

TILAPIA FISH (*Oreochromis niloticus*) QUALITY DURING STORAGE AT ROOM TEMPERATURE

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ABSTRACT

Fish is a food product that is high perishable. The natural content in fish such as fat, protein, carbohydrates and water are very favored by destructive microbes so that it will be very easy for fish to be damaged. This damage will lead to a decline in the quality of fishery products so that it needs good handling. The deterioration of fish quality is determined by the length of storage time and storage temperature. This study aims to determine the process of deterioration of the quality of tilapia during storage at room temperature. The ingredients used are fresh tilapia. The organoleptic test equipment is the score sheet of fresh fish. Organoleptic assessment was carried out every hour for 12 hours. Based on the results of the research on the quality deterioration of tilapia during 12 hours of storage, it showed that the organoleptic value of tilapia decreased from 0 to 12 hours. The decline of the fish phase is divided into 3 stages, namely the pre rigor mortis phase, the rigor mortis phase, and the post rigor mortis phase. The pre rigor mortis phase of tilapia occurred at 0 to 5 hours with organoleptic test values ranging from 8 to 9. The rigor mortis phase occurred at 6 to 10 hours with organoleptic values ranging from 7.6 to 9.7.8. While the post rigor phase occurred at the 11th and 12th hours with organoleptic values ranging from 6.5 to 6.8.

Keyword : *Tilapia, Organoleptic, Rigor mortis, Temperature*

1. INTRODUCTION

Fish and other fishery products are a category of perishable food. The quality of fish must be maintained from the time it is caught to the consumer. The quality of fish can be maintained if properly handled. The principle of handling fish is clean, careful, stored at a cold temperature, and fast. This damage will lead to a decline in the quality of fishery products, therefore handling of fish is needed with the aim of ensuring that fish freshness can be maintained or fish spoilage can be delayed [1] The process of decreasing fish freshness can be grouped into three stages, namely the pre-rigor stage mortis, rigor mortis and post rigor mortis. There are many factors that determine the speed of decline in freshness in fish, including storage temperature. Fish storage temperature plays a very important role when fish die. At a low temperature of 0oC after the fish dies, it can prolong the seizure period (rigor mortis), determine enzymatic, bacterial, chemical activities and change the physical so that it can extend the shelf life of fish [2].

After the fish die, there will be a process of physical, chemical, and organoleptic changes that occur quickly and lead to the process of decay. To determine the level of freshness of fish can be done through physical, sensory or organoleptic, chemical, or microbiological parameters. After the fish dies, biochemical changes will take place and a process of deteriorating fish quality begins to occur due to three types of activities, namely autolysis, chemical, and bacterial. In fish deterioration, the chemical reaction that occurs is auto-oxidation of the myoglobin pigment, as well as other changes. Another change is a very complex device, namely the presence of biochemical reactions that depend on the number and types of enzymes present in the fish and the bacteria that inhabit the fish. The process of quality degradation in fresh fish begins with an overhaul by enzyme activity that is naturally present in fish meat to a certain stage which is then continued with the decay process [3].

The decline in fish quality occurs after the fish are caught or die. Speed is influenced by many factors, such as sex, type of fish, fish size, environmental conditions, physical treatment, number of micro-organisms, and enzyme activity. The 4 stages of fish quality deterioration include the pre rigor, rigormortis, post rigor, autolysis and bacterial growth stages [4]. Rigor mortis Tilapia fish occurs since 2-10 hours after the fish died or was killed. The condition of the fish meat is stiff and hard due to the muscle contractions that occur. In appearance the fish is still

fresh and the organoleptic value is still acceptable. At this stage the fish begins to react with bacteria in the process of increasing the amount of hipoxantin which causes the fish meat to taste bitter [5]. Handling of fresh fish plays an important role because the main goal is to maintain postharvest freshness of fish as long as possible [6]. Based on the problems above, it is necessary to conduct research on the process of deterioration of the quality of tilapia during cold storage to see changes in each phase of the deterioration of the quality of the fish to the process of decay.

2. METHODOLOGY

2.1 Place and Time of research

The research and test of rigor mortis of tilapia fish were carried out in December 2020 at the Tropical Fisheries and Marine Laboratory PSDKU UNPAD Pangandaran, Cintaratu Village, Parigi, Pangandaran Regency.

2.2 Tools and Materials

The tools used in this study are a storage cupboard for storing fish, a score sheet to assess the deterioration of fish quality, a plate as a container for fish to be observed, and a knife to kill fish. The ingredients used are fresh tilapia

2.3 Work procedure

Fresh tilapia is killed directly by stabbed in the head of the fish with a needle. Tilapia was dead and intact directly organoleptically using a fresh fish score sheet. panelist. After the observation, the organoleptic characteristics of tilapia will be obtained, namely in the pre rigor phase, rigor phase, post rigor phase, and the decay phase of fish during storage at room temperature. In the first stage, fish were stored at room temperature for 12 hours to determine the pre rigor, rigor mortis, post rigor, and decay phases. Observations were made to the point of change in the quality of tilapia including pre rigor, rigor mortis, post rigor and decay for 12 hours.

2.4 Data Analysis

This study used a laboratory experimental method. Fresh fish were stored at room temperature and observed every hour for 12 hours of storage. The data obtained were tested organoleptically using the score sheet SNI 01-2346-2006 [7] regarding fresh fish. The data obtained were then analyzed descriptively.

3. RESULTS AND DISCUSSION

The determination stage is carried out by assessing the organoleptic every 1 hour for 12 hours using a score sheet for organoleptic and or sensory testing instructions (SNI 01-2346-2006), the checking stage is carried out after stage 1 by determining the time span of the fish condition in each phase . Observations were made to determine changes in the quality of tilapia including pre rigor, rigor mortis, post rigor and decay for 12 hours. The data on the organoleptic test results of tilapia during storage at room temperature for 12 hours are presented in Table 1

Table-1: Organoleptic test of tilapia stored at room temperature for 12 hours

Specification	hours												
	0	1	2	3	4	5	6	7	8	9	10	11	12
Eyes	9	9	8	8	7	7	7	7	7	7	7	6	6
Gills	9	9	9	9	9	8	8	8	8	7	7	6	6
Slime	9	9	9	9	8	8	8	8	8	8	7	7	7
Flesh	9	9	9	9	8	8	7	7	7	7	7	7	5
Odour	9	9	9	9	8	8	8	7	7	7	7	7	5
Texture	9	9	9	9	8	8	8	7	7	8	8	9	9
Average	9	9	8,8	8,8	8	7,8	7,7	7,3	7,3	7,2	6,8	6,7	6,5

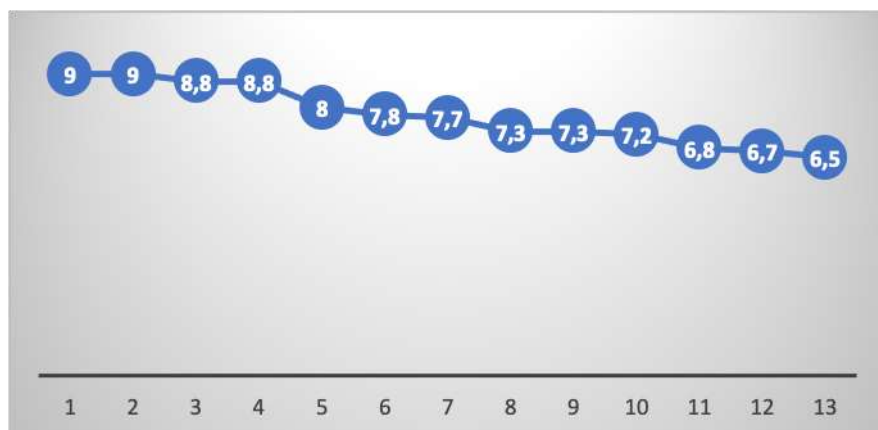


Chart-1 : Organoleptic value of tilapia stored for 12 hours at room temperature

The organoleptic interval value of tilapia stored for 12 hours at room temperature is 6.096 – 7.364, which means that the fish is still fit for consumption but has reduced quality. Determination of the stage of the condition of the fish was determined physically from the organoleptic test. The results of determining the rigor mortis phase of tilapia during storage can be seen in Table 2.

Table 2. Phase of Tilapia Quality Deterioration during 12 hours of Storage

No	Phase of Rigor Mortis	Hours
1	Pre Rigor Mortis	0-5
2	Rigor Mortis	6-10
3	Post Rigor Mortis	11-12
4	Fish Spoilage	-

Based on the observations made in stage 1 carried out by one person, the results showed that, the rate of quality decline at 0 to 5 hours found that fish in the rigor phase were a phase that occurred simultaneously when the fish had entered the death phase. Changes in the sample carried out at 0.1,2 hours have almost the same characteristics, namely; condition Bright eyes, protruding eyeballs, clear cornea, bright red gills, no mucus, mucus on the body surface has a clear layer; transparent, shiny bright; Very fresh smell, type specific, dense texture, elastic when pressed with fingers, difficult to tear the flesh from the spine.

While the results of the observation of tilapia at 6-10 hours enter the rigor phase where there are the following characteristics, namely some of the mucus layer is starting to get a little cloudy, the color is a bit white, less transparent, and the texture of the fish is rather dense, elastic when pressed with the fingers, difficult tearing flesh from the spine is one of the hallmarks of entering the rigor stage. Meanwhile, tilapia enters the post rigor stage at 11 and 12 hours, with the appearance of slightly sunken eyeballs, grayish pupils, slightly cloudy cornea, slightly dull red gills, a little mucus, the mucus layer starts to get a little cloudy, slightly white in color, less transparent.

The rigor mortis phase is characterized by stiff and hard muscles. Actomyosin has an important role in the rigor mortis phase, the formation of actomyosin which takes place slowly in the early stages then becomes fast in the later stages associated with the loss of flexibility of the fish flesh. When the cycle of contraction between relaxations between myosin and actin in the myofibrils is stopped and permanent actomyosin is formed. The appearance of tilapia entering the rigor mortis phase has characteristics, namely bright eyes, slightly flattened eyeballs, and clear cornea, fish gills are not bright red without mucus, while the mucus on the surface of the body is quite clear, transparent, and there is no visible change in color. , fresh smell and specific type and texture of the meat is dense, somewhat elastic when pressed and difficult to tear the meat from the spine.

The pre rigor condition for carp occurs from 0 to 5 hours. The pre rigor phase is the first change that occurs when the fish dies, characterized by the relaxation of the fish's muscles shortly after death so that the fish are easily flexed, while biochemically, the levels decrease. ATP and creatine phosphate. These changes occur because the blood circulation that carries oxygen for metabolic activities stops. However, in the fish's body, the enzymatic process is still going on even though the fish has died, the process runs out of control, resulting in extraordinary biochemical changes [8].

The lower the curve shows that the longer the fish is stored, the lower the quality of the fish. Use of quality deterioration, namely the pre rigor and rigor mortis phases, this is due to the effect of the temperature difference between the two treatments, the greater the temperature difference in the temperature of the fish habitat and the storage temperature used, the more inhibited bacterial growth will be [9]. The low temperature also affects the condition of the fish meat entering the rigor mortis phase. During storage using low temperatures, the protein in fish undergoes a denaturation process which causes the fish meat which was originally elastic to become hard [10]. The length of the rigor phase is influenced by the initial conditions of the fish, fish species, storage temperature, handling method, fish size and physical condition of the fish.

Fish that undergo the autolysis process can be recognized by the presence of urine odor due to the ammonia compounds produced. Changes in protein and fat in the autolysis process of fish can change the taste of fish meat, texture and appearance [11]. According to [12] fish spoilage due to microbial activity is dominated by bacteria. In a live state, bacteria cannot enter important organs in the fish's body because fish have a barrier to prevent bacterial attack. However, this limit will disappear or will not work when the fish dies so that bacterial attack cannot be prevented. Generally, bacteria will attack the gills, skin and digestive tract of fish.

4. CONCLUSIONS

Based on the results of the research on the quality deterioration of tilapia during 12 hours of storage, it showed that the organoleptic value of tilapia decreased from 0 to 12 hours. The decline of the fish phase is divided into 3 stages, namely the pre rigor mortis phase, the rigor mortis phase, and the post rigor mortis phase. The pre rigor mortis phase of tilapia occurred at 0 to 5 hours with organoleptic test values ranging from 8 to 9. The rigor mortis phase occurred at 6 to 10 hours with organoleptic values ranging from 7.6 to 9.78. While the post rigor mortis phase occurred at the 11th and 12th hours with organoleptic values ranging from 6.5 to 6.8.

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