Effect of Carbon Dioxide Scrubber Sticker during fish transportation (PRO/2600)

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Introduction

Water quality during the transportation of fish depend on load of fish concentration and the length of time for which the fish are transported.

During transportation, Fish metabolism is three times higher. Carbon dioxide is the one of major metabolic wastes produced during transporting.

With the increasing transport time, fish respiration cause to produce CO_2 and shifts water pH towards acidity.

Rapid changes in pH stress fish, and finally it is badly affect to the quality of fish.

It is better to lower the accumulating CO_2 amount while transporting fish.

Objectives

To check the effect of CO2 scrubber sticker by packing current fish density

To check the effect of CO2 scrubber sticker by increased stocking density

Methodology

Guppy fish (*Poecilia reticulata*) was selected for this experiment.

As a controller, guppy fish to be exported in normal way was selected.

150 individual guppy fish was taken with the conditions and quality as same as when they are to be exported.

In this time 12″ * 24 ″ sized polythene bag was filled with 1900 ml of water and supplied oxygen up to 8 $^1/2$ ″ after introducing 150 Female Guppy fish. Then it was double packed.

During the preparation, it was checked,

- pH
- Temperature
- Ammonia level
- Nitrite level

Simultaneously, the same procedure was applied again using 150,175, 200 individual guppy fish. In this case, CO_2 scrubber sticker was placed inside the top of the sealed polythene bag prior to shipment.

Figure 1: CO_2 Scrubber Sticker

Figure 2: Controller

Figure 3: 150 Guppy packed with Sticker

Figure 4: 175 Guppy packed with a sticker

Figure 3: 200 guppy packed with a sticker

Figure 4: Prepared bags prior to shipment

Figure 5: Sealed box with experimental bags

After 48 hours, again

- pH
- Ammonia level
- Nitrite level
- Stress level and
- DOA were checked.

Then the fish were stocked in a glass tank and allow them to stay several days. DOH was checked day by day. Finally, data were analyzed.

Observations

Tested parameters of water used to stock fish for shipment

Table 1: Pre shipment analysis on water quality

Parameter	Value
pH	9.2
Temperature	24 ^{0}C
Ammonia	0 ppm
Nitrite	0 ppm

Figure 6: Nitrite test result in water used to stock fish

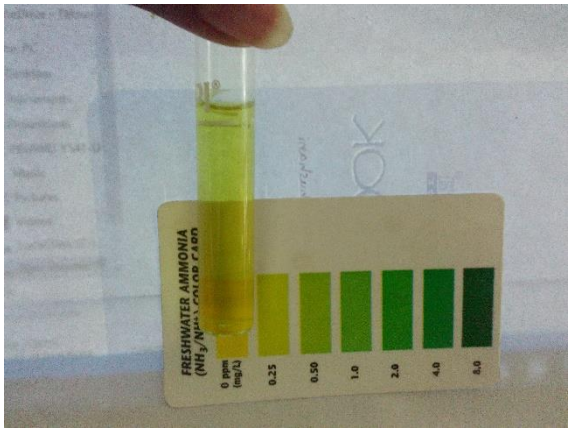

Figure 7: Ammonia test result in water used to stock fish

Figure 8: pH in water used to stock fish

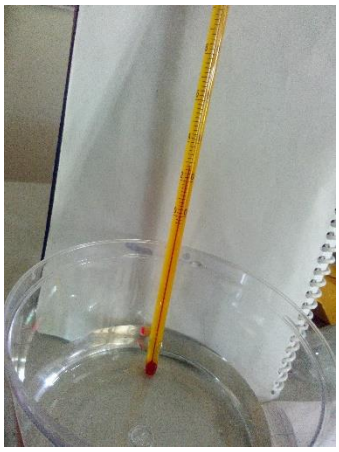

Figure 9: Temperature in water used to stock fish

Tested parameters of packed water after 48 hours

Table 2: Water quality parameters after 48 hrs.

		With CO2 Scrubber Sticker		
Parameters	**Controller**	**Bag with 150 guppy**	**Bag with 175 Guppy**	**Bag with 200 Guppy**
pH	7.4	8.3	8.2	8.2
Temperature (^{0}C)	24.5	24.5	24.5	24.5
Ammonia (mg/l)	8	8	8	8
Nitrite (mg/l)	0.2	0.2	0.3	0.3
Stress Level	Moderate	Moderate	Stressed	Stressed
DOA	1	0	0	1
DOH in First Day	2	0	1	2
DOH in Second Day	1	1	0	0
DOH in Third Day	0	0	0	0
Total DOH within 3 days	3	1	1	2

Figure 10: Nitrite result showing 0.3 ppm

Figure 11: Nitrite result showing 0.2 ppm

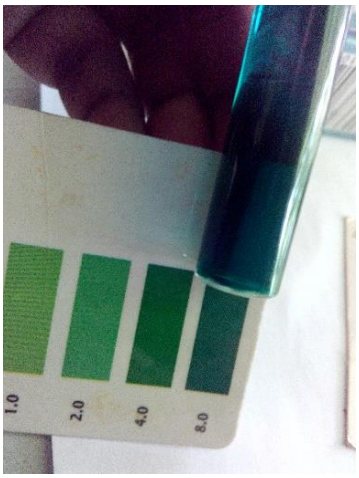

Figure12:Ammonia result showing 8ppm

Figure 13: Controller after arriving

Figure 14: 150 guppy tested with a Sticker after arriving

Figure 15: 175 guppy tested with a sticker after arriving

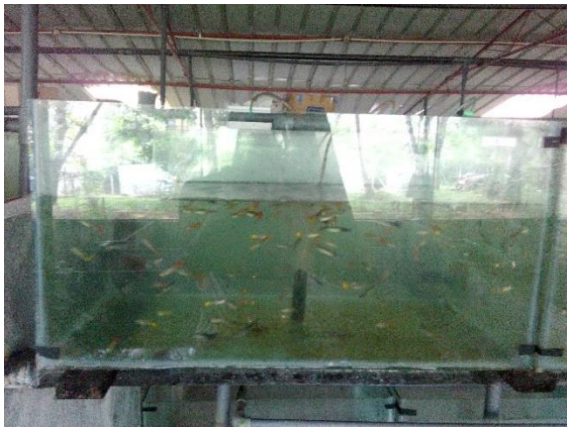

Figure 16: 200 guppy tested with a sticker after arriving

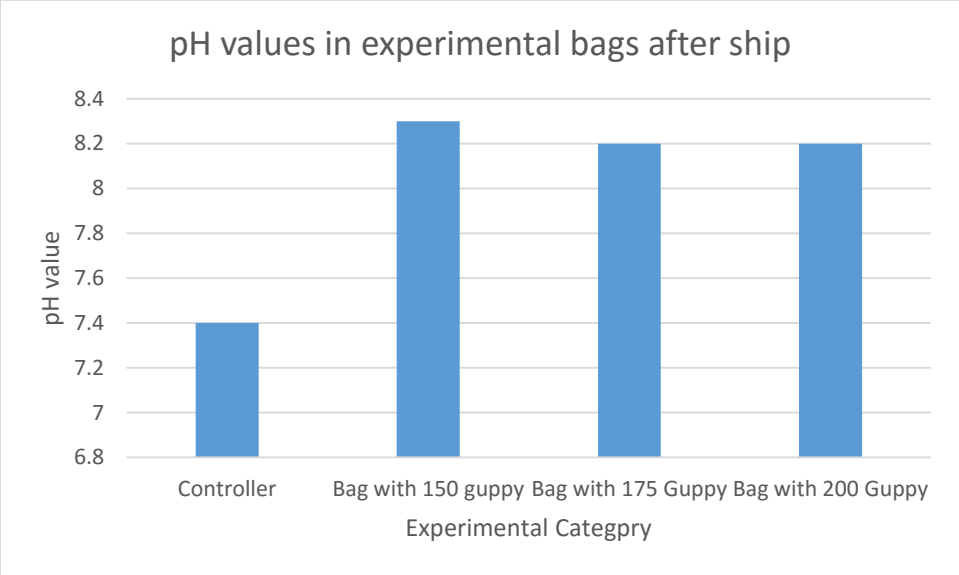

Figure 17: pH values in experimental bags after ship

Figure 18: CO2 Scrubber sticker after 48 hrs.

After 48 hours, the CO_2 scrubber sticker was swollen in appearance. It was a gas-permeable and water resistant sticker bag.

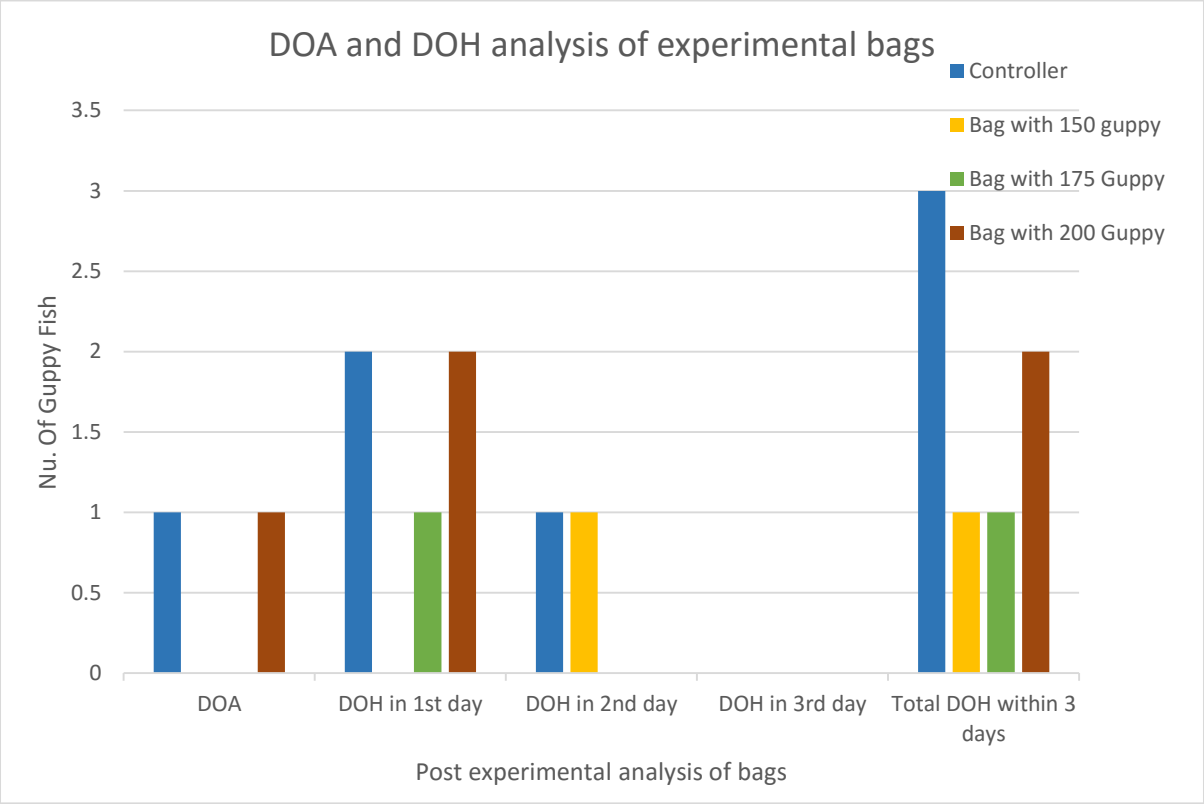

Figure 19: DOA and DOH analysis of Experimental bags

Discussion

According to the post shipment analysis, pH value in Controller is lower than other three experimental bags tested with a CO_2 Scrubber Sticker.

CO_2 cause to lower the pH value. When the amount of dissolved CO_2 in water is lower, pH value rises up.

Initial pH value in whole experimental bags were 9.2. After 48 hours, pH value in the bag stocked 150 guppy fish (Controller) is lower than the experimental bag stocked same number of fish but packed with a CO_2 Scrubber Sticker.

The reason for that is CO_2 gas was sucked by CO_2 Scrubber Sticker and cause to reduce CO_2 amount dissolved in the water.

Although there were higher packing densities, the pH values were higher than the controller. Higher amount of fish cause to accumulate more CO_2 gas. But, the final pH

value goes higher than controller means, more CO_2 gas was trapped by CO_2 Scrubber Sticker.

Total DOH in experimental bags were lower than the controller. Because, lower CO_2 amount dissolved in water cause to provide favorable environment to fish. Total DOH in experimental bag stocked 200 guppy fish was higher than other two experimental bags due to higher fish density. Limited amount of CO_2 gas can be absorbed by the sticker.

Conclusion

CO_2 Scrubber Sticker can absorb CO_2 gas and reduce the amount of dissolved CO_2 gas in shipment water. It helps to control the acidic pH levels in shipment water.

With the CO_2 Scrubber Sticker, it can be expand the packing density up to 175 guppy fish successfully.

There is a possibility to expand packing density up to 200 guppy fish also. But, in this time it cause to stress fish more and it is safe to expand packing density up to 175 guppy fish in one bag.

References

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