

CASE STUDY:

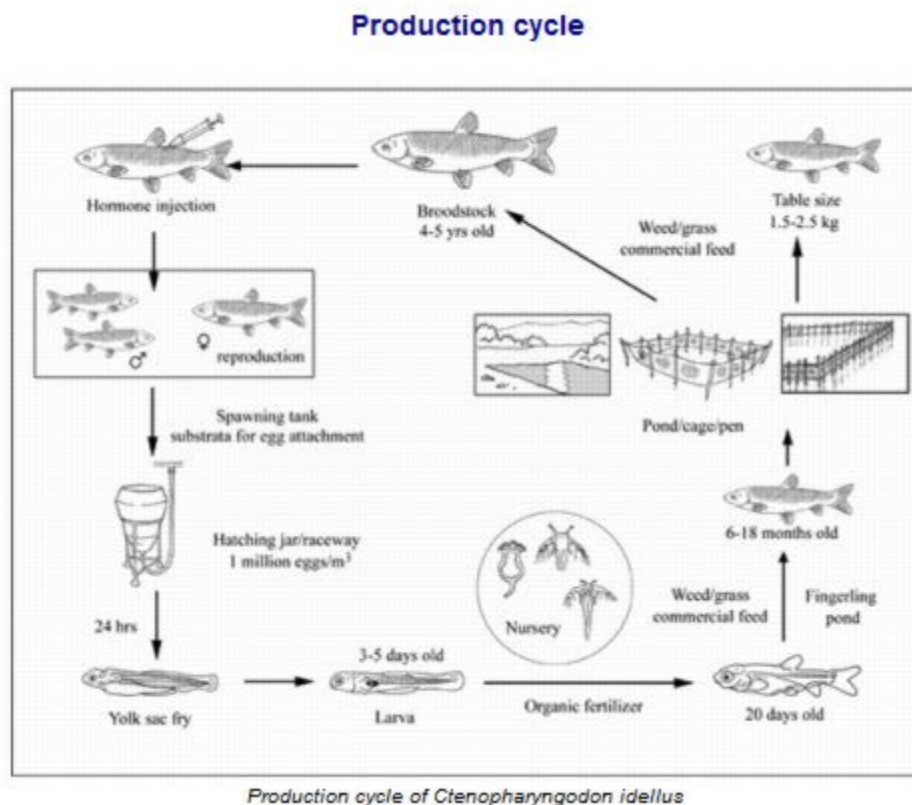
Enhancing Intensive Grass Carp Aquaculture Using StartSmart



Introduction

StartSmart is the only biological product independently proven to instantly nitrify, which means to biologically convert ammonia to nitrite to nitrate (See StartSmart review article, Aquarium Fish International, September 2010). This case study concerns use of StartSmart to improve intensive fish farming of grass carp (*Ctenopharyngodon idellus* Valenciennes).

The production cycle of grass carp is shown below:



This study was performed on freshwater grass carp. Freshwater grass carp are farmed using intensive methods in many countries, particularly China, India, and Russia. The study was divided into two phases:

- The **first phase** examined the effect of StartSmart on fish growth and mortality of summer fingerling (30 mm) to fingerling (13 to 15 cm) stage.
- The **second phase** examined the effect of StartSmart on test and control storage tanks of fully grown grass carp (1.5 Kg each).

Procedures and Results

Phase 1: Summer Fingerling (30 mm) to Fingerling (13 to 15 cm)

Phase 1 Procedures

Two identical ponds were chosen for the test, each being 0.1 hectare and 1.5 meters deep. Each pond was stocked with 15,000 summer fingerlings, averaging about 30 mm length. Feed consisted of standard arrhiza for the first month, then duckweed when the fish were between 70-100 mm in length. Finally, the fish were fed soybean cake at a daily rate of 2.0 kg/10 000 fish.

The rearing of the summer fingerling to fingerlings took 4 months. During the 4 months, each pond was tested weekly for ammonia and nitrite. The control pond did not receive StartSmart treatment. The test pond was treated with StartSmart as follows:

StartSmart Addition Schedule to Test Pond

This test required the use of StartSmart (liquid freshwater formula), StartSmart Activator (powdered bacteria and nutrients) and a Delivery System. The Delivery System consisted of a 55 gallon, open top drum, equipped with aeration and heating (27 C set point).

Each addition of StartSmart involved the following steps:

- The drum was filled with tap water
- 2 gallons of freshwater StartSmart were added to the drum
- 1 bag StartSmart Activator (powder, 600 grams) was added to the drum
- The drum was aerated at 27 C for 7 days
- At the end of 7 days, the entire drum (one batch) was added to the test pond

During the summer fingerling to fingerling stage, one batch of StartSmart was prepared and dosed each month. (2 gallons StartSmart and one bag StartSmart Activator per).

Phase 1 Results

The three key Phase 1 results were ammonia and nitrite concentration, fish length, and mortality rate.

Ammonia and Nitrite: 85% Reduction with StartSmart

During the 4 month test, the untreated control pond averaged 0.18 ppm of ammonia, and 2.4 ppm of nitrite. In contrast, the StartSmart test pond average 0.03 ppm of ammonia and 0.05 ppm of nitrite.

Fish Length: 14% Increased Growth with StartSmart

At the end of the 4 months, the average fingerling in the test pond was 16 cm, compared to 14 cm in the control pond.

Mortality Rate: 67% Reduction with StartSmart

The mortality rate in the control pond was 12% (88% survival), compared to 4% mortality in the StartSmart-treated pond. As expected, StartSmart reduced ammonia toxicity in the treated pond, which was reflected in the 67% reduction in mortality.

Phase 2: StartSmart Use with Fully Grown Grass Carp

Phase 2 Procedures

Two 500-liter storage tanks were used as test and control tanks. Each tank was aerated, and received 30 mature grass carp, (avg 1.5 Kg each). This phase was designed to test the ability of StartSmart to improve fish health during periods of storage or transport of live, ready for market fish.

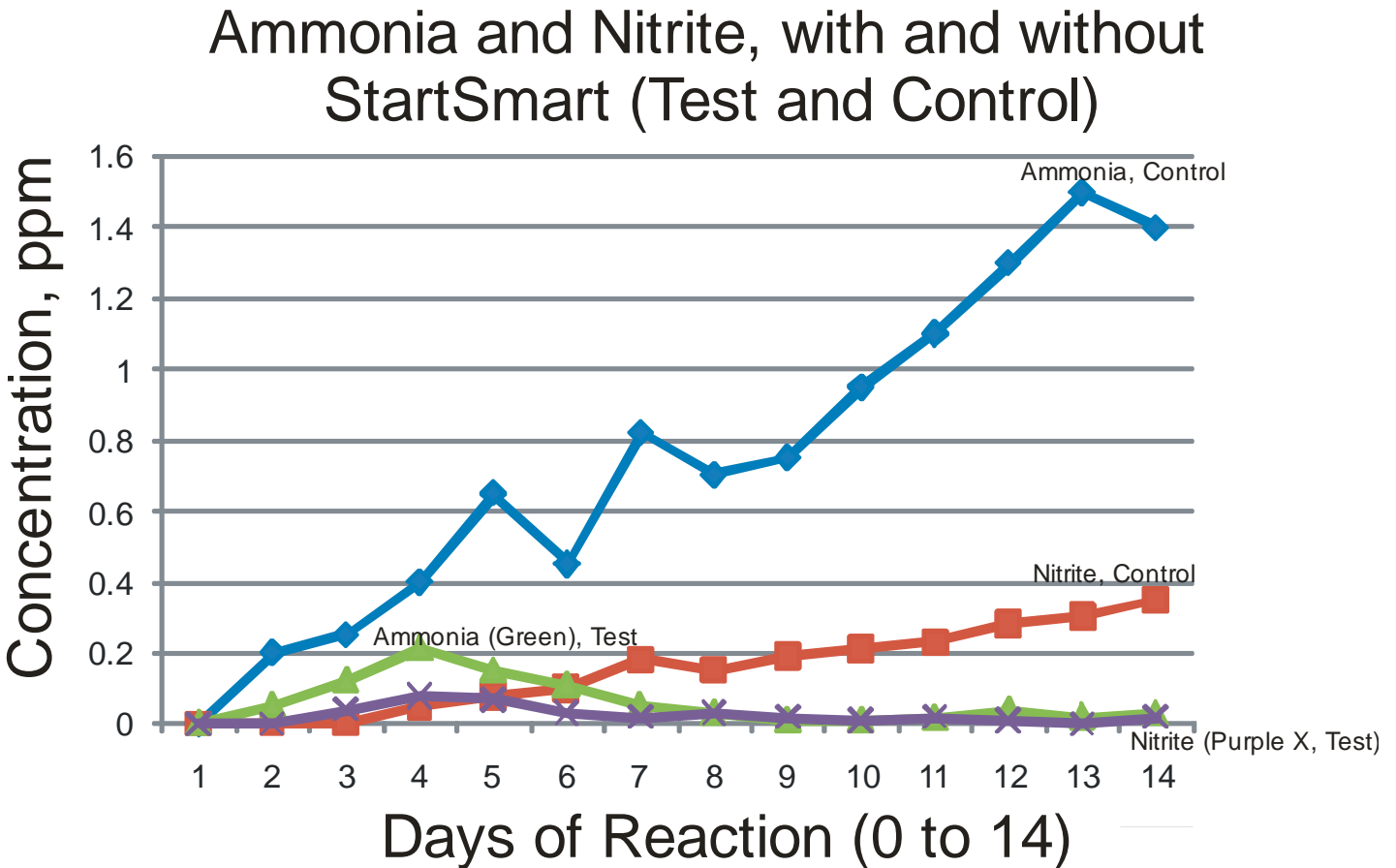
StartSmart Addition Schedule to Test Tank

For this type of project, with the extremely high stocking density, the standard StartSmart dose is 250 ppm of StartSmart compared to the tank volume. For this application the dose was 125 ml of StartSmart to the 500 liter test tank. No StartSmart was added to the control tank.

Each tank was aerated, and minimal feeding was performed, identically, for the test and control tanks.

Phase 2 Results

The chart below shows the ammonia and nitrite concentration in the test and control tanks for the 14 days of evaluation:



Phase 2 Results

The two key Phase 2 results were ammonia and nitrite concentration, and fish health.

As seen in the 14-day chart, ammonia in the untreated control tank rapidly increased to toxic levels of 1.5 ppm. Similarly, nitrite in the control tank increased steadily to 0.35 ppm.

In contrast, the test tank that received 125 ml of freshwater **StartSmart in the 500 liter test tank showed complete nitrification**, with negligible ammonia and nitrite at the end of the 14 day test.

Conclusions

Phase 1: Summer Fingerling (30 mm) to Fingerling (13 to 15 cm)
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Phase 1 Conclusions

The 85% reduction in ammonia levels due to StartSmart addition showed dramatic positive effect on growth of summer fingerlings (30 mm average size) to fingerlings (16 cm).

With lower ammonia through the 4 month growth period, the **StartSmart pond had 14% more growth and 67% reduced mortality**.

Phase 2 Conclusions

Phase 2 (short term storage of full-weight grass carp) showed the powerful advantage of StartSmart. One StartSmart dose gave complete protection against ammonia toxicity to a heavily-stocked, 500 liter storage tank of grass carp (30 fish, 1.5 Kg each). This result shows how beneficial StartSmart use can be in varied application such as storage and transport of fish.