THE EFFECT OF *BLANCHING* TIME VARIATION ON THE PHYSICAL QUALITY OF BROCCOLI VEGETABLES *(Brassica oleracea var. italica)*

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Abstract

Broccoli has one drawback, namely the shelf life and low durability of broccoli, especially if after harvest the broccoli is stored at room temperature. The physical quality of food products plays an important role as a characteristic that becomes the first assessment of the quality of a product. One way to maintain the quality of agricultural products is through wet processing techniques, one of which is by *blanching*. The purpose of this study was to determine the effect of variations in *blanching* time between 2 minutes, 3 minutes, 4 minutes at a temperature of 85°C on the physical quality of broccoli *(Brassica oleracea var. Italica).*

This type of research is a *Pre-experiment* with a *Pre test and Post test design* approach. Statistical analysis used ANOVA. The research method blanching on broccoli was examined from day 0 to day 6 to see its physical quality.

The results showed that statistical analysis using ANOVA showed that the sig. 0.737. Sig. value shows that sig. > 0,05 so there is no significant difference between blanching time of 2 minutes, 3 minutes, and 4 minutes.

The organoleptic test of physical quality conducted by 5 panelists showed that the *pre test and post test* samples from the 4 indicators namely texture, color, smell, taste began to experience a significant decrease on day 2-3. The suggestion is that people should do blanching to preserve food. For further research, it should be stored at low temperatures to maintain good physical quality and it is necessary to conduct research on the nutritional content and quality of microbiological quality.
Keywords: **physical quality; blanching; broccoli** *(Brassica oleracea var. italica)*

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1. Introduction

Food is everything that comes from biological sources of agricultural, plantation, forestry, fishery, animal husbandry, water and water products, both processed and unprocessed, which is intended as food or drink for human consumption including food additives, food raw materials, and other materials used in the process of preparing, processing and/or making food of beverages (1).

World Health Organization (WHO) defines foodborne diseases as diseases that are generally infectious or toxic caused by compounds that enter the body through the food consumsed (2). In America, there are about 48 million cases per year of foodborne diseases. In Indonesia, based on BPOM, the highest incidence of poisoning is caused by food. Cases that occurred in 2014 reached more than 500 cases. In 2011, it was reported that 18.144 people were exposed, while cases of food poisoning (KLB) were reported as many as 6.901 people were sick and 11 people died (3).

The physical quality of food products plays an important role as a characteristic that becomes the first assessment of the quality of a product. This happens because physical quality is easier and quicker to identify than chemical, microbiological and nutritional quality. One way to maintain the quality of agricultural products is by using wet proccessing techniques, one of which is by blanching. Blanching is the preheating of foodstuffs at boiling temperature or nearly boiling for a short time which aims to inhibit or prevent the activity of enzymes and microorganism on the ingredients (4).

Broccoli has one drawback, namely the shelf life and low durability of broccoli, especially if after harvest the broccoli is stored at room temperature. According to the results of research conducted by Angela Laura Oktaviani on the optimization of the blanching treatment in broccoli, it was found that research results of broccoli that were preferred by respondents were

the results of steam blanching at 80°C for 2 minutes. The longer the storage, the texture of broccoli stored at room temperature, refrigerator temperature, and freezer (after thawing) was not significantly different from the texture of broccoli on the 1st day. The longer broccoli is stored, the darker it is and the color of broccoli stored at room temperature and refrigerator tends to be yellow-brown, while those stored at temperature tend to be dark green (5).

Based on the series of descriptions above, the reseacher is interested in conducting a study entitled **"The Effect of Blanching Time Variations on The Physical Quality of Brococoli Vegetables** *(Brassica oleracea var. italica)* **in 2021"**.

2. Material and Methode

This type of research is a *Pre-experiment* with a *Pre test and Post test design* approach. The research method blanching on broccoli was examined from day 0 to day 6 to see its physical quality. The independent variables in this study was the blanching time (2 minutes, 3 minutes, 4 minutes). The dependent variable in this study is physical quality. The control variables in this study were washing water, washing technique, blanching temperature.

The tools used in this study include scale, thermometers, pans, gas stoves, stopwatches, measuring cups. Materials used in this study include fresh broccoli *(Brassica oleracea var. italica),* water, ice water.

Water blanching procces:

First, prepare the broccoli to be blanched in ±6-7 cm pieces, each weighing 20 grams for each sample. Then the broccoli is washed using running water, then drained. Second do the water blanching process by boiling 500 ml of water for 100 grams of broccoli on the stove using medium heat until the water temperature reaches ±85°C. After the water reaches that temperature, the broccoli is then put into a filter cloth before being immersed in boiling water and the temperature is kept at temperature of ±85°C. The time used to boil broccoli in the water blanching process is 2 minutes, 3 minutes, and 4 minutes. Third, the broccoli is immediately cooled by putting it in ice water for 2 minutes to stop the cooking process, the drained so that the water content in the broccoli is reduced. Fourth, broccoli is packaged in plastic valves and airthight as much as 20 grams per package to be distributed to each panelist. The sample was then stored at room temperature of 25°C in an open state.

The research data is normally distributed so that no further tests are carried out. Statistical analysis used ANOVA. The hypothesis used in this case is that there is no significant difference in the variation of blanching time on physical quality of broccoli *(Brassica oleracea var. italica).*

3. Result and Discussion

a. Calculating the Physical Quality Organoleptic Test Results on Broccoli *(Brassica oleracea var. italica)* Before *Blanching*

Organoleptic test of physical quality before being treated was carried out on 3 samples to be tested, namely with blanching 2 minutes, 3 minutes, and 4 minutes, which functions as a control. The number of pre test samples was 9 samples with repetition or replication 3 times for each treatment. This test aims to determine the physical quality of broccoli which includes 4 indicators namely texture, color, smell, and taste carried out by 5 panelists. The results of the organoleptic test before blanching are as shown in table 1.

Table 1: Results of Physical Quality Organoleptic Tests on Broccoli *(Brassica oleracea var. italica)* Before *Blanching*

Day of inspection-	Pre 2'	Pre 3'	Pre 4'
0	9	9	9
1	7,5	7,5	7,5
2	6	6	6
3	5	5	5
4	5	5	5
5	4	4	4
6	4	4	4
Min	**4**	**4**	**4**
Max	**9**	**9**	**9**
Average	**5,79**	**5,79**	**5,79**

Source: Primary Data, 2021.

The physical quality of broccoli before blanching began to experience a significant decrease in physical quality on day 3. The decrease in the physical quality of broccoli

will be in line with the length of storage. Storage that can cause vegetables to last a long time is at cold temperatures, while in this study the temperature used is room temperature. Factor that affect the decrease can be caused by temperature. Research (6) that the shelf life of broccoli will be more durable when treated at a cold room temperature of 0°C for 10-14 days. If without this treatment, the maximum durability is 3 days with the base of the stem watery and so on rotting.

b. Calculating the Physical Quality Organoleptic Test Results on Broccoli Vegetables *(Brassica oleracea var. italica)* After *Blanching*

Organoleptic physical quality test after being given treatment was carried out on 3 samples to be tested, namely with blanching times of 2 minutes, 3 minutes, and 4 minutes. The organoleptic test results after blanching are as in table 2.

Table 2: Results of Physical Quality Organoleptic Tests on Broccoli *(Brassica oleracea var. italica)* After *Blanching*

Day of inspection-	Post 2'	Post 3'	Post 4'
0	9	9	9
1	7	6,5	6
2	5	5	4,5
3	5	4,5	4
4	3,5	3	4,5
5	3	2	2
6	2	2	2
Min	**2**	**2**	**2**
Max	**9**	**9**	**9**
Average	**4,93**	**4,57**	**4,57**

Source: Primary Data, 2021.

The physical quality of broccoli before blanching began to experience a significant decrease in physical quality on day 2. The decrease in physical quality of broccoli is influenced by environmental conditions, namely temperature. A good temperature for storing vegetables is at a low temperatures. Research (7) storage of ingredients at low temperatures is an effective way to extend the shelf life of fresh ingredients, because this way can reduce respiration activities, aging processes, and the growth of microorganism.

c. Analyzing the Effect of Blanching Time on Physical Quality of Broccoli *(Brassica oleracea var. Italica)*

Bivariate data analysis using statistical tests was used to determine the difference in variations in blanching time between 2 minutes, 3 minutes, and 4 minutes on the physical quality of broccoli. The statistical test used to analyze bivariate data was the ANOVA (Analysis of Varians) test. ANOVA test is a test used to determine the significant difference in the variation of blanching time on the physical quality of broccoli *(Brassica oleracea var. italica).* ANOVA test can be done if the requirements for homogeneous data (Test of Homogenity of Variances) have been met. The results of the Test of Homogenity of Variances are as in table 3.

Table 3: *Test of Homogenity Variances*

Levene Statistic	df1	df2	Sig.
.174	5	36	.971

Based on table 3 the homogenity test results show that the sig. value is 0,971 which means that the variance data is homogeneous so that it meets the requirements for the ANOVA test.

Tabel 3: ANOVA Test Results

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	13.190	5	2.638	.551	.737
Within Groups	172.429	36	4.790		
Total	185.619	41			

Based on table 3 the results of the ANOVA test show that the sig. 0,737 which means the value of sig. 0,737 > 0,05, so there is no significant difference in blanching time variation on the physical quality of broccoli *(Brassica olerace var. italica)* between 2 minutes, 3 minutes, and 4 minutes. This can be caused by many factors, both technically research and data processing. (Wahyu Widhiarso, 2011) in (8) mentions the cause of the insignificant statistical test results due to several things, including the occurrence of errors in data entry, statistical test models that are not accordance with the research data, small sample size, analysis requirements that are not complied with, tools measure that is less valid and reliable, and other causes.

4. Conclusion

a. Calculating the Physical Quality Organoleptic Test Results on Broccoli Vegetables *(Brassica oleracea var. italica)* Before *Blanching*

Based on the physical quality organoleptic test conducted by 5 panelists, the results showed that broccoli was suitable for consumption up to day 3, the rest could not be consumedd, characterized by: less

dense texture, slighty brownish green color, slighly foul smelling, slighly bland taste and slightly bitter.

b. Calculating the Physical Quality Organoleptic Test Results on Broccoli Vegetables *(Brassica oleracea var. italica)* After *Blanching*

Based on the physical quality organoleptic test conducted by 5 panelist, it was found that broccoli was suitable for consumption up to day 2, the rest could not be consumed, characterized by: slightly soft texture, green in color, slightly foul smelling and almost stinging, taste a bit bland.

c. Analyzing the Effect of Blanching Time on Physical Quality of Broccoli *(Brassica oleracea var. Italica)*

Analysis of the effect of variations in blanching time (2 minutes, 3 minutes, and 4 minutes) on the physical quality of broccoli *(Brassica oleracea var. italica)* using the ANOVA test, show that the sig. 0,737 which means the value of sig. 0,737 > 0,05, so there is no significant difference in blanching time variation on the physical quality of broccoli *(Brassica olerace var. italica)* between 2 minutes, 3 minutes, and 4 minutes of use.

5. Acknowlegdement

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