International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2018): 7.426

Potential of Red Onion (Allium ascalonicum) as Natural Antioxidant on the Decrease of Soiling and Analysis of Activated Carbon in Cheap Oil

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Abstract: ***Bulk cooking oil made from low quality raw materials through a simple filtering process. The physical and chemical properties of cooking oil when used for frying turn brown, thick, the level of fusion increases, because prolonged and repeated heating will accelerate the occurrence of hydrolysis, oxidation and decomposition of oil into carbon (C). So that the short carbon chain fatty acids, which means the molecular weight of a small bulk cooking oil, have a large number of fission. Damage to the properties of oil can be determined by the number of fungi with color purification by activated carbon and the addition of natural antioxidants that are strong, safe and able to inhibit the oxidation process. This type of research is a quantitative experiment on 5 samples of bulk cooking oil in yellow plastic packaging at random (Simple Random Sampling) from traditional market traders in East Surabaya. The dependent variable is the iodine number and the independent variable is 10, 15, 20, 25 grams of onionss stored for 3 days by heating> 100 oC for 1-2 hours and 2 grams of activated carbon given when heating 70-80 ^{o}C. The results of the analysis obtained by MGC fused numbers for the control group were 208,086; with heating without onions an average of 209,513; Addition of BM by heating 1x to 10 g on average by 206.38; 15 g on average is 203.95; 20 g averaging 199.20; 25 g averaging 197.98; 2x heating for 10 g on average by 204.88; 15 g an average of 202.07; 20 g on average is 196.90; 25 g averaging 196.15; and heating 3x for 10 g with an average of 194.27; 15 g an average of 189.07; 20 g on average by 185.30; 25 g averaging 181.16. The organoleptic test of the oil color was still yellow after the treatment and the Anova One Way statistical test showed a decrease in the number of bulk cooking oil famines in the control and treatment groups***

Keywords: Bulk cooking oil, Fertilizer numbers, Onionss, Activated carbon

1. Introduction

The need for cooking oil is increasing, while the price of cooking oil raw material namely coconut has increased quite sharply and needs to be noted [1], where the consumption of cooking oil per capita of Indonesian population in 2011 reached 8.24 liters / capita / year [2] Cooking oil as a very important staple is widely used by the community to process food, provide flavor (savory), texture (crispy), color (brown), and add nutritional value [3].

The government has issued a regulation requiring that the cooking oil sold be SNI (Regulation of the Minister of Trade) and prohibit the distribution of bulk cooking oil from palm oil raw materials since February 2016, which applies to all producers and small and large businesses. This is done by the government to ensure cooking oil products that are used are more hygienic and safe for consumption by the community with little impact on the health of our bodies.

Most people in Indonesia still use bulk cooking oil to fry food, while the results of the survey, there are still many economically weak people who use bulk cooking oil as a basic ingredient in producing a product even though the government has issued a ban on the distribution of bulk cooking oil from coconut. 4]. The difference in the price of branded and bulk cooking oil is quite large is the main reason for people to consume, where the price of bulk cooking oil is cheaper. The community is still very hopeful that the current government policy does not burden small scale business actors in particular, both for their daily needs and for trading.

The fat and oleic acid content of bulk cooking oil is higher than branded (packaged) cooking oil. However, there is no problem using bulk oil, but not excessive and is not used until repeatedly until dark brown to blackish because of repeated use of oil is not very good for health. Bulk cooking oil has low quality and only has filtering up to the olein stage and still contains soft stearin (solid fraction oil) at a certain level, where bulk cooking oil is usually more turbid than branded oil. In addition, the level of sanitation and hygiene is also not good. So bulk cooking oil is a new cooking oil that is produced from a factory and sold in large quantities and is suitable for consumption. Bulk cooking oil has been distributed in the form of no packaging and certain brands, which means that bulk cooking oil before use is much exposed to oxygen [5]. So that bulk cooking oil will experience a decrease in quality much faster than good quality branded cooking oil because of the oxidation reaction.

The oxidation process can take place due to the direct contact of oxygen with oil which causes the quality of cooking oil to drop, which is a rancidity, bitter taste and color change in the oil, where oxidation occurs due to decomposition of fatty acids into aldehydes, ketones and free fatty acids. Oil damage due to oxidation events during the frying process will affect the quality and nutritional value of foodstuffs that are fried due to damage to nutrients such as carotene, tocopherol and essential fatty acids, and have been proven to have carcinogenic activity in oil that is causing liver cancer growth [3]

The main components of cooking oil are glycerol and unsaturated or saturated fatty acids, where unsaturated fatty acids (double bonds) are easily damaged when exposed to

heat so unstable, very susceptible to oxidation which causes the formation of free radicals and toxic, but very beneficial for body health, namely preventing the occurrence of blood vessel blockages (good cholesterol in the blood). While saturated fatty acids (single chain) have a high stability against heat, are not sensitive to oxidation reactions and the formation of free radicals, but are harmful to body health that can cause blockage of blood vessels until a stroke (bad cholesterol in the blood).

During the frying process, the double bonds found in unsaturated fatty acids break up to form saturated fatty acids. Good oil is oil that contains more unsaturated fatty acids than saturated fatty acids and cooking oil is said to be of high quality if it has high stability to heat. To find out the damage of cooking oil based on chemical properties, it can be done with a test of fission numbers, namely the determination of crude oil molecular weight, oil with short C-chain fatty acids means that it has relatively small molecular weight and large soap numbers and vice versa. Meanwhile, based on SNI 01-3741-2002 regarding the quality standard of famines that are regulated in Indonesia is 196-206.

Utilization of bulk cooking oil can be clarified by the addition of activated carbon as absorbent to remove the insoluble dyes in the oil. Activated carbon is carbon that undergoes an activation process, where the pores are more open and the surface is wider, so the adsorption power becomes greater. Activated carbon can absorb dyes as much as 95-97% of the total dyes and unwanted odors, so as to improve oil quality. Oil lost due to the purification process is approximately 0.2-0.5 percent of the weight of oil produced after the purification process [3]

Rancidity in cooking oil is strongly influenced by antioxidants which inhibits the process of oxidation speed in oil [1]. So that the processing of bulk cooking oil with better quality becomes very important by adding natural antioxidants to bulk cooking oil that can slow the process of damage to cooking oil and prevent the occurrence of free radical antioxidant reactions in lipid oxidation Natural antioxidants (antioxidants extracted from natural ingredients) that are safe and have many benefits one of which is onion (Allium ascalonicum) which utilizes all parts of onion, where the antioxidant ability of onions is seen from the reduced amount of liver lipid peroxidation. Onionss are substances that can stop the chain reaction of radical formation that releases hydrogen and have many double bonds that are easily oxidized, so that it will protect fats from oxidation and inhibit further oxidation in cooking oil. While synthetic antioxidants such as BHT, BHA, Ascorbil palmitate are antioxidants obtained from the synthesis of chemical reactions which in the long run can endanger the health of the body. So it is necessary to do research on the addition of onionss (Allium ascalonicum) as a natural antioxidant to counteract free radicals caused by oxidation and increase the storage time of cooking oil and color purification by activated carbon to the fissile numbers on bulk cooking oil.

2. Research Methods

This type of research is experimental with quantitative analysis techniques. The sample used was bulk cooking oil sold in the East Surabaya market as many as 5 (five) repetition samples taken by Simple Random Sampling (random) from 10 grocery traders with the criteria for type of bulk stained oil in 2 kg plastic packaging, yellow, slightly turbid.

The dependent variable in this study is the number of fats in bulk cooking oil, while the independent variable is onion as much as 10 g, 15 g, 20 g, 25 g which is immersed in bulk cooking oil for 3 days, activated carbon as much as ± 2 grams, heating> 100 oC for ± 1-2 hours using observation data collection techniques with laboratory test instruments obtained quantitative data. Data obtained were statistically tested using the Anova One Way method.

3. Result and Discussion

Analysis of seed numbers on bulk cooking oil without the addition (control) and with the addition of onionss (Allium ascalonicum) and color purification by activated carbon from coconut shells that do heating> 100 ^{o}C as much as 1x, 2x, and 3x for ± 1-2 hours, Data obtained as follows.

Table 1. Fertility Numbers in Bulk Cooking Oil without treatment (control) and with the addition of Onions (Allium ascalonicum) as much as 10 grams for 3 days with heating process> 100oC as much as 1x, 2x, and 3x for ± 1-2 hours and addition ± 2 grams of Activated Carbon when heating from 70-80 ^{o}C

Code	Fate number				
	Control	Warming & No Fresh Onions	Addition of Fresh Shallots & Warming> 100 oC and addition of ± 2 grams of Activated Carbon		
			1 x	2 x	3 x
10 gr	208,086	209,513	206,38	204,88	194,27
15 gr	208,086	209,513	203,95	202,07	189,07
20 gr	208,086	209,513	199,20	196,90	185,30
25 gr	208,086	209,513	197,98	196,15	181,16

The results of research on the number of fungi with the acidimetry titrimetry method on plastic packaging bulk cooking oil with the addition of red onion (Allium ascalonicum) as much as 10 g, 15 g, 20 g, 25 g and the addition of coconut shell activated carbon as much as ± 2 grams when heating reaches 70- 80 ^{o}C with heating> 100 ^{o}C for ± 1-2 hours sold in the Soponyono Rungkut market - East Surabaya in 2016 quantitatively, obtained the results of the number of fusion of bulk cooking oil without treatment (control) of 208,086 experienced an increase in the number of bulk cooking oil fusion with heating> 100 ^{o}C for ± 1-2 hours at 209,513.

Then, the number of fungi in bulk cooking oil decreases with the addition of shallots and heating> 100 ^{o}C for ± 1-2 hours, ie 10 grams, an average of 206.38; 15 grams of 203.95; 20 grams of 199.20; 25 grams of 197.98. Repeated heating of the 2nd bulk cooking oil decreased again, namely 10 grams on average by 204.88; 15 grams of 202.07; 20 grams is

196.90 and 25 grams is 196.15. Whereas for the repetition of the heating of the 3rd bulk cooking oil, it also experienced a decrease in the number of famines, namely 10 grams by 194.27; 15 grams of 189.07; 20 grams of 185.30 and 25 grams of 181.16.

Fertilizer numbers on plastic packaged bulk cooking oil are still in accordance with the standard requirements of cooking oil quality in Indonesia based on SNI-3741-2002 after adding the antioxidant natural antioxidants that is 196-206. Analysis of fairies plays a role in the process of identifying the quality of cooking oil used. The process of fabrication is the process of hydrolysis that occurs in oil using a base and produces glycerol and fatty acid salts or soap. The number of moles of base used for the fusion process depends on the number of moles of fatty acids. Thus, the number of fines is the number of mg of KOH needed to lather 1 gram of fat or oil, so, the size and size of the number of fines depends on the length or shortness of the fatty acid carbon chain [6].
Vegetable and animal oils are examples of glycerol and saturated fats or oils that can be hydrolyzed by an alkaline solution into a salt of fatty acids that are daily recognized as soap. This hydrolysis reaction is called bonding or safonification [6]

The number of bulk cooking oil famines during heating without the addition of shallots has increased from the control group, this is due to the decomposition or oxidation of molecules during heating due to prolonged and repeated heating will accelerate the occurrence of hydrolysis, oxidation and decomposition of oil into carbon (C). So that the carbon chain acid (C) is short, which means that the molecular weight of the bulk cooking oil is small, then the fission number is large [7]. The increase in the number of famines due to heating will result in the decomposition of carbon chains (C) of fatty acids is not short, so that the number of fines in large oils [8]. Oil that is damaged by the oxidation process will cause odor and rancidity and discoloration of the cooking oil. Meanwhile, bulk cooking oil added with natural antioxidants shallots (Allium ascalonicum) as much as 10 g, 15 g, 20 g and 25 g with heating decreases the average number of fungi by 15%, this is because red onion is a natural antioxidant with the content of polyphenols which can effectively inhibit the process of autookidation of carbon-unsaturated fatty acids (C), so as to prevent cooking oil rancidity, even without heating and can increase the storage time of cooking oil, where these polyphenol compounds cause further oxidation inhibition of oil fried [10]

Natural antioxidants of shallots in cooking oil can block the entry of oxygen compounds that will absorb double bonds in the oil due to oxidation that occurs during the heating process, so that the longer the carbon (C) chain of fatty acids in the oil, the smaller the proportion of carboxylic groups that will react with a base, which means it has a large molecular weight of oil and a small number. The nutritional value due to damage to vitamins and essential fatty acids can still be maintained, in addition to the aroma and taste in the cooking oil [8].

While the purification of bulk cooking oil with activated carbon from coconut shell when heating reaches a temperature of 70-80 ^{o}C aims to remove dyes that are not soluble in oil and absorb odors during the heating process which can cause damage to bulk cooking oil [3]. So that the organoleptic test on bulk cooking oil that has been added to activated carbon during heating has the color of the oil is still the same yellow as the color of the bulk cooking oil before adding activated carbon, while the odor of the oil is still normal and not rancid, characteristic of red onion which is added as a natural antioxidant.

The results of the study based on the Anova One way statistical test showed a decrease in the number of fungi in plastic bulk packaging cooking oil with the addition of red onion (Allium ascalonicum) by 10 grams, 15 grams 20 grams, 25 grams with the heating process temperature> 100 ^{o}C for ± 1-2 hour and the addition of activated carbon coconut shell ± 2 grams when heating 70-80 ^{o}C.

4. Conclusion

The addition of shallots (Allium ascalonicum) 10 grams, 15 grams, 20 grams, 25 grams to decrease the number of fungi in bulk cooking oil is still not significant, but there is a significant decrease which means that onion as a natural antioxidant containing polyphenol compounds effectively inhibits the occurrence of autooksidation short carbon chain (C) fatty acids, the greater the proportion of carboxylic groups that will react with bases, meaning they have relatively small molecular weights and large fissile numbers. Thus, it can cause further oxidation inhibition in cooking oil. The community is advised, it should be able to consume food using bulk cooking oil by heating or frying without repeating it, so that the nutritional value of the oil remains good. Meanwhile, the organoleptic test for bulk cooking oil with the addition of activated carbon still gives a yellow color.

References

[1] Perwitasari, D.S., 2009, Addition of Turmeric as a Natural Antioxidant in Bulk Cooking Oil, Journal of Chemistry and Technology, Department of Chemical Engineering FTI UPN Veterans Surabaya.
[2] Malkan Ibnu B.I., et al., 2015, Quality of Cooking Oil and Fried Products During Frying in Indonesian Households, Journal of Application of Food Technology, Volume. 4, Number. 2, Bogor Agricultural University (IPB), Bogor.
[3] Ketaren, S., 2008, Introduction to Food Oil and Fat Technology, ISBN: 979-8034-05-8, Jakarta: UI-Press
[4] Murtafi'ah, R., 2015, The Effect of Addition of Shallot Powder to Acid Levels in Bulk Cooking Oil, Scientific Writing, Department of Health Analyst, Muhammadiyah University of Surabaya
[5] [5] Aminah, S., 2010, Peroxide Numbers for Bulk Cooking Oil and Organoleptic Properties of Tempe in Frying Repetition, Journal of Food and Nutrition, Faculty of Nursing and Health, Muhammadiyah University, Semarang, Volume. 01, No. 01
[6] Poedjiadi, Anna., 2007, Fundamentals of Biochemistry, Jakarta: UI Press

[7] Sudarmadji, S., Haryono, B., Suhardi, 2007, Analysis of Food and Agriculture Materials, Third Edition, ISBN: 979-499-193-7, Yogyakarta: Liberty
[8] Sinaga, K.R., 2004, Effects of Antioxidants on Coconut Oil During Heating, Journal of Communication Research, Volume 16, No. 5
[9] Panagan, A.T., 2010, Effect of Addition of Shallot Powder to Peroxide Numbers and Acid Levels of Bulk Cooking Oil, Journal of Science Research, Sriwijaya University, South Sumatra, Special Edition, June (C) 10: 6-05.