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RESEARCH ARTICLE

EFFECT OF TEMPERATURE AND DRYING TIME ON QUALITY REDCHILI POWDER (CAPSICUM ANNUUM L.)

Rita Hayati, Marai Rahmawati and Wahyu Ramadhiny
Department of Agrotechnology, Faculty of Agriculture, Syiah Kuala University, Indonesia.

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Abstract

Red chili (Capsicum annuum L.) is an essential horticultural commodity for the human. However, its freshness level is difficult to maintain so it cannot last long. An alternative to this problem is to process it into powder through the drying process so that it has a long shelf life. The purpose of this study was to determine the effect of drying temperature, drying time, and the interaction between the two on the quality of red chili powder. The research was conducted at the Faculty of Agriculture, Syiah Kuala University from May to June 2023. The study used a Completely Randomized Design 3x3 factorial pattern with 3 replications, there were 9 treatment combinations, 27 experimental units. The first factor is drying temperature with 3 levels (60, 65, and 70˚C) and the second factor is drying time with 3 levels (20, 23, and 26 hours). Observation parameters included yield, water content, vitamin C content, capsaicin content, ash content, fat content, color measurement and organoleptic test. The results showed that drying temperature had a very significant effect on yield, water content, vitamin C content, capsaicin content, ash content, fat content, color, and organoleptic test. The best temperature was 60˚C. Drying time has a very significant effect on yield, water content, vitamin C content, capsaicin content, ash content, fat content, and color (a and b) and has a significant effect on color (L) and organoleptic test (smell). The best drying time is 20 hours. There is a very significant interaction between temperature and drying time on yield, moisture content, capsaicin content, ash content, and organoleptic test (aroma) and there is a significant interaction on vitamin C content, color (L), and organoleptic test (texture). The best treatment combination of temperature 60˚C with a drying time of 20 hours.

Introduction:-

Red chili (Capsicum annuum L.) is one of the most important horticultural commodities for human consumption.This commodity has a variety of benefits, both related to household activities and for other purposes such as traditional medicine ingredients, food, beverages and industrial raw materials (Nurahmi et al., 2011). Chili gets great attention among the public because of the high economic value. The supply of chili peppers continues to

Corresponding Author:- Wahyu Ramadhiny
Address:- Department of Agrotechnology, Faculty of Agriculture, Syiah Kuala University, Indonesia.

increase every year in direct proportion to the increasing population and the development of industries made from chili peppers (Setiawan, 2014).

The market value of chili tends to fluctuate due to the condition of the harvest at the farm level. The increase in chili prices occurs during the rainy season which results in crop failure resulting in a scarcity of chili products. Meanwhile, when the supply is abundant, the price of chili in the market decreases. This situation is certainly very detrimental to farmers who are looking for a large profit when the main harvest arrives. However, these conditions still require farmers to sell red chilies in fresh conditions because the harvest does not last long (Ramdani et al., 2018).

Horticultural commodities have a short storability, and red chili peppers are no exception. The freshness level of chili is difficult to sustain especially during humid conditions. This is due to the highwater content contained in chili which is up to 90% of the chili content itself (Setiawan, 2014). There are other factors that affect the short shelf life of chilies because after the harvesting process red chilies still undergo a respiration process which naturally cannot be stopped and undergo metabolic changes.

This alternative problem can be handled with proper post-harvest processing. The right post-harvest handling for chili is to process it into red chili powder so that it can extend the shelf life and can maintain the quality and content of chili (Cahyani and Suhastyo, 2020). Handling fresh red chili into powder will go through several stages including blanching, drying, and grinding.

Drying is an effort made to decrease the water content to a certain limit so that biological reactions can stop and microorganisms and insects cannot live in it. There are several ways to dry chili peppers including with the help of sunlight (natural) and mechanically (artificial). Mechanical drying is done by using a drying oven. The advantages of the mechanical method are that the amount of material required is smaller and the weight is reduced, thus saving packing space and facilitating transportation. Other than that, mechanical drying can increase the durability of a material, because some of the water in the material is removed or evaporated to reach a certain moisture content (Pustaka, 2008).

Processing fresh chilies into powder should have a moisture content of approximately 5-8% which requires a drying time of 20-25 hours for whole chilies, and drying reaches 10-25 hours for split chilies. Putra and Asriyani (2019) in their research used the level of drying time for 20, 23, and 26 hours, the results of their research stated that chilies with a drying time of 20 hours were of interest to panelists on a hedonic scale and description for the color and taste of large red chilies. Ramdani et al. (2018) said the drying temperature can be done at 50˚C to a maximum limit of 80˚C. Meanwhile, Taufik (2011) states that the temperature used in chili drying is 60˚C.

Dendang et al. (2016) stated that if chili powder is to be obtained with good quality, it must pay attention to the use of the most appropriate drying time and temperature. Drying using high temperatures can speed up the drying process, but is often a factor in losing the nutritional content of dried chilies. Therefore, this research needs to be done so that it can be a source of information about postharvest management of red chili with optimal drying temperature and duration to maintain the quality of red chili powder.

Method:-

Time and Place

The research was conducted at the Horticulture Laboratory, Seed Science and Technology Laboratory, Plant Breeding Laboratory, and Food and Agricultural Products Analysis Laboratory, Faculty of Agriculture, Syiah Kuala University, Banda Aceh from May to June 2023.

Tools and Materials

The tools used in this research are: analytical scales, oven, stove, gas, spectrophometer, blender, jar container, knife, cutting board, pot, tray, camera, stopwatch, wooden tongs, measuring cup, erlenmeyer, drop pipette, burette, spatula, aluminum cup, thermometer, desiccator, 60 mesh sieve, vortex mixer, fat flask, soxhlet tool, basket, name tag, and stationery. While the materials used in this research are: aquades, iod 0.01 N, absolute ethanol, filter paper, n-hexane liquid and 4,050 g of fresh red chili (Capsicum annuum L.) Manyar variety from Lambaro Traditional Market, Ingin Jaya District, Aceh Besar Regency.

Experiment Design
This study employed an experimental approach utilizing a completely randomized design (CRD) with a 3 x 3 factorial arrangement and 3 replications, resulting in a total of 9 treatment combinations conducted across 27 experimental units. The investigation focused on two factors, each comprising three experimental levels: drying temperature (at 60, 65, and 70˚C) and drying time (for 20, 23, and 26 hours). Data from the study underwent analysis via ANOVA. If the F test results indicated a significant impact at a 5% significance level ($\alpha = 5\%$), further testing to discern differences between treatment means was carried out using the Honestly Significant Difference (HSD) procedure at the 5% level.

Research Procedure
The implementation of research begins with the process of sorting red chilies which is carried out based on the freshness of the chilies which can be viewed in terms of color and texture and then ensuring that the red chilies used are not damaged or rotten. The process is then carried out by dipping the fresh red chili peppers into a container of water at 90˚C for 7 minutes. The red chili that has been blasted will be cut into two parts to remove the remaining water absorbed in the blasting process and then aerated for ± 1 hour. The next stage is drying the red chili by putting the red chili into the oven and then adjusting the temperature and removing it when it has reached the drying time according to the written treatment combination. The dried chilies are then ground using a blender. The chili peppers that have been finely sieved using a 60 mesh sieve are then put into a container and then the parameters will be analyzed.

Parameter Observation
Observation of parameters in this research was carried out after giving treatment to each sample. The observation parameters are: the yield (Murti, 2017), water content (Sebayang, 2016), vitamin C content (Sebayang, 2016), capsaicin content (Gonzalez et al., 2015), ash content (AOAC, 1995), fat content (Pargiyanti, 2019), color measurement (Hayati and Nasution, 2021) and organoleptic test.

Results and Discussion:-

The yield
Based on Table 1, it is evident that, at a drying temperature of 60˚C (S1), the most favorable yield is achieved after 20 hours (L1) of drying, which significantly differs from the yields after 23 hours (L2) and 26 hours (L3) of drying temperature at 65˚C (S2), the highest yield is observed drying time 20 hours (L1) of drying time, which is significantly distinct from the outcomes after 23 hours (L2) and 26 hours (L3) of drying. Similarly, at 70˚C (S3), the maximum yield is also attained after 20 hours (L1) of drying, and this result is not significantly different from the yields after 23 hours (L2) and 26 hours (L3) of drying. In summary, the optimum yield is obtained at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1), whereas the lowest yield is observed at a drying temperature of 70˚C (S3) with a drying time of 26 hours (L3).

Table 1:- Average yield (%) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	**Draying Time (hours)**			**HSD 0,05**
	20 (L_1)	**23 (L_2)**	**26 (L_3)**	
60˚ (S_1)	21,73Cc	20,10Cb	19,37Ca	
65˚ (S_2)	19,94Bb	19,56Ba	19,00Ba	**0,68**
70˚ (S_3)	18,64Aa	18,33Aa	18,08Aa	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of $\alpha = 0.05$.

The results obtained indicate that the higher the temperature and the longer the drying time will cause a decrease in the amount of yield in the powdered red chili sample, and vice versa. This is in accordance with research conducted by Murti (2017) which says that a high enough drying temperature causes the water content to evaporate more, causing the resulting yield to decrease. Vice versa, the lower the temperature used, the less water is evaporated so that a high yield is obtained. In addition to temperature, drying time also affects the amount of yield produced. Desrosier (1998) said that the more temperature and the more drying time used to dry a material, the more water evaporates from the material, so the weight of the material decreases and results in a low yield.

Water Content

The outcomes presented in Table 2 indicate that, when drying at 60˚C (S1), the moisture content reaches its peak after 20 hours (L1), which is significantly different from both 23 hours (L2) and 26 hours (L3) of drying. Meanwhile, at a drying temperature of 65˚C (S2), the highest moisture content is achieved drying time 20 hours (L1) of drying, and this result does not exhibit significant differences when compared to the moisture content drying time 23 hours (L2) or 26 hours (L3) of drying. Similarly, at 70˚C (S3), a higher moisture content is observed drying time 20 hours (L1) of drying, and this outcome is not significantly different from the moisture content observed drying time 23 hours (L2) or 26 hours (L3) of drying. In summary, the maximum moisture content is attained when drying at 60˚C (S1) drying temperature with a draying time 20 hours (L1), while the lowest moisture content is observed at a drying temperature of 70˚C (S3) for drying time of 26 hours (L3).

Table 2:- Average water content (%) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	**Draying Time (hours)**			**HSD 0,05**
	20 (L_1)	**23 (L_2)**	**26 (L_3)**	
60˚ (S_1)	10,55Cb	8,57Ca	8,49Ca	**0,69**
65˚ (S_2)	7,90Ba	7,67Ba	7,34Ba	
70˚ (S_3)	6,74Aa	6,58Aa	6,13Aa	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of $\alpha = 0.05$.

The research findings regarding water content parameters reveal that elevated temperatures and extended drying time periods lead to reduced water content, while the opposite holds true. This aligns with Sebayang's assertion in 2016, which states that higher temperatures and longer drying durations provide more heat energy to the material, leading to increased water evaporation from the substance. The water content levels in all treatment combinations are considered satisfactory as they adhere to the Indonesian National Standard (SNI 01-3389-1994), which specifies a maximum water content threshold of 11% for chili powder. As highlighted by Riansyah et al. in 2013, water content holds great significance in food ingredients because it has a profound impact on the appearance, texture, and flavor of such ingredients. The moisture content in food affects its freshness and shelf life; higher moisture levels create conditions conducive to the proliferation of bacteria, molds, and yeasts, resulting in notable alterations in food ingredients.

Vitamin C content

Table 3 illustrates that when the temperature is set at 60˚C (S1), it results in the highest vitamin C content after 20 hours of drying time (L1), which is distinctly different from the outcomes observed at 23 hours (L2) and 26 hours (L3) of drying temperature. Similarly, at 65˚C (S2), the peak vitamin C content is achieved with a drying time duration of 20 hours (L1), exhibiting significant differences compared to both 23 hours (L2) and 26 hours (L3) of drying temperature. Furthermore, at 70˚C (S3), the highest vitamin C content is obtained during the 20-hour drying time (L1), which is notably different from the vitamin C levels after 23 hours (L2) and 26 hours (L3) of drying. In summary, the optimal vitamin C content is attained at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1), while the lowest vitamin C content is observed at a temperature of 70˚C (S3) with a drying time of 26 hours (L3).

Table 3:- Average vitamin C content (%) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	**Draying Time (hours)**			**HSD 0,05**
	20 (L_1)	**23 (L_2)**	**26 (L_3)**	
60˚ (S_1)	21,16Cc	20,40Cb	19,47Ca	0,44
65˚ (S_2)	19,05Bc	18,02Bb	17,01Ba	
70˚ (S_3)	16,95Ac	15,29Ab	14,66Aa	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of $\alpha = 0.05$.

The results showed that the higher and longer drying time can reduce the level of vitamin C in red chili powder. This is in agreement with the statement of Sudaryati et al. (2011) which stated that the drying process at high temperatures and too long a time is undesirable, because it will cause damage and quality degradation due to reduced nutrients, especially vitamin C, color, and β-carotene in dried chili powder. Vitamin C at high temperatures can undergo oxidation, this oxidation produces precursor compounds that form brown pigments through reactions involving Strecker degradation. Browning in red chili powder is due to oxidative damage to carotenoid pigments and oxidation of vitamin C (Wiriya et al., 2009). Hasrayanti (2013) stated that vitamin C is a compound that is easily lost due to heat generated from the drying process.

Capsaicin Content

As per the data presented in Table 4, it becomes evident that when the temperature is set at 60˚C (S1), it results in the highest capsaicin content after a 20-hour drying time (L1), and this stands in stark contrast to the capsaicin levels observed drying time at 23 hours (L2) and 26 hours (L3) of drying temperature. At 65˚C (S2), the peak capsaicin levels are achieved with a 20-hour drying time (L1), and this differs significantly drying time from the levels at 26 hours (L3) but not significantly drying time from the levels at 23 hours (L2) of drying. Similarly, when drying at 70˚C (S3), higher capsaicin levels are also obtained during the 20-hour drying period (L1), significantly differing from the levels at 26 hours (L3) but not significantly different from the levels at 23 hours (L2) of drying. In summary, the highest capsaicin content is observed when drying temperature at 60˚C (S1) for 20 hours (L1), while the lowest capsaicin levels are found at a drying temperature of 70˚C (S3) for 26 hours (L3).

Table 4:- Average capsaicin content (mg/g) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	**Draying Time (hours)**			**HSD 0,05**
	20 (L_1)	**23 (L_2)**	**26 (L_3)**	
60˚ (S_1)	3,93Cc	3,79Cb	2,53Ba	0,16
65˚ (S_2)	2,82Bb	2,74Bb	2,21Aa	
70˚ (S_3)	2,35Ab	2,22Ab	2,06Aa	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of α = 0.05.

The results of the research on capsaicin content parameters are directly proportional to the opinion expressed by Dendang et al. (2016) who said that an increase in the temperature and length of drying will cause the spiciness of chili peppers to decrease due to capsaicin degradation. Hasrayanti (2013) states the capsaicin is very susceptible to hot conditions, temperature, and the length of drying used to reduce moisture content greatly affects the loss of capsaicin content in chili. Setiadi (2008) said that the spiciness of chili is due to the content of capsaicin. The capsaicin content in chili is an appetite generator.

Ash Content

According to Table 5, it can be seen that at 60˚C (S1), the highest ash content is found at 26 hours of drying time (L3), which is significantly different from 23 hours of drying time (L2) and 20 hours of drying time (L1). At 65˚C (S2), the highest ash content was found at 26 hours (L3) which was significantly different from 23 hours (L2) and 20 hours (L1). While at 70˚C (S3), the highest ash content was also found at 26 hours (L3) which was significantly different from 23 hours (L2) and 20 hours (L1). Overall, the highest ash content was found at a drying temperature of 70˚C (S3) with a drying time of 26 hours (L3). While the lower ash content was found at 60˚C drying temperature (S1) with a drying time of 20 hours (L1).

Table 5:- Average ash content (%) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	**Draying Time (hours)**			**HSD 0,05**
	20 (L_1)	**23 (L_2)**	**26 (L_3)**	
60˚ (S_1)	2,20Aa	2,74Ab	2,92Ac	0,28
65˚ (S_2)	2,33Aa	3,36Bb	4,07Bc	
70˚ (S_3)	2,76Ba	3,81Cb	5,04Cc	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of α = 0.05.

The results indicate that the higher temperature and the longer drying time will cause high ash content in a material and vice versa. This statement is in accordance with Lubis (2008) who said that the increasing ash content is caused by the long time and the high drying temperature, the more water that comes out of the dried material. Sudarmadji et al. (1989) also stated that the ash content of a material depends on the type of material, method of drying, time and temperature used while drying.Presetyaningsih et al. (2018) said that ash content is an organic residue obtained from the combustion or oxidation process of organic components in food ingredients. The ash content contained in spice powder products can determine the level of minerals contained in it. Ash is the residue left behind in samples that are burned until they are carbon-free. The residue left behind is the mineral elements contained in the sample, while other organic content in the process of ignition will be burned out.

Fat Content

According to Table 6, it can be seen that at 60˚C (S1), the highest fat content is found at 26 hours (L3) which is significantly different from 23 hours (L2) and 20 hours (L1). At a drying temperature of 65˚C (S2), the highest fat content was found at a drying time of 26 hours (L3) which was significantly different from the drying time of 23 hours (L2) and 20 hours (L1). While at 70˚C (S3), the highest fat content was also found at 26 hours (L3) which was significantly different from 23 hours (L2) and 20 hours (L1). Overall, the highest fat content was found at a drying temperature of 70˚C (S3) with a drying time of 26 hours (L3). While the lower fat content was found at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1).

Table 6:- Average fat content (%) of red chili powder due to temperature and drying time.

Drying temperature(˚C)	Draying Time (hours)			HSD 0,05
	20 (L_1)	23 (L_2)	26 (L_3)	
60˚ (S_1)	8,50Aa	8,54Ab	8,64Ac	0,04
65˚ (S_2)	8,72Ba	8,77Bb	8,82Bc	
70˚ (S_3)	9,10Ca	9,21Cb	9,27Cc	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of α = 0.05.

The findings suggest that elevating the drying temperature and prolonging the drying time of an ingredient can lead to an increase in its fat content. Lisa et al. (2015) have noted that as the water content decreases, food ingredients tend to contain higher concentrations of compounds such as proteins, carbohydrates, fats, and minerals, but this generally results in a decrease in vitamin content within the material. The higher fat content associated with elevated drying temperatures may be attributed to the reduction in water content, causing a higher percentage of fat in the composition. Conversely, the heightened fat content can also arise due to the degradation of fat caused by the relatively high drying temperatures. Fat is a composition formed through the esterification reaction between glycerol and fatty acids. Subjecting fat to high temperatures can lead to the breaking of double bonds within the fat molecules, resulting in the decomposition of fat into glycerol and fatty acids, as explained by Zuhra et al. (2012).

Color Measurement

Based on Table 7, it is known that the highest L (brightness) color value is found at a drying temperature of 70˚C (S3) with a drying time of 26 hours (L3), while the lowest L (brightness) color value is found at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1). The highest a (red) color value is found at 60˚C drying temperature (S1) with 26 hours drying time (L3), while the lowest a (red) color value is found at 70˚C drying temperature (S3) with 20 hours drying time (L1). The highest b (yellow) color value was found at a drying temperature of 70˚C (S3) with a drying time of 26 hours (L3), while the lowest b (yellow) value was found at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1).

Table 7:- Recapitulation of average color due to interaction between temperature and drying time on the quality of red chili powder.

Parameter	Drying temperature(˚C)	Draying Time (hours)			HSD 0,05
		20 (L_1)	23 (L_2)	26 (L_3)	
Color (L)	60 (S_1)	34,70Aa	37,87Ab	38,17Ab	**2,08**
	65 (S_2)	40,23Ba	39,77Aa	41,10Ba	
	70 (S_3)	42,93Ca	42,93Ba	43,23Ca	
Color (a)	60 (S_1)	44,5	47,5	50,3	-
	65 (S_2)	48,1	48,7	49,6	
	70 (S_3)	43,0	43,6	43,4	
Color (b)	60 (S_1)	21,07	23,13	23,50	

	65 (S_2)	24,47	24,13	25,37	-
	70 (S_3)	25,07	26,10	26,33	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of α = 0.05.

Murti (2017) stated that drying at 70°C is good enough to get an attractive dried chili color. The higher the temperature, the better the color tends to be. Yuliana et al. (1991) state that chilies that are dried for too long will cause shrinkage of their essential oils and also affect the pungency and color of the dried chilies.

Color is a characteristic that can change due to the drying process. Chili has a color that comes from the carotenoid content. In general, the drying process can cause carotenoids to degrade and can cause browning reactions to occur so that it can change the color of chili (Parfiyanti et al., 2016). The red color in chili mainly comes from capsanthin, capsorubin, and cryptocapsin (Arimboor et al., 2015). The yellow color in chili comes from β-carotene, zeaxanthin, violaxanthin, and β-cryptoxanthin (Arimboor et al., 2013). Chili peppers contain carotenoids which are pigments that are orange, red, or yellow depending on the type of concentration. This compound is very sensitive to alkali in the air or temperature, especially at high temperatures (Dutta et al., 2005).

Organoleptic Test

Based on Table 8, it was known that the highest texture value was found at a drying temperature of 70 ˚C (S3) with a drying time of 20 hours (L1), while the lowest texture value was found at a drying temperature of 60 ˚C (S1) with a drying time of 20 hours (L1). These results indicate that panelists liked the combination of treatment at 70˚C drying temperature (S3) with 20 hours drying time (L1). On smell, the highest value was found at a drying temperature of 65 ˚C (S2) with a drying time of 26 hours (L3), while the lowest smell value was found at a drying temperature of 60 ˚C (S1) with a drying time of 20 hours (L1). In this study, it can be seen that the panelists liked the smell of red chili powder in the treatment combination of 65 ˚C drying temperature (S2) with a drying time of 26 hours (L3). In color, the highest value was found at a drying temperature of 70˚C (S3) with a drying time of 20 hours (L1), while the lowest color value was found at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1). In this study, it can be seen that the panelists liked the color of red chili powder in the treatment combination of 70˚C drying temperature (S3) with a drying time of 20 hours (L1).

Table 8:- Recapitulation of the average organoleptic test due to temperature and drying time on the quality of red chili powder.

Parameter	**Drying temperature(˚C)**	**Lama Pengeringan (Jam)**			**HSD 0,05**
		20 (L_1)	**23 (L_2)**	**26 (L_3)**	
Texture	60 (S_1)	7,48Aa	8,78Ab	7,46Aa	**1,01**
	65 (S_2)	10,15Ba	10,39Ba	10,85Ba	
	70 (S_3)	11,07Ba	10,88Ba	10,87Ba	
Smell	60 (S_1)	7,09Aa	8,80Ab	7,84Aa	**0,82**
	65 (S_2)	9,93Ba	10,20Bb	10,62Bb	
	70 (S_3)	10,52Ca	10,40Ba	10,57Ba	
Color	60 (S_1)	9,19	9,76	9,30	-
	65 (S_2)	11,16	11,18	11,43	
	70 (S_3)	11,75	11,31	11,34	
Overall Acceptance	60 (S_1)	7,84	9,16	8,12	-
	65 (S_2)	10,43	10,99	11,12	
	70 (S_3)	11,25	11,05	11,08	

The numbers followed by the same letter (the uppercase letters are read vertically and the lowercase letters are read horizontally) are significantly different based on the Honestly Significant Difference (HSD) at the level of α = 0.05.

The things that affect texture according to Mahanom et al. (1999) is the turgor pressure of living fruit cells, if the water in the cells decreases due to drying, the cells will become soft, limp and dry so that the fruit will shrink. Muchtadi et al. (2010) also said that texture or hardness is influenced by the turgor of living cells. Turgor is the pressure of the cell contents against the cell wall. If water is reduced, the cells will become soft and limp. According to Vesania (2016) although aroma can be known, each human has different preferences, so the panelists' assessment in terms of aroma the range of values in each treatment is not so different.

Smell is one of the attributes that affects the acceptance of panelists on a product, where aroma is something that affects the level of consumer preference where the smell that does not match or deviate from what it should be will be easily rejected (Saputri et al., 2022). Dutta et al. (2005) said that processing using high temperatures in a short time is a good alternative in reducing the decrease in carotenoid content of ingredients. Nursari et al. (2016) color is one of the quality factors of food ingredients which is included in the appearance of a product and is an important sensory assessment parameter. This is because the determination of color quality in food or agricultural products generally depends on the appearance of the color first assessed by consumers.

Based on Table 6, it is known that the highest overall acceptance value was found at a drying temperature of 70˚C (S3) with a drying time of 20 hours (L1). While the lowest overall acceptance value was found at a drying temperature of 60˚C (S1) with a drying time of 20 hours (L1). The most preferred red chili powder by panelists based on the average results of the treatment combination is 70˚C drying temperature with a drying time of 20 hours. The difference in assessment of whether the panelists liked or disliked the taste depends on the preferences of the panelists (Cahyani and Suhatyo, 2020). Daroini (2006) states that the parameters of color, aroma, texture, and taste are a combination of the overall acceptance results.

Drying temperature 60˚C with drying time 20 hours

Drying temperature 60˚C with drying time 23 hours

Draying temperature 60˚C with drying time 26 hours

Draying time 65˚C with draying time 20 hours

Draying temperature65˚C with draying time 23 hours

Drayingtemperature65˚C with draying time 26 hours

Drying temperature 70˚C with drying time 20 hours

Drying temperature 70˚C with drying time 23 hours

Drying temperature 70˚C with drying time 26 hours

Figure 1:- Color Result of red chili powder due to different drying temperature and time.

Conclusion:-

Drying temperature has a very significant effect on yield, water content, color (L, a, and b), vitamin C content, capsaicin content, ash content, fat content, and organoleptic test (color, texture, aroma, and overall acceptance). The best quality of red chili powder was found at 60˚C drying temperature. Drying time has a very significant effect on yield, moisture content, color (a and b), vitamin C content, capsaicin content, ash content, and fat content and has a significant effect on color (L) and organoleptic test (smell). The best quality of red chili powder is 20 hours drying time. There is a very significant interaction between temperature and drying time on yield, moisture content, capsaicin content, ash content, and organoleptic test (smell) and there is a significant interaction on color (L), vitamin C content, and organoleptic test (texture). The best quality of red chili powder is found in the treatment combination between 60˚C drying temperature and 20 hours drying time.

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