CHAPTER 10

Evaluation of an Ultrasonic Device to Control Golden Alga *Prymnesium parvum* in Fish Hatchery Ponds

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Abstract

An ultrasonic device (i.e., Aquasonic Algae Controller) was evaluated to determine its efficacy at controlling *Prymnesium parvum* in hatchery ponds. This pilot study consisted of one pond with one Aquasonic Algae Controller (treatment) and two untreated ponds (control). Each 0.1-ha pond was stocked with five adult rainbow trout *Oncorhynchus mykiss*. Cell density *P. parvum* cell density was monitored in each pond for 21 days. The ultrasonic device appeared to be ineffective in reducing *P. parvum* cell density and had no discernable effect on survival of rainbow trout.

Introduction

The toxin producing, brackish-water phytoflagellate *Prymnesium parvum* was first identified at the Dundee State Fish Hatchery in March 2001. During the preceding month, about 7,000 rainbow trout *Oncorhynchus mykiss* died from exposure to the alga and its toxin. Since rainbow trout are known to be sensitive to copper sulfate (Hansen et al. 2002c) and ammonium sulfate is ineffective at controlling *P. parvum* at temperatures below 18ºC (Sarig 1971), an alternative control method was needed for cold water conditions. This study was initiated to determine the effectiveness of the Aquasonic Algae Controller to control *P. parvum* in water with temperatures up to 18ºC. This device is advertised for control of aquatic vegetation and reported to have successful application and wide acceptance (VoR Environmental, http://www.vor-env.com). The device works by emitting sound waves that cause cell death by breaking the cell vacuole (VoR Environmental)

Materials and Methods

Three 0.1-ha ponds were filled on 16 December 2001. Two of the ponds were used as control and received no treatment and the ultrasonic device was installed in the remaining pond on December 17. Each pond was stocked with five rainbow trout on December 17. *P. parvum* cell counts were conducted on December 17 and continued periodically through the end of the trial on January 7, 2002 using an established protocol (Appendix A). Morning temperatures, dissolved oxygen, and pH readings were recorded daily in each pond. Ponds were harvested on January 7, 2002 and the number of fish recovered from each pond was recorded.

Results and Discussion

At the beginning of the trial, cell counts showed *P. parvum* cells were present in one of the two control ponds as well as in the Aquasonic-treated pond (Table 1). Three days later, the same pattern was observed. Ten days after the start of the trial, *P. parvum* cells were present in the control pond that had previously had none while the two ponds that previously had cells now had none. Sixteen days after the trial began, cells were not observed in any of the ponds and after 21 days, *P. parvum* cells were found only in the pond with the ultrasonic unit. These observations suggest that the Aquasonic device was not effective in eliminating *P. parvum* from the pond after 21 days.

One fish (20%) died in the Aquasonic-treated pond while no fish died in either control pond, though the cause of the mortality is unclear. Although this study is not robust due to a lack of replication, the results presented herein suggest that further study of ultrasonic devices is unwarranted.

TABLE 1.—*Prymnesium parvum* cell densities and rainbow trout *Oncorhynchus mykiss* mortality in ponds with or without the Aquasonic Algae Controller.

			Cell density (number/mL)				
Treatment	Pond	Fish mortality (%)	17 Dec 01	20 Dec 01	27 Dec 01	2 Jan 02	7 Jan 02
Aquasonic	13	20	2,000	2,000	0	0	4,000
Control	9	0	0	0	2,000	0	0
Control	12	0	2,000	8,000	0	0	0

TABLE 2.—Water quality variables of trout ponds with or without the Aquasonic device for controlling *Prymnesium parvum*.

Treatment	Pond	Dissolved oxygen (mg/L)	Temperature (ºC)	pH	Dissolved oxygen (mg/L)	Temperature (ºC)	pH
Aquasonic	13	12.0 10.9 - 13.0	5.3 2.3 - 9.4	7.97 7.70 - 8.20	12.3 11.5 - 13.6	6.0 4.1 - 10.0	8.00 7.7 - 8.2
Control	9	12.0 10.8 - 12.8	5.1 1.7 - 9.5	7.91 7.80 - 8.10	12.0 11.4 - 12.9	6.4 3.8 - 10.3	7.98 7.80 - 8.10
Control	12	11.8 10.6 - 13.0	5.3 1.9 - 9.3	7.91 7.80 - 8.00	12.1 11.0 - 13.0	5.8 3.9 - 9.9	7.96 7.90 - 8.00