Phytophthora* spp. present
- Lowest effective treatment application rate



Algaecides

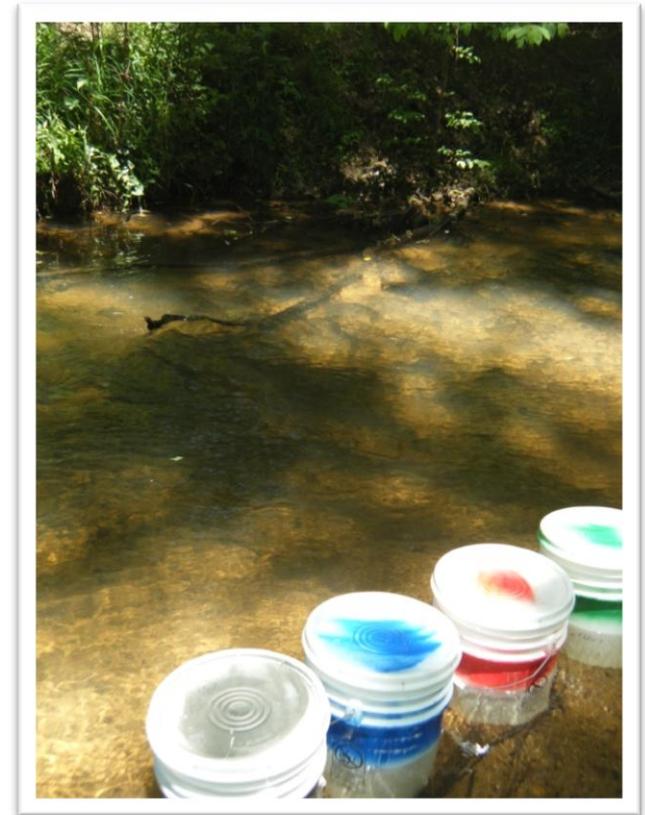
- For use in slow moving or quiescent bodies of water—including:
 - Golf course, ornamental, fish, irrigation and fire ponds
 - Fresh water lakes and fish hatcheries;
 - Potable water reservoirs and associated waters (rivers, streams, bays and coves)
 - Crop and non-crop irrigation conveyance systems (canals, laterals and ditches)





Methods – Streams, Treatments

- 2 suburban streams:
 - Six Mile Creek, Seneca Creek
- Sampling months:
 - Six Mile Creek: Jan – Dec 2010
 - Seneca Creek: Feb – Dec 2010
- Treatments:
 - 5 treatments (@ highest label rate):
 - K-Tea 1 ppm Cu
 - Captain 0.8 ppm Cu
 - Algimycin 1 ppm Cu
 - GreenClean 25 ppm H₂O₂
 - Non-treated control
- Experimental units:
 - 15 20-L containers - 3 per algaecide
 - 10 L stream water per container





Methods - Rates

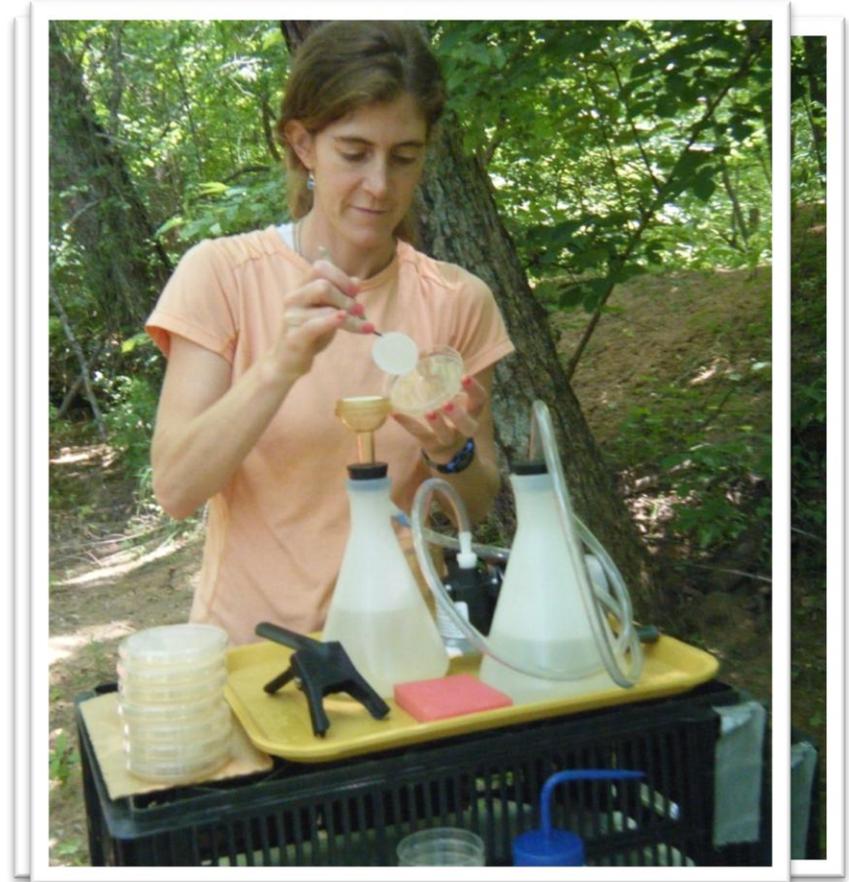
- Each algaecide tested at each stream
- 3 containers per rate
- Treatments:
 - Copper-based algaecides:
 - Non / Control
 - Low = 0.25x
 - Med = 0.5x
 - Maximum = x
 - Hydrogen dioxide:
 - Non / Control
 - Low = 0.04x
 - Med = 0.4x
 - Maximum = x



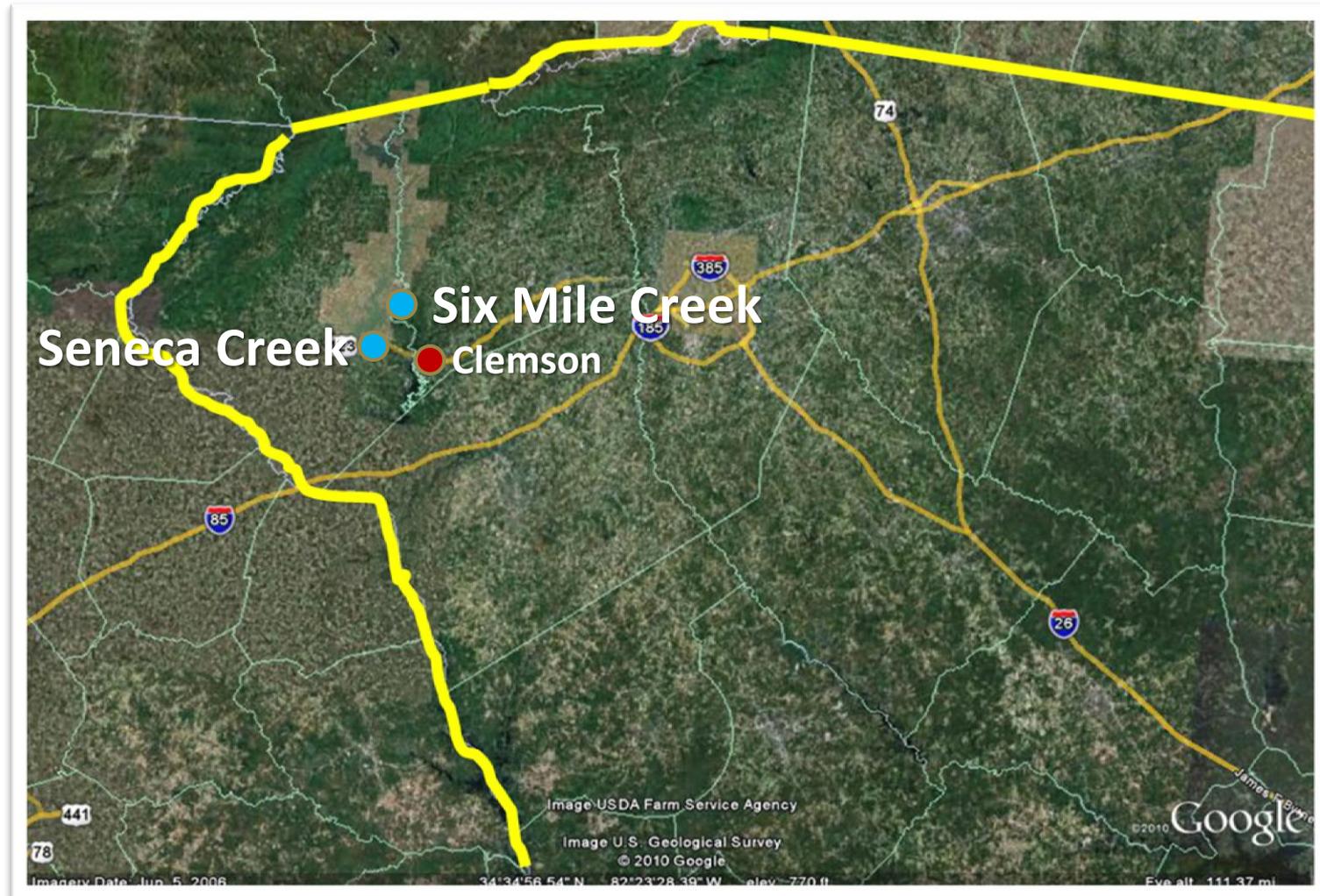


Methods - Filtering

- 3 – 200 ml aliquots water per container
- 0h, 2h, 4h, (8h) after treatment
- Millipore Durapore filters
 - 5 μm pores, 47 mm diam.
- Filters inverted onto PARPH-V8 selective medium
- 20°C for 3-7 d
- Count no. CFU/200 ml

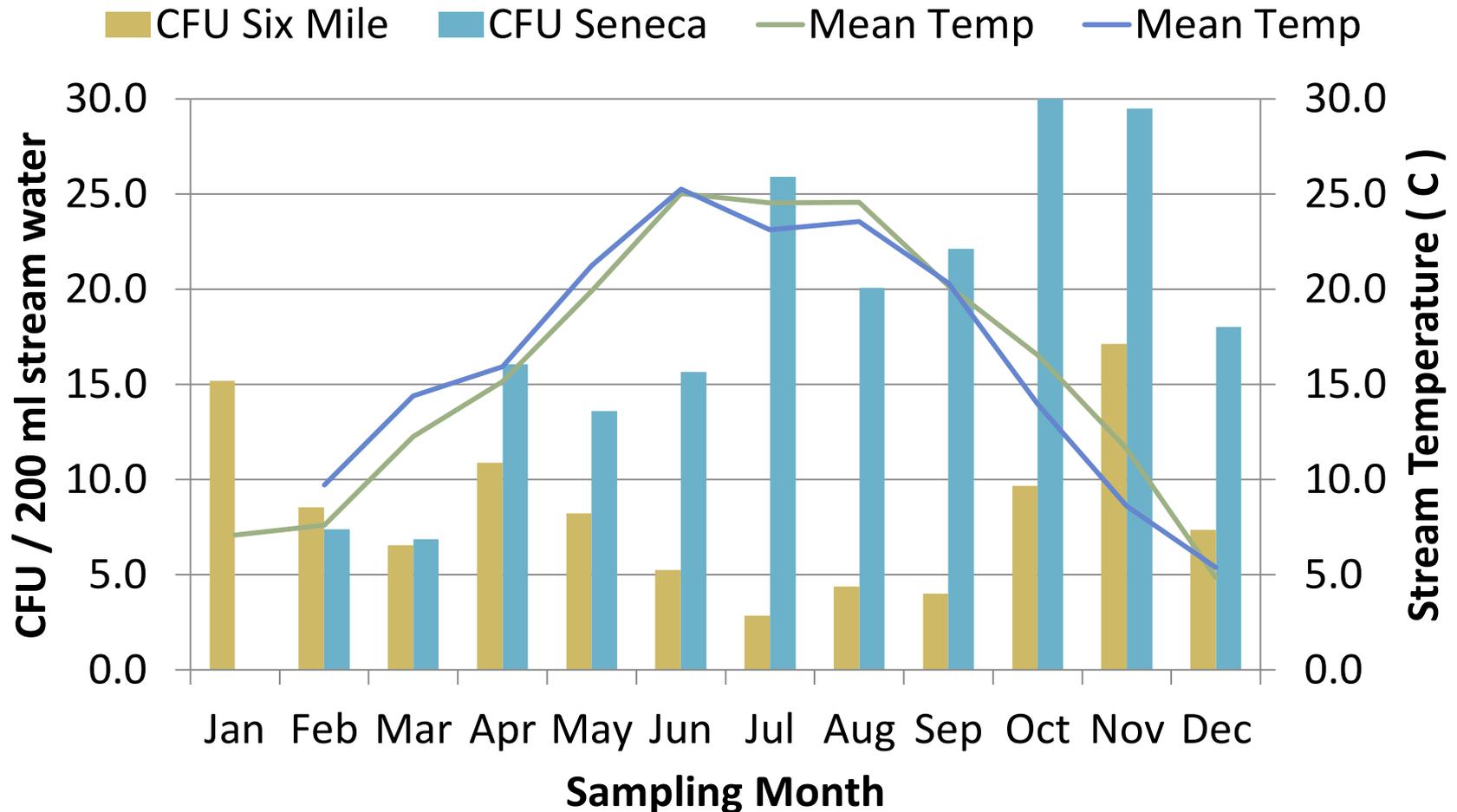


Methods - Stream Locations



Results – Monthly Means by Stream

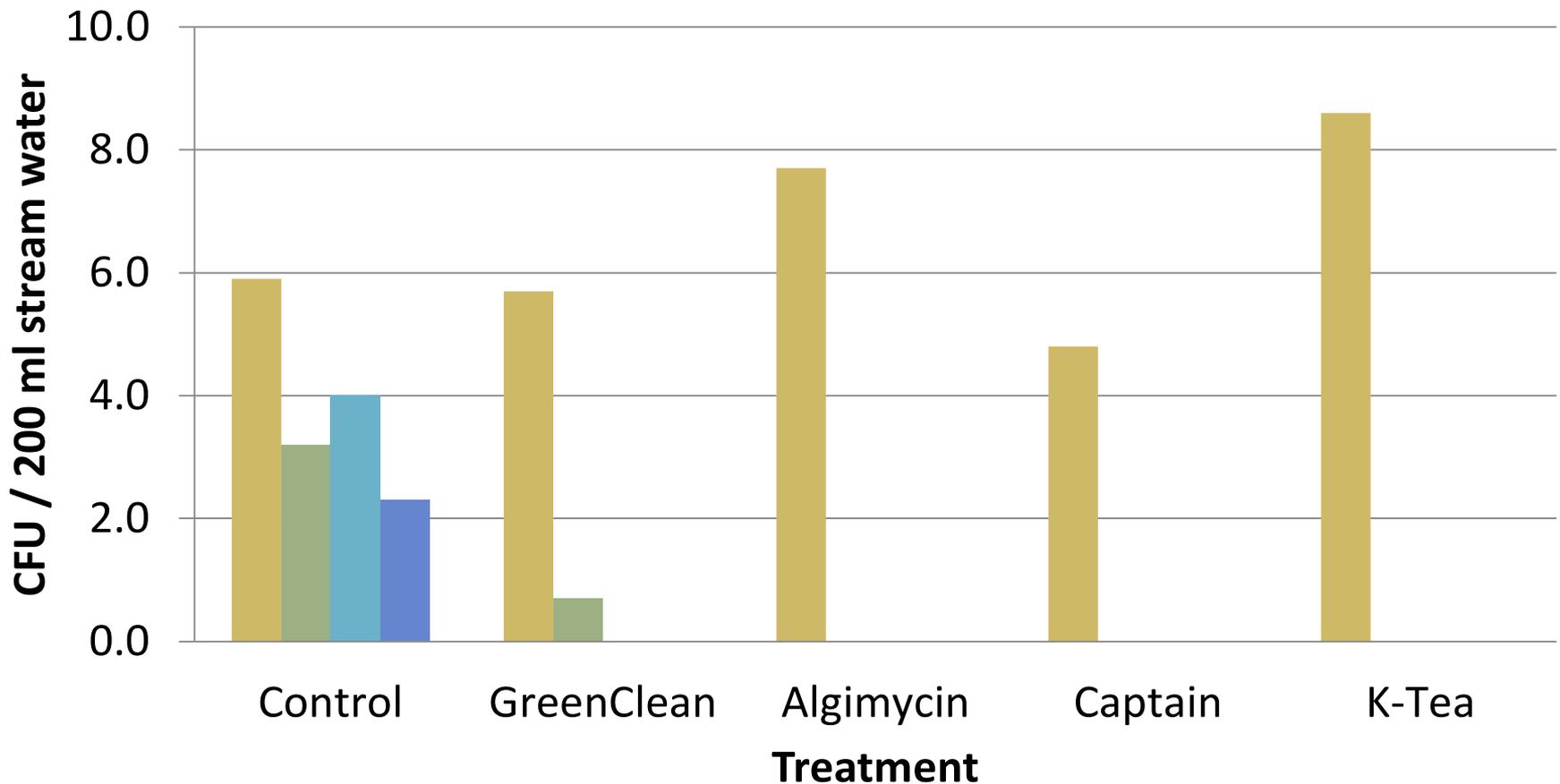
Density of *Phytophthora* spp. & Temperature



Results: Six Mile Creek – March



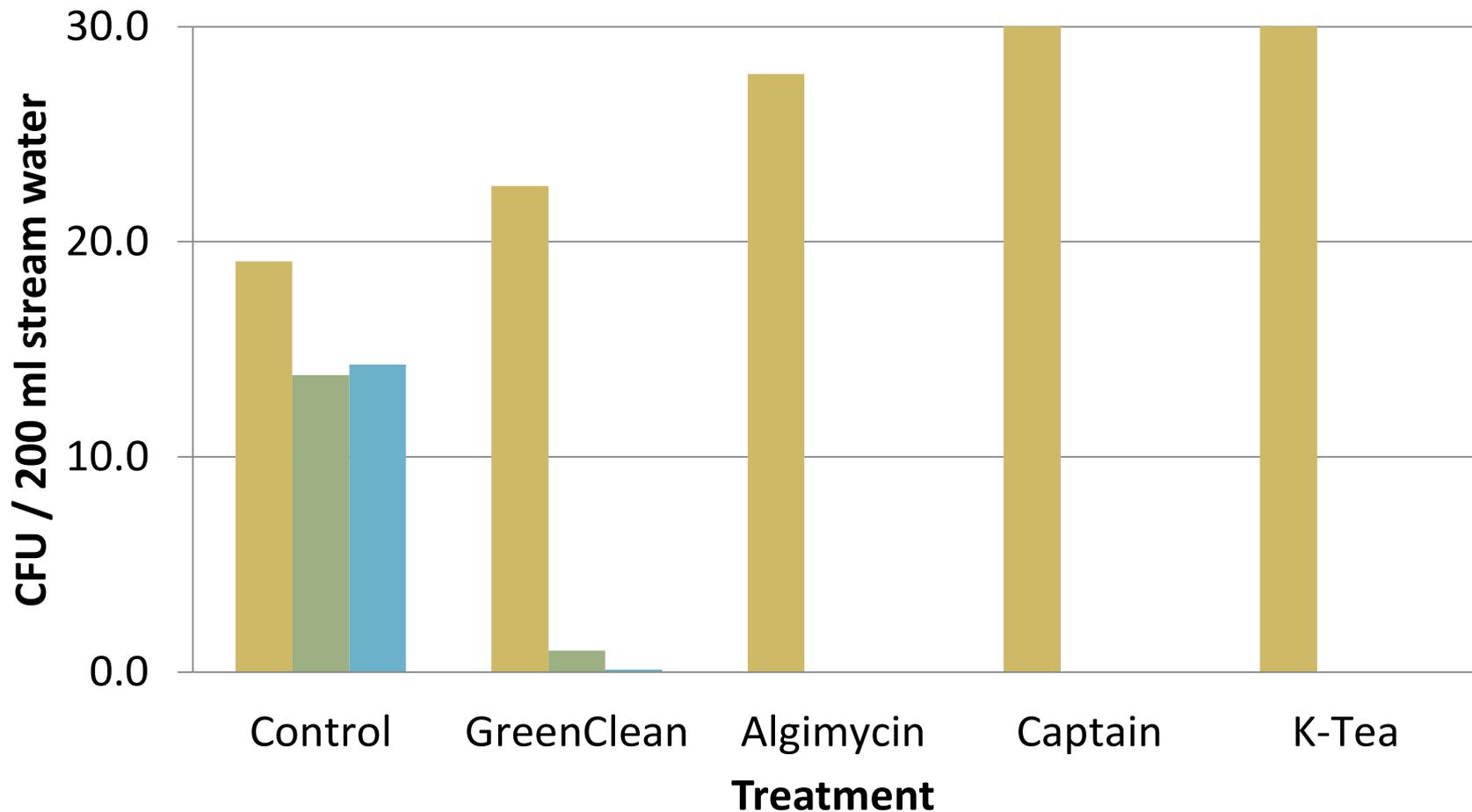
0 hours 2 hours 4 hours 8 hours



Results: Seneca Creek – July

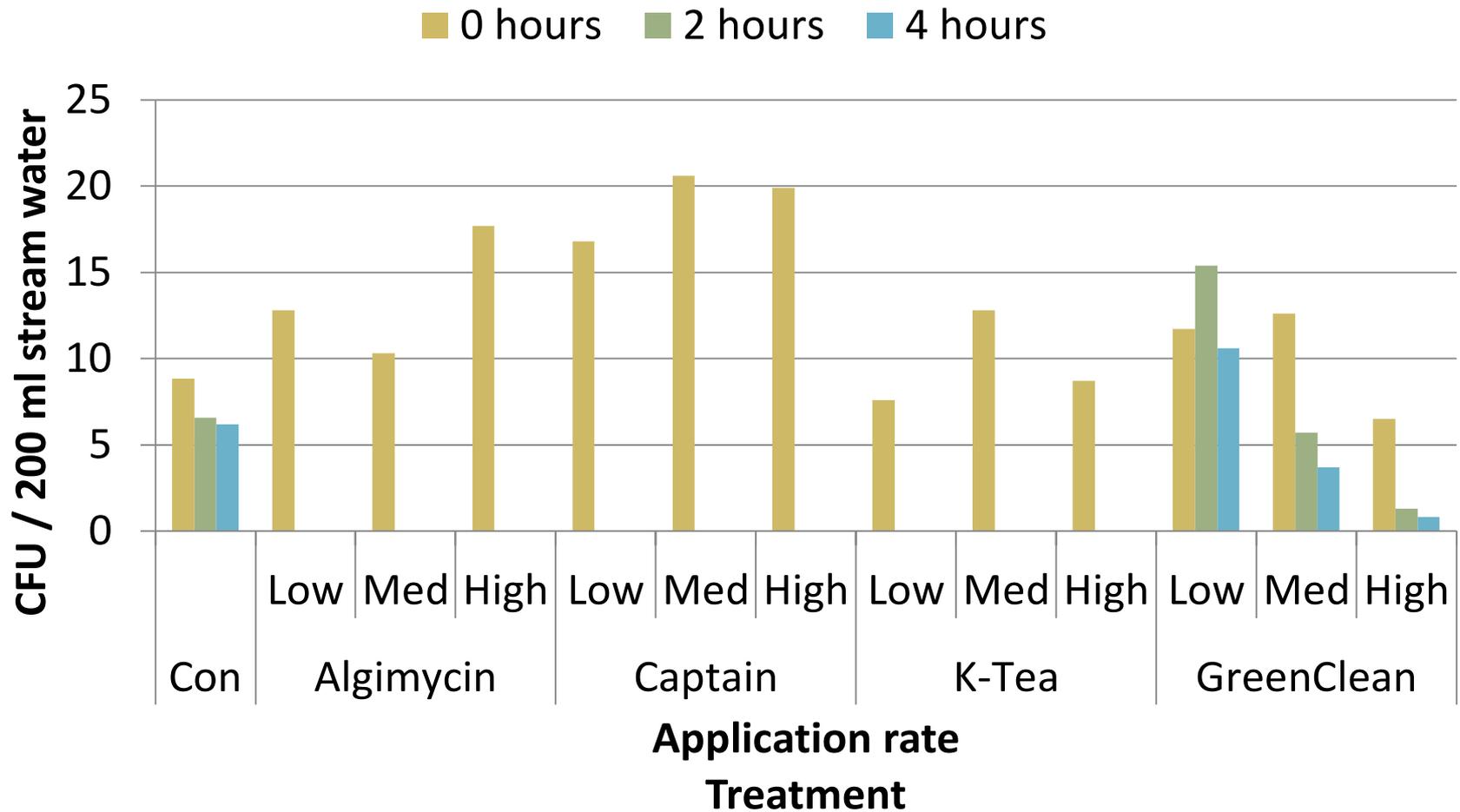


0 hours 2 hours 4 hours





Results – Treatment Rates





Conclusions

- Copper-based algaecides eliminated propagules of *Phytophthora* spp. from water throughout the year
 - Range of temperatures
 - *Phytophthora* spp. present – *P. cinnamomi*, *P. citricola*, *P. gonapodyides*, & others)
- Hydrogen-dioxide (GreenClean) not consistently effective at max label rate
- Rates:
 - Cu-based algaecides: lowest label rate effective
 - H₂O₂ algaecide: not effective
- Population density of *Phytophthora* spp. varied
 - Between the two streams
 - Among months in each stream
- Copper-based algaecides may be an effective management strategy for species of *Phytophthora* in infested waterways

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