International Journal of Research and Review
Vol.7; Issue: 3; March 2020
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Effect of Red Dragon Fruit Peels (*Hylocereus polyrhizus*) as a Natural Dye and Preservatives on Chicken Nuggets

Najla Lubis, Jefri Agustiono, Ismail D, T. Gilang Pradana

Faculty of Science and Technology, Universitas Pembangunan Panca Budi, Medan, Indonesia, 20122

Corresponding Author: Najla Lubis

ABSTRACT

This study aims to determine the influence of red Dragon fruit Peel Extract (*Hylocereus Polyrhizus*) as natural dyes and preservatives on chicken nuggets. The study uses the group Random Plan (RAK) method with 2 treatment factors. The first factor is the addition of Red Dragon fruit peel extract concentration consisting of 4 levels of treatment of 0%, 10%, 30%, and 50%. The second factor is the length of storage at 27 °C with 4 levels of treatment, i.e. 0, 12, 24 and 48 hours. The analysis parameters include moisture content, degree of acidity and saving power. The results showed that the addition of red dragon fruit peel extract concentrations at 50% treatment is the most optimal as a natural preservative because it can produce a higher shelf life of 46 hours with a water content of 34.38%. The result of chemical quality analysis of nutrients in chicken nuggets with red dragon fruit extract is the degree of acidity (pH), protein levels (% b/b), carbohydrate levels, and total fat content. The results of the protein test were conducted on samples of 13.9 (P0L0), 11.6 (P1L1), 10.7 (P2L2) and 10.0 (P3L3). Carbohydrate test Results (% b/b) are 32.0 (P0L0), 30.3 (P1L1), 28.8 (P2L2) and 28.4 (P3L3). The results of total fat content test (% b/b) are 8.04, (P0L0), 7.73 (P1L1), 7.51 (P2L2) and 6.47 (P3L3).

Keywords: Red Dragon Fruit Skin, *Hylocereus polyrhizus*, Chicken Nugget, Natural Preservatives

INTRODUCTION

Fast food is a popular community, especially in urban areas. A lot of ready meals are sold like meatballs, noodles, nuggets, and others. Nugget is a form of food processed from ground beef that is printed in the form of a four-square cut and coated with seasoned flour. Nuggets consumed after frying the soak. It is a fried half-cooked Nugget and frozen to defend its quality during storage. This type of food is much favored among children.

Quality standardization for foodstuffs for Nuggets includes chemical and organoleptic properties. Requirements to test the quality of food ingredients according to the National Standardization Agency (BSN) using chemical quality tests include fat, water, ash, protein, and carbohydrate levels. Including quality, tests include aroma, flavor, and texture. Chicken Nugget is formulated by BSN SNI 6683:2014 as a product of processed chicken that is made from a mixture of chicken meat with or without the addition of other foodstuffs, with or without the addition of permitted food additives, printed (steamed print or frozen print), given coating material, with or without frying and frozen. The nugget has been widely variated with the addition of color substances, such as color nuggets of orange and yellow.

Red dragon fruit is a plant that contains substances that can increase endurance and improve metabolism. Some research results on dragon fruit skins have been done. Dragon Fruit Skin is known to have antioxidant content of vitamin C,

flavonoids, tannins, alkaloids, steroids, and saponins (Noor, et al, 2016). Dragon Fruit Skin is also known as natural dyes because it contains anthocyanins. Dragon Fruit skins have been applied to the food and tested in white rats, the test results showed coloring dragon fruit can be used as a natural dye food (Handayani, et al, 2012).

Anthocyanin, a group of organic chemical compounds that can dissolve in the polar solvent, is responsible for giving the color of orange, red, purple, blue, to black in high-level plants such as flowers, fruits, grains, vegetables, and tubers. Based on its polity in the universal solvent, anthocyanins in plants are in the form of aglycones known as Anthocyanidin and anthocyanins in the form of Glikon as the sugar that is fastened in glycol prints to form esters with monosaccharides (glucose, galactose, rhamnose, and Pentose). Or it can be said, the process of hydrolysis in the esterification reaction of an Anthocyanidin (Aglikon) with one or more glycone (sugar clusters) can form anthocyanins.

Anthocyanin which is a natural color substance of the flavonoids group with three carbon atoms tied by an oxygen atom to connect two benzene aromatic rings (C6H6) within its main structure, derived from the Greek meaning of blue flowers. Anthocyanins have characteristic carbon frameworks (C6-C3-C6) with the basic structure of anthocyanins that are 2-phenyl-Benzofirilium from Flavilium salts [10].

Chemically, anthocyanins are derived from a single aromatic structure that is cyanidin, where all types of anthocyanins have differences that are based on the bonds between the R3 and R5 clusters with the aromatic rings of anthocyanins.

Up to now in nature, there are more than 700 types of anthocyanins isolated from various types of plants and have been identified, some of which play an important role in foodstuffs namely Pelargonidin, Cyanidin, Peonidin, Delphinidin, Petunidin, Malvidin, and glycosides-Anthocyanidin glycosides. One type of anthocyanins is the most numerous in, and it is used as a reference compound, in general, is a cyanidin derivative and peonidin.

Anthocyanin is used as a substitute for sodium nitrite in the fermentation of meat products, this is because anthocyanins have a characteristic quality that is almost the same as sodium nitrite. In food material or packaging, anthocyanins do not cause damage due to anti-viral activity; antifungal; and high anti-bacterial that can protect food from microbial decomposition, and do not provide harmful side effects (toxic) compared to the use of synthetic dyes. Not only on food, the role of anthocyanins as natural dyes have also been modified is used in dyeing the hair using a solution of mordants Tunjung (Fe (SO4)) as a color reinforcement substance; While in Japan, anthocyanins are used as an Awobana paper dye.

LITERATURE REVIEW

The "Human Rights City" is one of the initiatives developed globally with the aim of localizing human rights. This notion is based on recognition of the city as a key player in the advancement and protection of human rights and generally refers to a city whose government and population are morally and legally governed by the principles of human rights. The initiative departs from the idea that, in order for international human rights norms and standards to be effective, all townspeople must understand and understand human rights as a framework for sustainable development in their communities. The concept was launched in 1997 by the people's Movement for human Rights Education, a nonprofit international organization engaged in service. This concept was further developed, primarily as a normative concept, by the world human Rights Cities Forum which takes place annually in the City of Gwangju (Republic of Korea).

The Gwangju declaration on the Human Rights city passed on 17 May 2011 defines the city of human rights as a local community or socio-political process in a

local context where human rights play a key role as Fundamental values and guiding principles. A human rights city requires a shared human rights governance in a local context, where regional governments, regional parliaments (DPRD), civil society, private sector and other stakeholders work together to improve the quality of Lives for all people in the spirit of partnership based on human rights standards and norms. The human rights approach to local governance includes the principles of democracy, participation, responsible leadership, transparency, accountability, non-discrimination, empowerment and legal supremacy. The concept of the human rights city also emphasizes the importance of ensuring broad participation of all actors and stakeholders, especially the marginal and vulnerable groups, and the importance of effective and independent human rights protection as well as mechanisms monitoring involving everyone. This concept recognizes the importance of interregional and international cooperation and the solidarity of various cities involved in the advancement and protection of human rights. The following factors can be referred to as the main reason that has led to the emergence of "City of Human Rights": (a) The shift from standard determination to implementation, especially at the level of governance, i.e. local government, which becomes the place Best for realizing human rights, especially economic and social rights; (b) Global tendencies, beginning in the 1980, toward the decentralization of government power – in fact, over the last few decades most countries in the world bestowed important authorities into local governments; (c) A change in global demographics: In 2008, for the first time in history, more than half of the world's population lives in large and small cities, and this number is expected to rise to nearly 5 billion in the year 2030.

The city has a unique potential for human empowerment and for social and environmental problem solving. At the same time, the city faces important challenges in the field of social cohesion. In the presence of people from different regions and backgrounds that are often moved to the city in search of individual autonomy, citizens and governments alike are trying to identify a discourse that unites the population and forming a joint reference frame to establish mutual expectations between the city and its inhabitants. The Gwangju guiding principles for the city of Human rights passed on May 17, 2014 in a meeting of the Fourth World human Rights Forum, contains the principles of a human rights city as follows: The right to the city; Non-discrimination and affirmative action; Social inclusion and cultural diversity; Participatory democracy and accountable governance; Social justice, solidarity and sustainability; Political leadership and institutionalization; The human rights mainstreaming; Coordination of effective institutions and policies; Education and human rights training, and the right to compensation. Other concepts are developed, both in doctrine and practice, which are essentially the same. One of them is the "right to the city" first proposed by the French philosopher Henri Lefebvre; This concept primarily refers to the rights of citizens and the "users" of a city to participate in local public affairs and establish a spatial layout of the city. So far the concept of "right over the city" has been instituted on a limited basis, for example the Brazilian City Regulation (2001), the Montreal Charter on Rights and Responsibilities (2006) and the Mexico City Charter for the right to the City (2010). The latter mentions six fundamental principles that are indispensable for the promotion of the right to the city: (a) The full implementation of human rights within a city; (b) The social functions of the city, land and property; (c) Democratic management of the city; (d) The production of democratic cities and production in the city; (e) Ongoing management and responsible for the public property (natural heritage, culture and energy resources) existing in the city and its surroundings; and (f) a democratic and fair city evenly.

The rights to the city are specifically stipulated in the World Charter for the rights to the City (2005), various organisations and networks, including UNESCO and UN-HABITAT, participating in the preparation of such important documents. This Charter defines the right to the city as the utilization of a fair-equitable city in accordance with the principles of sustainability, democracy, equality and social justice. This is the collective right of citizens who give them the legal right to act and administer, based on their respect for their differences, expressions and cultural practices, with the intention of exercising their right to determine the fate Achieve a decent standard of living. The rights to the city are dependent on other internationally recognised human rights, including civil, political, economic, social, cultural and environmental rights as defined by the various human rights agreements International.

METHODOLOGY

Materials and tools Research

The research was carried out by Diamond Farm agricultural Trial Plantation (LKPP) University of Panca Budi Development and Baristan test Laboratory.

The ingredients used in this research are skins of red dragon fruit, wheat flour, chicken meat, panir flour, salt, water, chicken eggs, pepper powder, garlic, shallots, tapioca flour, plastic, paper labels, and tray.

The tools used are digital scales, knives, blenders, pans, basins, boiler, strainers, aluminum pans, cups, stationery, stopwatches, glass beakers, and universal pH, ovens

Research Methods

The study uses the group's Random Plan (RAK) method consisting of 2 treatment factors with 4 levels and 2 repeats. These factors consist of:

A. The treatment of variations in the addition of Red dragon fruit extract which symbolized by "P" consists of 4 levels of treatment namely:

P0 = 100% Nugget material (Control)
P1 = 90% of material nuggets + 10% red Dragon Fruit Peel Extract (Hylocereus Polyrhizus)
P2 = 70% material nugget + 30% red Dragon Fruit Peel Extract (Hylocereus Polyrhizus)
P3 = 50% nugget material + 50% red Dragon Fruit Peel Extract (Hylocereus Polyrhizus)

B. Long treatment factor of chicken nuggets storage with additional red dragon fruit Peel extract is given the symbol "L" consisting of 4 levels of treatment namely:

L0 = 0 Hours
L1 = 12 hours
L2 = 24 Hours
L3 = 48 Hours

The treatment used in this study consisted of 16 combinations

P0L0 P1L0 P2L0 P3L0
P0L1 P1L1 P2L1 P3L1
P0L2 P1L2 P2L2 P3L2
P0L3 P1L3 P2L3 P3L3

RESULTS AND DISCUSSION

Nugget Colors

This research aims to see the influence of the Red dragon fruit extract as a dye in chicken nuggets. To view the data of the observations performed during the study.

Table 1. Effects of addition of red dragon fruit extract and long storage of chicken Nugget color
To color Nugget chicken

Factor L	Factor P				The averages
	P0	P1	P2	P3	
L0	3,5	3,7	3,7	3,7	3,65
L1	4	4	3,9	3,9	3,95
L2	4	4	4	4	4,00
L3	3,5	3,95	3,9	3,75	3,78
The averages	3,75	3,9125	3,875	3,8375	

Table 1, above shows that the addition of red Dragon fruit Peel extract does not give a different color to the resulting chicken nuggets, because the extract given is a percentage of the total water used, not from

the total of all manufacturing materials Chicken nuggets, so as not to give a noticeable effect on the resulting color.

Moisture content

Water content contained in the nugget is an important factor that must be considered because it can affect other factors especially on the shelf life and nutrient content contained in the Nugget. According to Troller in Arini (2016), the moisture content is increasing with the storage time, which is one of the indicators of food damage. Results of the effect of adding red dragon fruit peel extract on chicken nuggets seen in table 2.

Table 2. Effects of adding red dragon fruit extract and old storage against water content of chicken nuggets

Factor L	Factor P				The averages
	P0	P1	P2	P3	
L0	40,00 DE	42,00 E	39,00 DE	40,00 DE	40,25 B
L1	41,50 E	40,50 E	39,00 DE	37,00 CDE	39,50 B
L2	39,00 DE	39,00 DE	31,00 AB	32,50 ABC	35,37 AB
L3	34,00 BCD	41,00 E	27,00 A	28,00 AB	32,50 A
The averages	38,62 AB	40,62 B	34,00 A	34,37 AB	

From the table above, it is known that the highest moisture content found in P1L0 is 42% and the lowest rate is at P2L3 as much as 27%. The length of storage also affects the moisture content contained in chicken nuggets, because in the process of less good storage can increase or decrease the water content contained. The storage of nuggets in the study was conducted in the incubator at 27 °c so that the resulting temperature remained stable

Acidity (pH)

This research aims to determine the pH levels contained in chicken nuggets that are given additional red dragon fruit Peel Extract (Hylocereus Polyrhizus) and the storage influence against the average pH value on chicken nuggets.

The addition of red Dragon fruit Peel extract affects the pH value. The higher the extract given to the nugget then the pH value will also be decreased, because of the average pH of the red dragon Fruit Peel range between 2.73 – 3.23 (Ingrath, 2015). The lower the pH value then the anthocyanins will be more stable, the increase in the pH value indicates that the color of anthocyanins is increasingly fading because the red cation of the colored flavilium is experiencing hydration into a colorless carbonyl. This causes the anthocyanins to be quickly damaged in high pH conditions (Ingrath, 2015).

The value of pH nugget in the chicken is also P3 (50%) 4.90 because the number of extracts given more than the other treatment, then P2 (30%) 5.10, then P1 (10%) 5.19 and higher on P0 (0%) 5.35 because it does not use red dragon fruit peel extract.

The pH value of chicken nuggets on the length of storage ranges from 4.88 to 5.35 where the highest nugget pH value is found in L0 (0 hours), which is 5.35 and the lowest chicken nuggets at L3 (46 hours) is 4.88. A Comparison of red dragon fruit peel extract with old chicken nuggets storage can be seen in Figure 4.

Power Save Nugget

Color change

This research aims to see the influence of the addition of Red Dragon Fruit Peel Extract (Hylocereus Polyrhizus) with the number of different variants of the saving power of chicken nuggets to replace the synthetic preservatives widely used in Food making.

The addition of red Dragon fruit peel extract on the chicken nuggets affects the discoloration of ANOVA's printing analysis, but differs not in real honest difference test (BNJ 1%) The higher the extract is given, the fewer changes occur as well. The color change Rataan ranged from 22.75 to 27.50%. Old storage is a very noticeable effect on changing the color of the chicken

nugets because the longer the nugget is stored then the change of color that occurs is also increasingly noticeable. In storage for 0 hours (L0) and 12 hours (L1) shows a difference that is not noticeable, but the change began to be displayed on the 24-hour storage (L2) and the changes were very noticeable on storage for 46 hours (L3).

Sour smell

The addition of Red Dragon Fruit Peel extract aims to extend the saving power of chicken nuggets, to replace artificial preservatives at this time that could harm human health, especially consumers who consume chicken nuggets. To know the influence of the addition of Red dragon fruit extract with a different length of storage against sour smell on chicken nuggets.

The addition of Red Dragon fruit Peel extract does not give a noticeable effect on the smell of acid that occurs (BNJ 1%) But if viewed on the data analysis of ANOVA variegated, give different results very real. When viewed numerically (P3) is the best treatment between treatment (P2), (P1) and (P0). The smells of the chicken nugget acid range from 19.13 – 25.13. The best value is (P3), which is 19.13% and the lowest is at (P1) which is 25.13%.

Long storage is very influential to the acrid odor that arises in chicken nuggets because the longer the storage period will decrease the quality contained in the chicken nuggets. According to table 8., in the test BNJ 1%, give a different result is very real, long-lasting retention of acid odor (L0) 1.00%, then at (L1) 4.635%, at (L2) 11.13% and the last on (L3) is 76.38%.

Mucus

The slime observation Data on chicken nuggets that have been given additional red dragon fruit peel extract with different storage length. The addition of red Dragon fruit peel extract can inhibit the appearance of mucus on the chicken nuggets, as more and redder dragon skin extract is added to the chicken nuggets the mucus is also getting less. The addition of Red dragon fruit extract is 14.00% (P3), then 17.38% (P2) then 22.88% (P1) and the last 24.13% (P0). But different is not real to the onset of mucus on chicken nuggets.

The length of storage greatly affects the onset of mucus on chicken nuggets (BNJ 1%), on storage for 0 hours (L0) to 24 hours (L2) does not indicate a noticeable difference to mucus arising but on storage for 46 hours (L3) Slime That arises on the chicken nuggets more and more.

Mushrooms

The addition of Red Dragon Fruit Peel extract aims to increase the saving power of the resulting chicken nuggets, one of them by inhibiting the growth of mushrooms so that it can shorten the shelf life of chicken nuggets. In this research, the Red Dragon Fruit Peel extract is very influential to inhibit the growth of fungi with different old storage. Observation Data on the addition of red Dragon fruit peel extract with different length of storage.

The addition of red Dragon fruit peel extract can inhibit the growth of mushrooms, in the final storage of 46 hours, the best treatment is (P3) is only 25% when compared with (P0) growth Fungus as much as 75% it is in line with the change of color, the smell of acid and slime that arises in the chicken nuggets indicating that the addition of extracts as much as 50% (P3) is the best concentration among other treatments.

The length of storage is also in line with other saving power assessments, as the longer the chicken nuggets are stored it will lower the quality of the container. At the assessment of storage fungi for 0, 12 and 24 hours did not show a noticeable difference (BNJ 1%), but on storage for 46 hours showed different results are very noticeable.

Chemical quality Analysis

Analysis of the chemical quality of the chicken Nugget with dragon fruit extract tested in the laboratory as follows:

Sample NO total fat carbohydrate Protein test

1 P0L0 13.9 32.0 8.04
2 P1L1 11.6 30.3 7.73
3 P2L2 10.7 28.8 7.51
4 P3L3 10.0 28.4 6.47

That shows that the addition of red Dragon fruit peel extract concentration can lower protein, carbohydrates, and total fat levels of chicken nuggets. This indicates that the consumption of nuggets with the lecture extract of dragon fruit is very good for diabetics and obese people (overweight) who are undergoing a diet program (weight loss).

CONCLUSION

Based on the explanation above, the following conclusions:

1. The addition of Red Dragon fruit peel extract affects when the dough has not been steamed but loses after steaming due to reduced anthocyanin levels by heating.
2. Administering Red Dragon Fruit Peel Extract (Hylocereus Polyrhizus) as much as 50% of the total water used can be used as a natural preservative of chicken nuggets because of the amount of water content and pH that can meet the specified requirements to make the power Save the nugget for longer.

REFERENCES

1. Kumalaningsih, sri, 2006. Antioksidan Alami-Penangkal Radikal Bebas, Sumber, Manfaat, Cara Penyediaan dan Pengolahan. Surabaya: Trubus Agrisarna.
2. Luckman et al, 2014, Pembuatan Es Krim Ekstrak Ubi Jalar Ungu (*Ipomea batatas* L) Dengan Variasi Jumlah Penambahan Susu Full Cream dan Karagenan, Berkala Ilmiah Pertanian, Universitas Jember.
3. Mangunwidjaja, D, dan Sailah, I, 2017, Pengantar Teknologi Pertanian, Penebar Swadaya, Jakarta
4. Moorthy, 2004.Penelitian Gizi Pada Umbi-Umbian.Gajdah Mada University Press.Yogyakarta.
5. Oktiarni,D, Ratnawati D, Anggraini D.Z, 2012, Pemanfaatan Ekstrak Kulit buah naga Merah ((Hylocereus polyrhyzus sp) sebagai pewarna dan pengawet alami Mie basah, Jurnal Gradien volume 8 no 2 Juli 2012, hal 819-824
6. Nururrahmah, Widiarnu W, 2013, Analisis kadar beta karoten Kulit Buah Naga Menggunakan Spektrofotometer UV Vis, Jurnal Dinamika, April 2013, hal 15-26, ISSN 2087-7889, Universitas Cokroaminoto, Palopo
7. Pilliang, GW. 2005. *Pengelolaan Hasil Ternak*. IPB. Bandung. Sastrosupadi, A., 2003. Rancangan Percobaan Praktis Bidang Pertanian. Penerbit Kanisus. Yogyakarta.
8. Priska M, Peni N, Carvallo N, Ngapa, Y.D, 2018, Review: Antosianin dan pemanfaatannya, Journal of Applied Chemistry) Volume 6 Nomor 2, Desember 2018
9. Susilorini, T. E., M. E. Sawitri. 2007. Produk Olahan Susu. Penebar Swadaya. Jakarta.
10. Thai Agricultural Standard. 2008. Raw Goat Milk. Thailand: National Bureau of Agricultural Commodity and Food Standards. Ministry of Agriculture and Cooperatives.
11. Umayah U, E, dan Amrun H, M, 2007, Uji Aktivitas Antioksidan Ekstrak buah naga (Hylocereus Undatus(HAW) Britt. dan Rose), Jurnal Ilmu Dasar, vol 8, no 1, 2007, hal 83-90, Universitas Jember.
12. Usmiati,2005. Yogyakarta. Kanisius. Sumber Direktorat Gizi, Departemen Kesehatan Republik Indonesia.
13. Widyastuti, Y. E. 1993. Flora Fauna maskot Nasional dan Propinsi. Penebar Swadaya. Jakarta.
14. Winarno, F. G., 2002. Kimia Pangan dan Gizi. Gramedia Pustaka Utama, Jakarta.

How to cite this article: Lubis N, Agustiono J, Ismail D et.al. Effect of red dragon fruit peels (*Hylocereus polyrhizus*) as a natural dye and preservatives on chicken nuggets. International Journal of Research and Review. 2020; 7(3): 168-174.

******