Comparison Study Of Bacteria On *Pangasius djambal* In Ponds And River In Pagelaran Lampung

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ABSTRACT

Pangasius djambal is one of the popular fish. The obstacle in this fish culture is the presence of bacterial attack, which is thought to originate from the waters where the fish live. This study aims to determine the differences in the number of bacteria found in the body of P djambal that are cultivated in ponds and those that live in rivers. Based on research, it is known that the number of bacteria found in the body of fish originating from rivers is more than the number of bacteria originating from ponds. The results showed the number of bacteria in the gills of fish from river reached 250 x 10^7 Cfu/g and in mucus 199 x 10^7 Cfu/g. While the number of fish bacteria originating from ponds in the gills section is 204 x 10^7 Cfu/g and in the mucus section is 131x10^7 Cfu/g.

Introduction

One freshwater fish that is widely cultivated in Indonesia is *Pangasius djambal*. The Food and Agriculture Organization (FAO) placed *P djambal* in fourth place as freshwater consumption fish favored by people after *Clarias batracus*, *Cyprinus carpio*, and *Osphronemus gouramy*. In 2011 - 2014, the productivity of *P. djambal* increased to 25% (Suhendra et al., 2017). According to the Office of the Deputy Minister of State for Research and Technology in the Field of Science and Technology Utilization and Socialization, *P. djambal* in Indonesia are mostly found in Lampung, South Sumatra, West Java, and Kalimantan.

Obstacles in the cultivation of *P djambal* are diseases from culture media and pathogens in the form of bacteria. The decline in the quality of aquaculture media can affect fish health due to the accumulation of leftovers and feces, changes in physical, chemical, and biological characteristics (Afrianto et al., 2015). The quality of unhealthy cultivation media might be able to cause many pathogens that cause disease in *P djambal*. Based on research conducted by Jasmanindar (2011) in the Kupang Regency aquaculture pond, it is known that parasites and bacteria are found in almost all freshwater fish samples. This is due to the management of cultivation that has not been done so well, especially in maintaining water quality. One of the bacteria that cause disease in *P djambal* is *Aeromonas hydrophila* (Wahjuningrum et al., 2008).

Pringsewu Regency is one of the districts that have a large enough production of freshwater fish farming in Lampung.

Pringsewu Regency has a fish farming area of 1070.32 hectares (Cahyonugroho & Hendriyanto, 2005). Based on the results of observations that have been made on one of the *P djambal* ponds in Pagelaran, Pringsewu, Lampung, it was found that the water conditions in the aquaculture pond were quite good. Although the stocking density of fish is quite high, the water conditions are still quite clear. Efforts to use natural food cultivators aim to minimize the remnants of pesticide ingredients that are usually contained in the artificial feed. The condition of ponds in open areas causes pond water to be directly exposed to the sun. So it is assumed that the *P djambal* culture media in the pond is still quite good.

In addition to observing water conditions in aquaculture ponds, preliminary observations were also made Way Ngison River has quite heavy flows Water that always flows will have a high DO content because it is always in contact with free air High DO content can inhibit the growth of bacteria. But even though it has a fairly heavy flow, it turns out that after being traced, the river is quite polluted with a lot of non-biodegradable household waste such as plastic waste that runs along with the river water flow from upstream to the middle of the river. Beside after conducting interviews with the surrounding population, it was found hat a large number of farmers drained wastewater from the aquaculture ponds into the Way Ngison river, thus indicating the process of water pollution. Based on this background, the aim of this research is to determine the differences in the number of bacteria found in the body of *P djambal* that are cultivated in ponds and those from the Pagelaran river, Lampung.

Materials and Methods

This research was conducted at the Biology Education Laboratory of the Tarbiyah and Teaching Faculty of UIN Raden Intan Lampung and the Regional Health Laboratory. The study was conducted in March - June 2016.

The research sample was 3 fish obtained from ponds and 3 fish collected from rivers. For the analysis of bacteria carried out from the mucus and gills of *P djambal*. Fish mucous is scraped off using a scalpel and then placed into a sterile test tube. Mucus is used as much as 9 ml for 3x repetition. For sampling on the gills, the gills are crushed using mortar and pastel then dissolved with distilled water with a ratio of 1: 9 (w / v). Take as much as 9 ml for 3x repetition.

Furthermore, diluted 10^{-9} and planted on NA media using technique *pour plate*. Incubate bacteria that have been planted for 48 hours. Calculation of the number of bacteria using The total Plate Count (TPC) method. Morphological observations were made by observing the shape of the colony, the shape of the elevation, the size of the colony, and the formation of margins. Gram staining is done to determine the type of bacteria.

Water quality testing is based on physical and chemical parameters. Physical parameters include water temperature, TTS, and brightness. While chemical parameters in the form of measurements of BOD, COD and pH

Results and Discussion

To find out the bacterial differences in *P djambal* that are cultivated in ponds and which live freely in rivers, the isolation process of the mucus and gills of the fish is carried out.

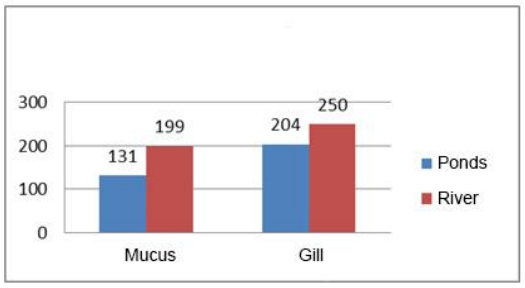

Figure 1. Average Total Bacteria on the body of *P djambal* fish in Pond and River

Based on research that shown in figure 1, it is known that the number of bacteria in

the *P djambal* gills is more than the number of bacteria in mucus, both isolated from ponds and rivers. Gills that act as a place for the release of water in the process of breathing become one of the causes of the discovery of more bacteria than in mucus. Based on the results of research conducted by Ratnawati et al., (2014), it is known that *Edwardsiella tarda is* also found more in the gills. This is because the gills are organs respiratory that are always in contact with water that contains bacteria. Mucus also acts as a protection against bacterial infections because mucus functions to minimize the body's frictional force with water so that bacteria contained in the water are difficult to stick to the body of a fish. *P djambal* is type of fish that does not have scales, so *P djambal* uses mucus for its self-defense process against pathogens in its body.

In addition to differences in the number of bacteria, the types of bacteria found in mucus and gills are also different. Bacteria most found in mucus are aerobic, whereas while most bacteria found in gills are facultative anaerobes. Bacteria most found in mucus or gills are gram-positive. Additional organic substances in rivers such as leaves and natural food leftovers in ponds affect the growth of gram-positive bacteria. This organic substance is a source of nutrition for the metabolism of gram-positive bacteria. In the waters of organic compounds will undergo a decomposition process that produces nitrogen in the form of amino acids, carbohydrates, protein peptides, and organic acids. These materials are organic compounds that are a source of energy for bacteria that carry out metabolism by chemoorganoheterotrophs. Gram-positive bacteria are chemoorganoheterotrophs bacteria. Gram-positive bacteria use oxidation of these organic substances as energy sources during metabolism (Staf Pengajar Fakultas Kedokteran UI, 1994). This makes rapid growth of gram-positive bacteria, so more bacteria are found.

Table 1. Characteristics of Bacteria found in *P djambal* from Ponds

Characteristics	Isolate code (mucus)			Isolate code (gills)	
	LT1	LT2	LT3	LT1	LT2
O_2 demand	Facultative anaerobes	Aerobes	Aerobes	Facultative anaerobes	Facultative anaerobes
Isolate color	Transparent white	White	White	White	White
Isolate edge	flat	Beryllium	flat	Beryllium	flat
Isolate size	small	Small	Small	Small	Small
Cell surface	smooth	smooth	Smooth	Smooth	Smooth
Cell form	Coccus	Coccus	Coccus	Coccus	Coccus
Gram	Negative	Positive	Positive	Negative	Positive

Table 2. Characteristics of Bacteria found in *P djambal* from River

Characteristics	Isolate code (mucus)					Isolate code (gills)	
	LS1	LS2	LS3	LS4	LS5	LS1	LS2
O_2 demand	Aerobes	Facultative anaerobes	Aerobes	Aerobes	Aerobes	Facultative anaerobes	Facultative anaerobes
Isolate color	White	Transparent white	White	White	White	White	White
Isolate edge	beryllium	Flat	Flat	beryllium	Beryllium	beryllium	Flat
Isolate size	large	Small	Large	small	Small	small	Small
Cell surface	smooth	Smooth	smooth	smooth	wrinkled	smooth	Smooth
Cell form	coccus	Coccus	basil	basil	Basil	basil	Basil
Gram	positive	Negative	positive	positive	Positive	negative	Positive

Bacteria found from the body of *P djambal* both cultivated in ponds and in rivers are mostly bacilli. Bacteria in the form of bacilli that are usually found are *Aeromonas hydrophyla*, *A. Salmonicida*, *Pseudomonas aeroginosa*, *Edwardsiella tarda*, *Morganella morganii* (Natiq et al., 2014). Bacilli are the most abundant bacteria found in nature. This is related to the growth system which is relatively faster than other types of bacteria. Basil has an unbalanced speed of division with the enlargement of its cell, many bacilli before reaching the length that should have begun to divide (Dwijosaputro, 1978). So that the spread in nature is relatively high and easier to find than other types.

The results showed that the number of bacteria found in rivers was more than that found in ponds. The condition of the waters is one of the causes of these differences. Ponds that are in an open area without any trees contribute to the exposure to sunlight that penetrates them. Sunlight contains ultraviolet light, which is able to change the composition of cell walls and change the composition of nucleic acids. Ultraviolet absorption by DNA can cause these microorganisms to be unable to replicate (Cahyonugroho & Hendriyanto, 2005). Ultraviolet light contained in sunlight is one of the causes of the death of microorganisms. This is what causes the growth of bacteria in pond water slower than bacteria in rivers.

Exposure to sunlight can increase water temperatures. The results of water quality measurements show that the pond temperature is 32^{o}C, while the river is 27^{o}C. Pond temperature exceeds the maximum limit that has been set at 30^{o}C. Ambient temperature higher than the temperature that can be tolerated will cause denaturation of proteins so that cells will die (Cahyonugroho & Hendriyanto, 2005). This is likely to cause the number of bacteria in pond fish is relatively less when compared to river fish.

Water temperature can affect the types of bacteria that live in rivers and ponds. Bacteria have optimum temperatures so they can grow and develop properly. Thermophile bacteria have optimum temperatures ranging from 40^{o} - 80^{o}C, mesophyll bacteria have temperatures ranging from 25^{o}-30^{o}C, while in psychrophile bacteria, the optimum temperature is 10^{o}-20^{o}C (Dwijosaputro, 1978). The possibility of bacteria found in this study is mesophyll bacteria.

Table 3. Quality of Pond Water and Pagelaran River

Quality	Test Result		Maximum limit*	Unit
	River	Ponds		
Chemical				
BOD	46	33	30	mg/l
COD	94,7	43,6	80	mg/l
pH	5,5	6	6,5-9,0	-
Physic				
TSS	41	42	20,0	mg/l
Themperature	27^{0}C	32^{0}C	25-30	^{0}C
Brightnes	55	58	≥45	Cm

Note: * Lampung Governor Regulation No.7 of 2010

The type of bacteria that is able to live in river and pond water is also determined by the pH. Every living creature has the ability to tolerate the pH level of the waters in which they live (Wijayanti, 2007). Water quality test how that the pH of river water is 5.5, while pond water is 6. Based on the pH range, microbes are divided into 3 groups, namely acidophilic microbes (pH ranges from 2 to 5.5), mesophilic microbes (pH ranges from 6-8) and alkafilic microbes (pH ranges from 8.4 - 9.5) (Dwijosaputro, 1978). Based on this, the possibility of bacteria found in river water is acidophilic bacteria,

while bacteria found in ponds is mesophilic bacteria.

Water quality is also affected by Total suspended solid (TSS). TSS are suspended materials consisting of mud, sand and microorganisms (Aditya & Watun, 2012). The maximum limit of TSS in group III waters is 20 mg/l, while the results of the study obtained river TSS is 41 mg/l and the pond is 42 mg/l. This shows that the TSS of rivers and ponds exceeds the maximum limit. The high value of TSS for rivers and ponds are influenced by the amount of additional organic material such as feed and leaves that falls in it. However TSS in river water is lower than in the pond water. This is due to the state of the river that has a flow and has a water change. Substitution of water causes additional organic substances in it to drift along with the flow, thus minimizing the buildup of organic matter. TSS is also one of the parameters that affect the number of bacteria found in the body of *P djambal*. TSS affects the thickness of the waters. Viscosity causes the process of diffusion of oxygen into the water disrupted, so that the oxygen content in the waters decreases. Decreased oxygen levels in the waters will affect the growth of pathogenic bacteria such as *Aeromonas salmonicida* (Afrianto et al., 2015).

The results showed that BOD and COD content in rivers was higher than in the ponds. Increased BOD and COD in water indicate a decrease in water quality. BOD is the need for oxygen, which is used to break down waste material in water by living organisms. The waste material will be biologically stabilized by involving microbes. A high enough BOD level allows the number of microorganisms to use more oxygen. Oxygen used for the oxidation of waste materials causes the availability of oxygen for other living things such as fish is decreasing. Decreased oxygen levels can cause stress on the fish, so the immune system declines. At that time, the disease will easily enter the body of the fish, both in the form of bacteria and parasites (Salikin et al., 2014).

Conclusion

Based on the research, it can be concluded that there are differences in the number of bacteria found in the body of *P.djambal* from rivers and ponds. The number of bacteria in river fish is higher than the number of bacteria in ponds fish. The bacteria count of river fish in the gills reaches 250 x 107 Cfu/g and on the mucus 199 x 107 Cfu/g. While the number of fish bacteria originating from the ponds on the gills amounted to 204 x 107 Cfu/g and in the mucus section amounted to 131x107 Cfu/g.

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