



## MICROBE-LIFT® Technology Increases Yield & Size of Shrimp

**Location:** Mississippi Gulf Coast, Community College



**Background:** The increase in popularity of freshwater shrimp (*Macrobrachium rosenbergii*) production has prompted researchers to develop better and more efficient production methods. The current production methods are sufficient to justify the growing of freshwater shrimp. However, to stay competitive long term in the market place, producers will have to increase yields and reduce costs. The small and medium size growers cannot compete with current production costs. Globalization will continue to put downward pressure on market prices, so production costs must be reduced and efficiency improved in order for the farmer to maintain profitability.

The aquaculture instructors at Mississippi Gulf Coast Community College in Southeastern United States found that products used in aquaculture applications for improved water quality also may increase growth and survival of shrimp.

**Objective:** Through an agreement with Global Seafood Technology's Aquaculture Department, Ecological Laboratories for MICROBE-LIFT® technology, and Mississippi Gulf Coast Community College Aquaculture Department, a decision was made to evaluate the microbial product in the production of *Macrobrachium rosenbergii*. The microbial product MICROBE-LIFT® Formulation was used.

Global Seafood Technology supplied juvenile shrimp to stock two ponds for the study, Ecological Laboratories, Inc. supplied the product MICROBE-LIFT® to be used in one pond, and Mississippi Gulf Coast Community College Aquaculture Department supplied the ponds, feed, and labor.

The purpose of the study was to see if shrimp production could be improved using the MICROBE-LIFT® Formulation. Two ponds were used in the study and both ponds were stocked with juvenile freshwater shrimp. One pond was treated with MICROBE-LIFT® Formulation in accordance with the manufacturer's recommendations, while a second pond was kept as a control. Dissolved oxygen and temperature were measured once per day, and pH, alkalinity and hardness were measured once per week using industry standard methods. Shrimp were sampled periodically by seine and feed rates were adjusted using sample results. Both ponds received continuous aeration using Aerolator brand surface aerators and were stopped only when students entered the ponds for sampling.

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### Stocking:

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Two 0.10-acre (0.04 hectare) ponds (MGCCC #4 and #5) were stocked with juvenile prawns (*Macrobrachium rosenbergii*) on June 21, 2001. Prawns with an average weight of .10 grams were stocked at a rate of 2,150 per pond (21,500 per acre). Pond #4 received MICROBE-LIFT® treatment, and Pond #5 did not. Each pond had a volume of 142,718 gallons (539,474 liters).

### Feeding:

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Feeding began in both ponds on June 24, 2001, three days after stocking. Both ponds were fed #2 Rangen Trout Starter at a rate of 1 lb. (0.45 kg) per pond every other day. This feed rate was chosen not only to feed the shrimp but to also build up a food base for the MICROBE-LIFT® bacteria that were to be introduced into pond #4. On July 4, 2001, feed type was changed to Burris Shrimp Crumbles, and the feed rate was changed to 1 lb. per day. The feed rate was changed again on August 20, 2001 based on shrimp samples. Pond #4 was fed 2.7 lbs. (1.22 kg) of Burris Shrimp Crumbles per day, and Pond #5 was fed 3.1 lbs. (1.41 kg) of Burris Shrimp Crumbles per day. Feed rates were determined by utilizing "Freshwater Prawns Pond Production & Grow Out" from Mississippi State University. Feeding was done daily except in a few instances when the weather made feeding dangerous. Half feed rates were fed on 8/23/01, 9/4/01 and 9/2/01 due to heavy rains and thunderstorms and neither pond was fed on 9/1/01 and 9/3/01 due to loss of electrical power to the aerators. Dissolved oxygen did not reach dangerous levels, and no shrimp losses were observed. On August 24, 2001 feed type was changed to Burris Shrimp Grow-out Pellets but feeding continued at the same rate. The feed rate was changed to 4.5 lbs. (2.04 kg) per day in Pond #5 and 3.6 lbs. (1.63 kg) per day in Pond #4 on September 13, 2001 and continued at this rate until harvest. Feeding was discontinued two days prior to harvest.

### Water Quality:

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Aerators were operated continuously to prevent dissolved oxygen problems. The aeration also helped distribute and suspend microbes and organic material. The aerators were turned off briefly for shrimp sampling and other work details around the ponds. As noted above, aerators were off for two days, 9/01/01 and 9/02/01 due to electrical problems. Aerators were off briefly in Pond #4 on 9/27/01 and 9/30/01 due to electrical problems, but these were quickly remedied. Dissolved oxygen and temperature readings were taken every day in both ponds. Pond #4 had average dissolved oxygen of 8.53 for the growing season. The lowest dissolved oxygen was 5.41 and the highest dissolved oxygen of the growing season was 13.59. The average temperature for the growing season in pond #4 was 28.10° Celsius. The lowest temperature was 20.6° Celsius, and the highest was 32.9° Celsius. Pond #5 had average dissolved oxygen of 7.94 for the growing season. The lowest dissolved oxygen was 3.96, and the highest was 13.60. The average temperature for the growing season in pond #5 was 27.55° Celsius. The lowest temperature recorded was 20.4° Celsius, and the highest was 32.4° Celsius. The growing season for the shrimp was from 6/21/01 to 10/23/01 for a total of 125 days.

Alkalinity, pH and hardness were measured once per week. The average pH reading for pond #4 was 7.84, and pond #5 had an average pH reading of 7.89. There was no problem with alkalinity or hardness in either pond. The average alkalinity for pond #4 was 91.28 and for pond #5 was 74.14. Pond #4 had an average hardness of 9.57, and pond #5 had 10.07.

The water quality parameters that were observed during this grow-out period are typical for south Mississippi.

The first cold front of the season came through on September 24, 2001. At this time, both ponds were flushed with warm (33° Celsius) well water whenever pond temperature reached 20° Celsius or lower. This was done to both to extend the growing season and to pick a scheduled time for the shrimp harvest.

## MICROBE-LIFT® Technology

**MICROBE-LIFT®** is a bio-augmentation liquid product that is produced by **Ecological Laboratories Inc.** The product is used to help with water quality problems. This purpose of this trial was to determine if the product would improve water quality and produce an alternative food source for pond raised freshwater shrimp.

Pond #4 was treated with **MICROBE-LIFT®** at the manufacturers recommended rates. Treatment took place 26 days after stocking and 22 days after first feeding. **MICROBE-LIFT®** was applied to the pond by spreading it over as much of the surface as possible. On June 16, 2001, 3.5 gallons (13.23 liters) of **MICROBE-LIFT®** were added to pond #4. Subsequently, 1 gallon (3.78 liters) of **MICROBE-LIFT®** was applied to pond #4 on 6/24/01, 6/31/01, 7/8/01 and 7/15/01. On 9/14/01 the amount was reduced to 1 quart (0.94 liters).

**Results achieved:** Both ponds were first seined for a partial harvest and then were pumped down and hand harvested to completion.

Pond #5 was pumped down half way and then seined during the day. That evening the pond was pumped down the rest of the way and hand harvested. A representative sample of shrimp was counted and weighed to determine the average individual shrimp weight. The sample had a total count of 389 and weighed 19.3 lbs. (8.75 kg), which calculates to .049 lb. (0.022 kg) weight per shrimp. It was determined that the shrimp harvested were 20 count (20 shrimp per pound). The total harvest weight from pond #5 was 101.07 lbs. (45.85 kg), and the survival rate was 94%.

Pond #4 was harvested in the same matter. The pond was pumped down half way and seined and then pumped down the rest of the way and hand harvested. A representative sample of 317 shrimp was collected. The weight of the 317 shrimp was 19.28 lbs. (8.75 kg) producing an average shrimp weight of .06 lbs. (0.027 kg) or 16 count (16 shrimp per pound). The total harvest weight from pond #4 was 118.14 lbs. (53.59 kg), and the survival rate for the pond was 91.5%.

**Conclusion:** Water quality parameters were monitored to assure average or better than average water quality. Pond #4 had average dissolved oxygen of 8.53, average temperature of 28.10° Celsius, average pH of 7.84, average alkalinity of 91.28 and an average hardness of 9.57. Pond #5 had average dissolved oxygen of 7.94, average temperature of 27.55° Celsius, average pH of 7.89, average alkalinity of 74.14 and an average hardness of 10.07. These water quality parameters are typical for aquaculture ponds in South Mississippi.

**MICROBE-LIFT®** Formulation was added only to pond #4. A total of 5.75 gallons (21.74 liters) of **MICROBE-LIFT®** were used. This was the manufacturer's recommended rate to inoculate the estimated 142,718 gallons (539,474 liters) of water contained in pond #4. Pond #5 was harvested 125 days after stocking, and the shrimp that were harvested were 20 count. The total weight harvested out of the 0.10-acre pond was 101.07 lbs. (45.85 kg), which equates to 1010.7 lbs. (450.85 kg) per acre, and the survival rate was 94%. Pond #4 was harvested 126

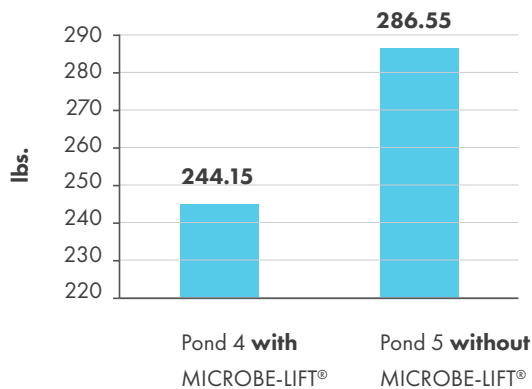
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days after stocking, and the shrimp from pond #4 were larger at 16 count. Total harvest from pond #4 was 118.14 lbs. (53.59 kg), which equates to 1181.4 lbs. (535.90 kg) per acre, and the survival rate was 91.5%. Pond #4, which was treated with MICROBE-LIFT®, had a survival rate of 2.5% less than pond #5 but produced 17.07 lbs. (7.74 kg) which equates to 170.7 lbs. (77.40 kg) per acre more than pond #5 on 42.4 lbs. (19.23 kg) which equates to 424 lbs. (192.30 kg) per acre less feed. The feed conversion for shrimp in pond #4 was 2.06 to 1 and 2.8 to 1 in pond #5.

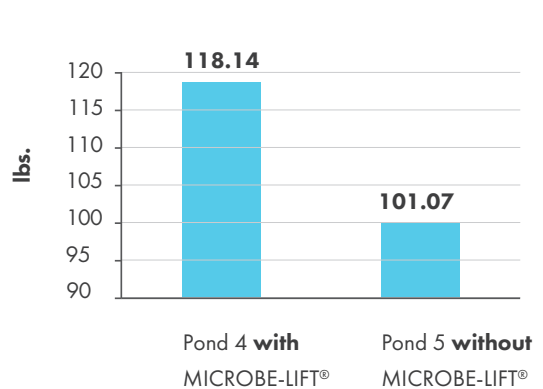
The results of this study strongly indicate that MICROBE-LIFT® may increase total production and average size of pond-raised shrimp while improving feed conversion and reducing production costs.

Further research by a research institution would be justified by the results of this study.

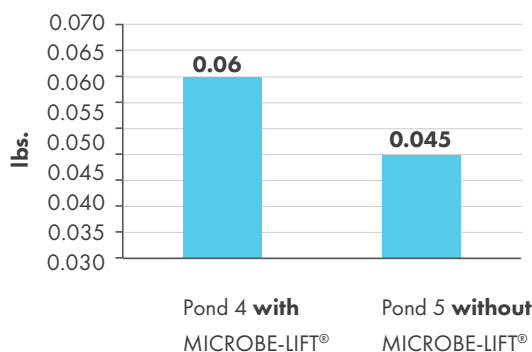
Total Feed Consumption



Total Shrimp Production



Average Weight of Shrimp



### Benefits of MICROBE-LIFT®

Total Shrimp Production	+17.4%
Total Feed Consumption	-14.4%
Total Weight of Shrimp	+22.4%

For more information on MICROBE-LIFT® Technology contact

**Ecological Laboratories Inc.**

[www.EcologicalLabs.com](http://www.EcologicalLabs.com)

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