AQUACULTURE

POTASSIUM PERMANGANATE IS NOT AN EFFECTIVE POND DISINFECTANT TO CONTROL DERO DIGITATA

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PRE-TREATING PONDS WITH POTASSIUM PERMANGANATE, EVEN UP TO 20 MG/L, IS NOT AN EFFECTIVE PREVENTATIVE OF HAMBURGER GILL DISEASE. DERO WORMS, INTERMEDIATE HOSTS IN THE LIFE CYCLE OF THE PARASITE CAUSING HAMBURGER GILL, APPARENTLY ARE ABLE TO BURROW INTO THE MUD AND BE PROTECTED FROM POTASSIUM PERMANGANATE TOXICITY.

Proliferative gill disease (PGD), commonly referred to as hamburger gill disease, is a major problem in farm-raised channel catfish. PGD represents the most commonly diagnosed parasitic disease and approximately 17% of the total cases submitted to the Thad Cochran National Warmwater Aquaculture Center fish diagnostic laboratory.

The parasite requires the intermediate host, *Dero digitata*, to complete its life cycle. One commonly used method to reduce disease caused by parasites requiring multiple hosts is to disrupt the life cycle. Catfish farmers have tried several chemical treatments to disinfect ponds, thus disrupting the PGD life cycle through elimination or reduction of *Dero* populations. Some treatments are believed to reduce PGD incidence, but have not been experimentally validated.

Dero digitata

Disinfection with various chemicals in the hatchery is a routine part of good hatchery practice. However, pond disinfection is considerably more difficult to achieve. Lime, potassium permanganate, and niclosamide (Bayluscide®) have all been used in attempts to eliminate pathogens and disease vectors from ponds before stocking, but their effectiveness is unknown.

Potassium permanganate is an oxidizing agent that has been used to treat several fish diseases, especially crustacean and protozoan parasites (20 mg/L for 1 hour), and has been used as an equipment disinfectant at 10 mg/L for 30 minutes. It is particularly effective for treating *Trichodina*

or *Ambiphrya* infestations and external columnaris infections. Potassium permanganate is believed to be an effective disinfectant at high rates in ponds before stocking. It is believed potassium permanganate disinfects ponds and reduces *Dero* populations, but this practice has not been verified experimentally.

We evaluated potassium permanganate as a pond disinfectant to reduce *Dero* populations before stocking fish. In the first study, 2 liters of catfish pond mud and 18 liters of pond water were placed in each of 16 20-liter microcosms. Four microcosms were dosed at each of four treatment levels (0, 10, 20, and 30 mg/L) of potassium permanganate. After treatment, all *Dero* present in the sample were counted. In the microcosm study, all treatment levels significantly ($P<0.05$) reduced *Dero* populations relative to controls (Table 1).

In a second study, benthic populations were compared from 10 0.1 acre ponds before and after treatment with 20 mg/L potassium permanganate. However, in the field trial, there were no significant ($P<0.05$) differences pre- and post-treatment with potassium permanganate at 20 mg/L in *Dero* populations or total benthic organism populations (Table 2).

Treatment with potassium permanganate at 20 mg/L is not an effective pond disinfectant. This treatment level did not eliminate or even significantly reduce *D. digitata* populations. Although it was believed such high levels of potassium permanganate should 'sterilize' the pond, and previous toxicity studies (and the current microcosm study) of potassium permanganate to *Dero* indicated much lower levels of toxicity, it is clear this treatment is not effective. The 15-min potassium permanganate demand was less than 1 mg/L, so organic matter in the ponds should not have influenced the effectiveness of potassium permanganate. Apparently, in a commercial pond environment, *D. digitata* are able to burrow in the mud below the chemical-sediment interface and be protected from potassium permanganate toxicity.

Treatment	Mean	Standard Error
Control	60a	29.6
10 mg/L	1b	0.7
20 mg/L	0b	0.2
30 mg/L	0b	0.0

Table 1: *Comparison of mean and standard error of* Dero digitata *numbers in microcosms after treatment with potassium permanganate. ANOVA followed by Fisher's PLSD was used to detect treatment differences. Mean values sharing the same letter were not significantly different (P<0.05).*

	Before Treatment	After Treatment	Mean Difference	P-value
Dero	561 (256.0)	115 (48.8)	447 (264.3)	0.1253
Non-Dero	878 (246.2)	1055 (141.8)	-177 (238.5)	0.4769

Table 2: *Comparison of mean (+/- SEM)* Dero digitata *numbers and all* non-Dero *benthic macroinvertebrate numbers before and after treatment with 20 mg/L potassium permanganate. A paired t-test was used to determine if the difference between pre- and post-treatment was different from zero.*