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A COMPARATIVE PREVALENCE STUDY OF ECTOPARASITES IN WILD AND CULTURED GROUPER BEFORE AND AFTER TRANSPORTATION

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Abstract: Twenty wild groupers (*Cephalopolis boenak*) and 20 cultured groupers (*Epinephalus tauvina*) were used as the main research material in this study. All of these groupers were examined for individual body weight, total length and ectoparasite number and prevalence before and after transportation. The results of this study showed that the four groups of ectoparasite that infected both groups of fish were six species namely Ciliated Protozoa; *Cryptocaryon irritans*, *Trichodina sp*., and Unidentified Ciliates, Monogenea; *Pseudorhabdosynochus sp*., Leech; *Zeylanicobdella arugamensis* and Parasitic Copepod; *Caligus sp*. The dominant species for culture grouper is unidentified ciliates meanwhile for the wild grouper is *Trichodina* sp. Cultured groupers showed an increase in ectoparasites after transportation. Overall comparison showed that cultured groupers maintained the prevalence of ectoparasite before and after transportation with 100% infection; mean intensity showed an increase from 7.1 before to 37.4 after transportation compared to Wild Grouper with the prevalence of ectoparasite; 65% infection before and 95% infection after transportation and mean intensity of; 3.2 before and 5.1 after transportation. The increase in ectoparasite infection could be attributed to change in water quality.

KEYWORDS: *Ectoparasites, Cephalopolis boenak, Epinephalus tauvina and transportation*

Introduction

Live fish have long been traded around South East Asia (SEA) as a luxury food item with most live fish captured from coral reef or wild areas or sourced from culture farms (Scholz, 1999) e.g. grouper spp. (Kanchanakhan, 1996). The trade industry in recent years has concentrated on coral reef species and these have become the most valued fish in trade. Nowadays, the marine live fish trade is one of the largest industries in Malaysia especially for marine aquarium or marine live foods that generate income for the beneficial industry. Harvesting and sampling of fish from the wild can cause significant stress to individual (Bartelme, 2004) and individuals will get stressed easily if handling and transportation is not carried out wisely.

Handling and transportation of live fish are important factors to consider in maintaining quality of fish over time. The development of marine live fish industry has paralleled development of transportation technology. Poor handling and non-systematic management of transportation also contribute significantly to stress factors (Bartelme, 2004). The culture environment can have a major influence on virtually every important parasite species especially in wild or cultured marine fish (Noga, 2000). This problem can lead to pathological changes in host species and decrease fitness and reduce the market value of live fish (Scholz, 1999). The aim of the present study therefore, was to assess the impact of transportation on relative ectoparasite numbers in two species of grouper collected from the wild or from culture.

Methodology

This study was conducted from 11 September 2006 to 15 March 2007 using wild grouper (*Cephalopolis boenak*) and cultured grouper (*Epinephalus tauvina*) from the same family;

Serranidae. Fish were sourced from the wild, Endau Coast of Johore (2°28'31.75"N, 103°50'2.55"E) and transferred to Aquaria KLCC (3°9'26.61"N, 101°42'43.18"E) with 274 km distance while cultured fish were taken from Setiu Wetland (5°40'47.93"N, 102°42'45.04"E) and transferred to Universiti Malaysia Terengganu (UMT)(5°24'36.74"N, 103°5'23.69"E) with 90 km distance but all the fish were dissect for ectoparasites after 6 hour to parallel the both transportation time. Wild groupers (*C. boenak*) were caught by line fishing, and 20 live individual were taken randomly and transferred to separate tanks. Body weight (BW), total length (TL) and ectoparasite number and diversity were measured on each individual before and after transportation. The duration after six hour was used because, according to Davis *et al.* (2002), this was the most suitable duration for ectoparasite number to increase. Cultured groupers (*E. tauvina*) were obtained from the Setiu Wetland and transfereed to UMT. Individuals were caught by net, and 20 live individual taken randomly and transferred to a separate tank. Individual Body weight (BW), total length (TL) and ectoparasites were assessed before and after six hours of transportation.

Live fish examination was conducted using the method of Untergrasser (1989). Individual were taken from the tank and carefully measured for BW and TL using a Length Measurement Surveyor. The skin was examined carefully using a dissecting microscope for only three minutes per individual to maintain the welfare of fish. A biopsy material was taken from various parts of the body. To accumulate some mucus, a scraper was run lightly from the anterior to the posterior end of the area being tested. Smears from the caudal peduncle and from the angles formed at the bases of the pectoral fin and opercula were also taken. Mucus samples were mixed separately with a drop of water on a slide and a cover slip was lowered gently to cover the sample. The scalpel was cleaned between each sample. Mounted slides were examined at 4x, 10x, 20x, 40x, and 100x magnification for parasite assessment. There are several methods of staining that can be used to identify parasites including those of Berland (2005) and Fernando *et al*. (1972). The current study employed the method of Berland (2005) because it is rapid and reliable. For the prevalence and mean intensity, all the data were analyze by referring to Margolis, et al., (1982).

Results and Discussion

The mean TL and BW for wild and cultured grouper is revealed in Table 1. The data for the number of ectoparasites in cultured and wild grouper are available in Table 2. Six species of ectoparasite were found in both species of grouper during the study. Based on Table 2, the dominant species for culture grouper is unidentified ciliates meanwhile for wild grouper is *Trichodina* sp. The marine leech *Zeylanicobdella arugamensis* was only found on the cultured grouper and parasitic copepod *Caligus* sp was only found on wild grouper. *Trichodina* sp. was most abundant on the cultured grouper followed by *C. irritans*. Monogenea *Pseudorhabdosynochus sp.* had the lowest abundance in both grouper species.

Table 3 demonstrated the prevalence of ectoparasites in cultured grouper (100%) was higher than in wild grouper (65%) before transportation. The prevalence of ectoparasites increased in both species of grouper where cultured groupers were 100% infected by ectoparasite and wild grouper with 95% infection. The great differences in the intensity of infestation by the ciliated protozoan between cultured and wild grouper, showed the rise of heavy infestation if high stocking density culture were practice. Values for mean intensity of ectoparasites before transportation were 3.2 for wild and 7.1 for cultured grouper. The mean intensity for the cultured grouper after transportation showed a five times increase compared to wild grouper; 5.1 for wild and 37.4 for cultured grouper.

Since the ciliated protozoans have direct lifecycle, the close proximity of fish allows a high percentage of the infection stage to locate the definitive host. The occurrences of high infestations of ciliated protozoan in fish cultured appear to be common. The ciliated protozoan are not ubiquitous, but nevertheless present the most serious risk to cultured fish of most species due to their high pathogenicity, fecundity and resistance to environmental means of control (Paperna, 1987).

The techniques and procedures on transportation also contribute to the rise of disease problems as well as the characteristics of

Table 1: The body weight and total length for both wild and cultured grouper.

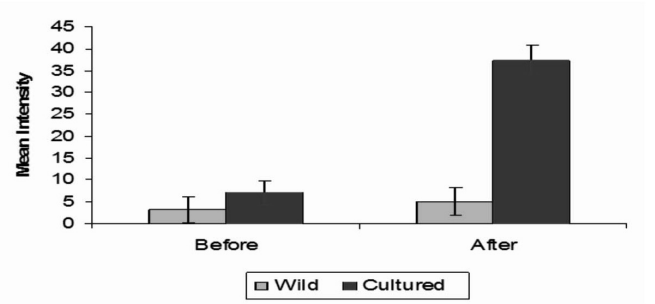
Fish species	Body weight (BW)	Total length (TL)
Wild Grouper *(Cephalopolis boenak)*	182.6 ± 26.1	17.5 ± 3.8
Cultured Grouper (*Epinephalus tauvina*)	162.0 ± 28.9	23.7 ± 1.4

Table 2: Number of Ectoparasites in Wild and Cultured Grouper before and after Transportation.

Group / species	Wild Grouper		Cultured Grouper	
	Before	After	Before	After
Ciliated Protozoa				
Cryptocaryon irritan	18	37	42	40
Trichodina sp.	4	44	76	167
Unidentified ciliates	16	15	18	543
Parasitic Crustacean				
Caligus sp.	1	-	-	-
Monogenea				
Pseudorhabdosynochus sp.	2	-	3	3
Leeches				
Zeylanicobdella arugamensis	-	-	3	4
Total	**41**	**96**	**142**	**748**

Table 3: Prevalence and Mean Intensity of Ectoparasite in Wild and Cultured Grouper before and after Transportation.

Group/Species	Before		After	
	Prevalence (%)	Mean Intensity	Prevalence (%)	Mean Intensity
Wild Grouper *(Cephalopolis boenak)*	65	3.2	95	5.1
Cultured Grouper (*Epinephalus tauvina*)	100	7.1	100	37.4



parasites infecting the wild and cultured grouper before and after transportation which have been described in the results earlier. Poulin (1999) also stated that the parasite body size could be an important factor determining aspects of parasite abundance (measured as prevalence and mean intensity of infection).

Cultured grouper is the most affecting fishes compared to the wild grouper. Maybe the habitat of the fish can cause the parasite problem. In the nature, parasite did not affect the fish because it just stick to the host body but did not give serious infection compared to the cultured fish that shows the highest parasite

infection. This is because of the condition of the water and the several factors that can contribute to the outbreaks of parasite (Davis, et al., 2002)

Conclusion

Transportation process appears to contribute to a rise in the frequency of ectoparasites on grouper species and this is true of both wild and cultured grouper. The question that remains is whether parasites is possible to control or prevented ectoparasites from infecting fishes during transportation. Pathogens including; protozoans, monogeneans, copepod parasite and leeches are present naturally in wild and cultured grouper. Most parasites that have a potential economic effect on marine aquaculture are ectoparasites with direct lifecycles and a short generation time (Nowak 2007, Paperna 1991). Due to this, protozoan presents a greater threat to transport of live fish; i.e. very often the densities of monogenean parasites in disease cultured fish are found to be higher than in the healthy cultured ones, which in turn are higher than in the wild ones (Seng, 2002).

Recommendations

Water conditions available to marine species can often degrade significantly during transportation and this will stress the fish. Temperature, pH and salinity are the main factors to consider when acclimatizing aquatic life on arrival after transportation. Fishes that arrived in bags should remain in the bags. Bags should be left to float on the surface of the designated quarantine system until temperatures inside the bag and the quarantine system have equilibrated. Once the bags are opened, the high-pressure gradient of oxygen across the water surface is lost, and at this time additional aeration will be required. Slowly the water in the bag should be drained to waste and the quarantine system water introduced to the fishes. Signs and symptoms in fish indicate that acclimatization is happening quickly can include: i) rapid gill movement; ii) pectoral and dorsal fins held rigid; iii) pale colouration; and iv) loss of orientation.

Quarantine operations can further compromise fish survival (FAO, 1988). Quarantine is to ensure that transportation is clear of transmittable ectoparasites before and after individuals are released into the water. This involves holding fish under controlled conditions in tanks over an approved period of time combined with checks for diseases. Currently, quarantine is not practiced because fish sourced from the wild/ cultured are not certified for health, but this will change in the future. The frequency and volume of fish important are high and increasing in frequency and complete control cannot as yet be assured. Shariff (1984) stated that the live fish should not be fed 12 hours before transportation. The reason is to prevent release of ammonia in the water after the digestion process which may pollute and cause fish mortality. As a precaution, it is advisable that isolation and observation of new arriving fish should be practiced to monitor the efficiency of their immune systems.

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