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Study about Some Quality of Green Tea Ground with Addition of Red Ginger Powder (*Zingiber Officinale Rosc*)

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Abstract: The combination of green tea with red ginger powder has many health benefits. Objective: 1) Knowing some of the quality of green tea due to the addition of red ginger powder, 2) To know the appropriate red powder formulation of green tea dye. Methodology: The design which is used in this research is Completely Randomized Design (CRD) with 6 treatments and 3 replications. The obtained data were analyzed statistically with F test and Duncan's New Multiple Range Test (DNMRT) advanced test at 5% real level. Microbiology properties: total plate number and organoleptic test. Result: The addition of red ginger powder does affect microbial growth. The most favorable organoleptic taste analysis result of panelist is found in F treatment with percentage value 20%. The result of organoleptic analysis for the most favored aroma is panelist treatment D with percentage value 40%. The result of organoleptic analysis shows the most preferred color of panelist is F treatment with percentage value 41.11%. Conclusion: The addition of red ginger powder effect on the quality of green tea of organoleptic test most favored panelists and microbial content already meet the SNI. The addition formulation of the right red ginger powder is on the treatment of F (the addition of red ginger powder 5%).

Keywords: quality, red ginger, green tea, TPC, organoleptic.

I. INTRODUCTION

Health is a very valuable and priceless, so it needs to be maintained and cared for. The high prices of medicines, the economic crisis that has not been gradually recovering so encouraging consumers try to find other alternatives in maintaining health, thus raising a new trend in the health world is the trend to "back to nature" (back to nature). One impact that can be seen from this trend is the tendency of consumers in eating a food not only judge in terms of nutritional and delicious whether or not a food, but also see in terms of its benefits in maintaining healthy body [1]

After water, tea is the most commonly consumed beverage by most of the world's population with an average consumption of 120 ml / day. Black tea is generally consumed in Europe, northern part of America and northern part of Africa (except Morocco) whereas green tea is consumed in Asian region; oolong tea is widely consumed in China and Taiwan. All types of tea drinks come from tea leaves (*Camellia silences*). There are three types of tea, black tea (enzymatic oxidation) is a fermented tea, oolong tea (semi enzymatic oxidation) is the result of transition processing between green tea and black tea, and green tea (non-enzymatic oxidation) Tea obtained without experiencing the fermentation process. One of the reasons why choosing green tea because the processing is not difficult. Tea became one of the most popular types of functional drinks in the world. Called as a functional drink because in tea contained natural antioxidants, namely flavonoids that can keep the body from the threat of free radical attack.

Susilaningsih et al. [2] Reported that green tea polyphenols can increase the body's defense system against infection, which helps in the process of phagocytosis by inhibiting the work of hyaluronase enzymes so that the macrophages will remain functioning well. Consumption of tea drinks, especially green tea, according to Goldberg [3] mentioned that to be able to reduce the risk of gastrointestinal cancer by consuming 10 cups or more green tea. Then according to Sibuea [4] by consuming green tea regularly, two to four glasses a day can stimulate the decrease in blood pressure and help normalize high blood pressure. Therefore the need for additional antioxidants from sources other than tea. In this study, in the green tea drink will be added ginger powder is expected in addition to adding aroma and flavor green tea will also increase the content of natural antioxidants in green tea beverage dye.

Based on Ananda [5] research that produced three types of instant green spice tea formula with the ratio of each green tea extract: ginger: Javanic acid, which is 15: 1: 4, 15: 2.5: 2.5, and 15: 4: 1 (w / w) and presented with a serving dose of 3 g / 100 ml. The preferred test of 30 student panelists showed that the best formula that can be accepted on the 15: 4: 1 formula is aroma (90%), taste (73.33%) and color (70%). The best panelist acceptance is best found in the 15: 4: 1 (80%) formula. In the non-parametric test of Friedman the beverage color in the three formulas was not significantly different while in flavor, taste and general acceptance were significantly different ($\alpha = 0.05$).

From research Darningsih et al [6], entitled *Camelia-Murbei Tea Formulation with Ginger Powder (Zingiber officinale) and Javanese Acid (Tamarindus indica, L.)* As a health drink to improve the immune response of mice it is said that the addition of red ginger powder 10 % And Javanic acid as much as 6% of total tea. Based on the results of Ratiningsih [7] research, that with the combination of powder of red ginger and java acid is obtained tea with taste and aroma most preferred by panelist. In addition, tea added 10% red ginger powder and 6% tamarind has the highest antioxidant activity among the concentration combination of ginger and other java acid. From Tobing research [8] that the product with the addition of 0.6% ginger powder is the best product Instant black tea with ginger flavor with the addition of 0.6% ginger powder has tannin content of 3.32%, 0.58% moisture content, oleoresin 0.40% and 0.30% water insoluble part. Favorite value of instant black tea drink taste of ginger is the color 3.5 (like), aroma (3.65 (like) and taste 3.7 (like).

Ginger that contains antioxidant compounds used as a traditional medicine for the prevention and treatment of several diseases, such as sore throat, fever, stomach disorders, and lack of blood. Ginger contains gingerol compounds that have high antioxidant activity. According to Raja Lakshmi and Narasimhan [9], gingerol from ginger extract has higher antioxidant activity than α -tocopherol. Gingerol as a major bioactive component in ginger is a heat-resistant compound (Zakaria, et al [10]), so ginger can be developed into a variety of processed products other than beverages.

Several ginger properties that have been proven based on Kemenkes [11] among others to overcome nausea and vomiting, diarrhea, abdominal bloating, fever, cough with phlegm, flu, and stiff, lack of appetite, tingling feet, and food poisoning. Added again by Hap sari [12] that consuming red ginger drink 3.2 ml / kg body weight per day has an effect on decreasing LDL cholesterol level in woman dyslipidemia (lipid metabolism abnormality). All subjects in the treatment group experienced a decrease in LDL cholesterol after being given a red ginger drink.

The addition of red ginger powder to green tea can improve the taste in tea. Merging between green tea and red ginger powder has many health benefits. By consuming green tea and red ginger powder can lower cholesterol, gingerol in ginger can help lower cholesterol levels. Ginger contains no fat and sugar so it can be added to food products to increase the scent without the addition of calories so that the most widely used for treatment [13].

The use of a mixer in an improper composition (too much) can cause a weak aroma and tea flavor. Supposedly the overall quality of the steeping tea is found in teabags added 10% ginger powder as there are still components of ginger solid that are not easily mixed and dissolved during brewing so that the aroma and taste of steeping tea plus ginger powder is rather less sharp and the use of ginger powder 20% concentration should also provide good quality in terms of aroma and taste steeping that combines the aroma and taste of tea with ginger is quite fitting. [5].

During this addition of ginger with green tea has not been done in the form of instant. Based on that the researchers want to increase the added value of ginger by processing it with green tea into tea bags. In this case the researcher has done pre-experiment with the percentage of ginger 0.06, 0.12, 0.18, 0.24, and 0.36 from that percentage ginger still not felt then pretrial continued by increasing the percentage of ginger to 1%, 2 %, 3%, 4%, and 5%. In this case the treatment of ginger powder following the pre-trial. The purpose of this research is: 1). Knowing the effect of adding red ginger powder on the manufacture of green tea bags to some quality tea produced.2). Knowing the formulation of the addition of red ginger powder is appropriate to the green tea bags to be accepted by consumers.

II. MATERIAL AND METHODS

This research has been conducted at the Instrumentation Laboratory of Center of Agricultural Technology Andalas University of Padang West Sumatra in October to November 2016. The raw material used in this research is green tea from PT. Mitra Kerinci Solok Selatan West Sumatra and red ginger purchased at Pasar Raya Padang West Sumatra. The materials used for Total Plate Count (TPC) test are Plate Count Agar and buffered phosphate solution. Equipment: The organoleptic score sheet uses a score sheet. Equipment for Total Plate Count (TPC) test: - Scales with accuracy of 0.0001 g for weigh sampling - Mortar for smoothing sample - Petridisk for bacterial inoculation container - 10 ml pipette volume to take inoculant - Spatula for fish sampling device - Tubes Reaction for dilution container - Measuring glass 25 ml and 50 ml - Incubator with temperature 37°C for bacterial incubation - Autoclave to sterilize equipment and media - Colony counter to count growing number of colonies. Other tools used are oven, blade, blender, pan, 60 mesh sieve.

The design used in this study was Completely Randomized Design (CRD) with 6 treatments and 3 replications. The data obtained were analyzed statistically with F test and Duncan's New Multiple Range Test (DNMRT) advanced test at 5% real level. The treatment conducted in this study is green tea with the addition of red ginger powder as follows:

- A = 100% green tea (control)
- B = Added red ginger powder 1%
- C = Added red ginger powder 2%
- D = Added red ginger powder 3%
- E = Added red ginger powder 4%
- F = Addition of red ginger powder 5%

Material Formulation:

Formulation is very important in the manufacture of tea, if there is a mistake in determining the formulation of the tea can be damaged and not favored by consumers. In this research the formulation used is like table 1 as follows

TABLE 1: TEA FORMULATION IN 5 GRAMS OF MATERIALS

Material	Treatment					
	A	B	C	D	E	F
Powder green tea (gram)	50	49,5	49	48,5	48	47,5
Powder red ginger (gram)	0	0,5	1	1,5	2	2,5
Amount	50	50	50	50	50	50

Research Stages:

1 Making Green Tea [14]

The manufacture of green tea is as follows:

- a. Preparation of ingredients ie green tea (*Camellia sinensis* L. Kountze) required taken.
- b. The wasting is carried out at a temperature of 27°C for 8 to 10 hours, carried out on a thin layer (para-para) layer, reversed 3 times, given airflow using a fan.
- c. Drying is done using an oven with a temperature of 105°C for 25 minutes.
- d. Milling (size reduction) using blender ((Scheme of green tea manufacturing procedure can be seen in figure 1 below)

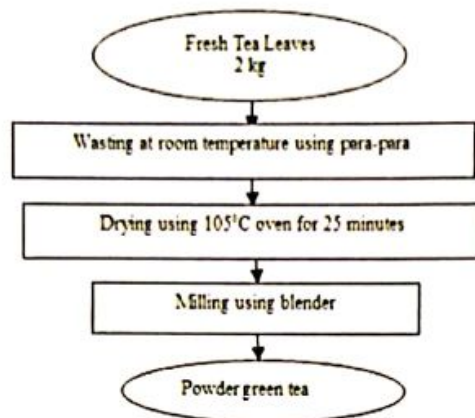


Figure 1: The Process of Making Green Tea

2 Making Ginger Powder [15].

The manufacture of ginger powder is:

- a. Fresh red ginger 7 months old.
- b. Washed with running water to remove dirt on the red ginger.
- c. Gingerbread peeling using a knife and wash again.
- d. Chopped with a size of 0.3 cm.
- e. Pengovenan at 45°C for 30 hours.
- f. Size size using blender escapes 60 mesh sieves.

(Scheme of procedure of making ginger powder can be seen in picture 2 below):



Figure 2: Making Red Ginger Powder

3. Addition of Green Tea and Ginger Powder [16]

Green tea powder mixed with ginger powder in accordance with the treatment set ie 0%, 1%, 2%, 3%, 4%, and 5%. After that the homogenization process so that mixed ginger powder mixed evenly. To process the addition of ginger powder on the green as Figure 3 below.

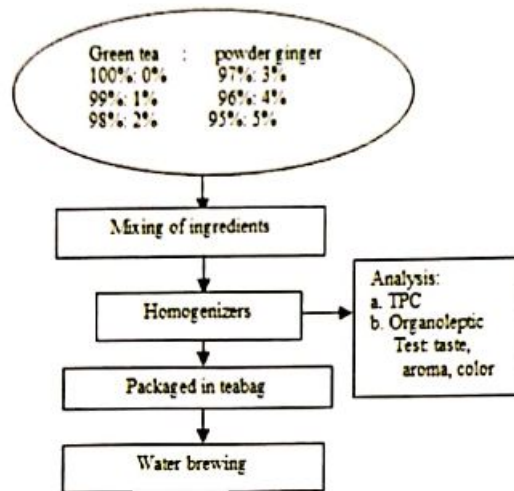


Figure 3: The process of adding red ginger powder to green tea

Green tea that has been mixed with ginger powder is tested water content, tannin, and then packed in tea bag. The observation parameters are: a. Total Plate Count (TPC) [17], b. Organoleptic test: Odor, color, taste, appearance [18].

III. RESULTS AND DISCUSSION

1). *Analysis of Microbiology (Total Plate Count)*: Determination of total plate number on green tea was done on the 2nd day. Aims to determine the total amount of microbes present in the product. The results of total plate Count testing on green tea can be seen in Table 2.

TABLE 2: GREEN TEA TEST RESULT WITH RED GINGER POWDER ADDITION

Treatment (Plus ginger red)	TPC
A (0%)	2.9×10^{-3}
B (1%)	1.8×10^{-3}
C (2%)	1.4×10^{-3}
D (3%)	9×10^{-2}
E (4%)	8×10^{-2}
F (5%)	6×10^{-2}

From Table 2 it can be seen that the total plate count of microbes in green tea in the addition of red ginger powder ranges from 6×10^{-2} colonies to 2.9×10^{-3} colonies. At treatment A that is equal to 2.9×10^{-3} colony. The lowest number of microbes is found in the F treatment of 6×10^{-2} colonies. The average total plate number of microbes found in green tea addition of red ginger powder meets the SNI of dry Green Tea 03-3836-2012.

The addition of red ginger powder on green tea affects microbial growth; the higher the concentration of red ginger powder provided the lower the growth of microbes. According to Mayuni [19], ginger powder has antimicrobial properties of gingerone and gingerol which have an inhibiting role especially in pathogenic bacteria. Another factor that can affect microbial growth is the water content in foodstuffs. Foods with larger water content are generally more easily overgrown with microbes making it more risky in terms of food safety. Added by Hap sari [12] ginger contains zingeron and gingerol compounds which are phenolic methyl and oleoresin ginger derivatives which are bactericidal to E. coli and can inhibit growth and kill microbes.

This is consistent with Rufauda's research [20] the effectiveness of any antimicrobial agent depending on the amount used, the addition of ginger powder that has more percent can inhibit microbial growth in sour soup leaf beverage.

Coupled with Zakaria [21] phenolic found in ginger is also able to inhibit microbial growth because it has a hydroxyl group capable of inactivating microorganisms. This compound is also used as an active disinfectant against vegetative cells of bacteria, viruses and molds. Nurcahyo [22] also mentioned that highly susceptible ginger antimicrobial activity inhibited *Salmonella thypii* growth (gram-negative bacteria causing typhoid), *Bacillus cereus*, and *Staphylococcus aureus* (gram-positive bacteria causing indigestion).

According to Winarto [23], based on chemical analysis it is known that ginger contains compounds such as flavonoids, polyphenols, essential oils, gingerol, limonene, oleoresin, 1,8 cineole, 10 dehydroginger dione, 6 gingerdione, alpha-linolenic acid, arginine, aspartic, Beta-sitosterol, acrylic-acid, capsaicin, chromogenic acid, farnesol, Farnese, and farnesol. Essential oils and oleoresins are chemical compounds capable of inhibiting growth and killing bacteria by damaging the bacterial plasma membrane, destroying the cellular system of the cell, and causing lysis of bacterial cells. In addition, the 3-dimensional structure of the protein is disrupted causing the denatured protein. After experiencing denaturation, the amino acid sequence in the bacteria remains intact but can no longer perform its function.

2). Analysis of Organoleptic Test

a). *Taste*: The percentage value of green tea taste with the addition of ginger organoleptic assessment results can be seen in Table 3.

TABLE 3: PERCENTAGE VALUE TASTE OF GREEN TEA WITH RED GINGER ADDED

Treatment	Taste value (%)				
	Very-very like	Very like	like	rather like	dislikes
A	2,22	61,11	36,67	-	-
B	5,55	51,11	41,11	2,22	-
C	3,33	47,77	44,44	4,44	-
D	3,33	44,44	47,78	4,44	-
E	6,67	44,44	42,22	6,67	-
F	20	43,33	34,44	2,22	-

Description: flavor value include 7 = very very like 6 = very like

5 = likes 4 = somewhat likes 3 = dislikes

Table 3 shows that green tea with F treatment of 5% red ginger powder showed very high percentage like the highest yield of 20%. While on treatment A, the addition of 0% red ginger powder shows very low percentage like the lowest yield of 2.22%. In treatment A, the addition of 0% red ginger powder showed the highest percentage likes the highest yield of 61.11%. While on the treatment of F the addition of red ginger powder 5% shows the percentage is like the lowest result of 43.33%. In treatment D the addition of red ginger powder 3% showed the highest percentage likes by 47.78%. While on the treatment of F the addition of red ginger powder 5% showed the lowest percentage likes 34.44%. In the E treatment the addition of red ginger powder 4% showed the highest percentage results rather like 6.67%. In the treatment of B and F the addition of red ginger powder of 1% and 5% showed the lowest percentage results rather like 2.22%.

Flavors can be assessed in response to stimuli that come from chemical compounds in a food that gives the impression of sweet, bitter, sour, and salty. Good taste can attract attention so that consumers are more likely to like food based on taste. The taste of food consists of three components, namely, smell, taste, and oral stimulation (Winarno in Rufauda [20]). From Table 3 it can be seen that the results of organoleptic percentage of flavors in green tea with various variations of red ginger powder most preferred by panelists is on the F treatment with the addition of 5% red ginger powder with a percentage of 20% which means very, very like. This is because the addition of red ginger powder more and more result in the content of shogaol ginger powder is more pronounced. Paimin [24] mentions that ginger contains oleoresin comprising the components of zingerol, shogaol and resins that because spicy flavor from ginger so the higher the addition of ginger powder to green tea causes a more spicy taste.

Graph on the taste of green tea with the addition of red ginger powder can be seen in Figure 4.

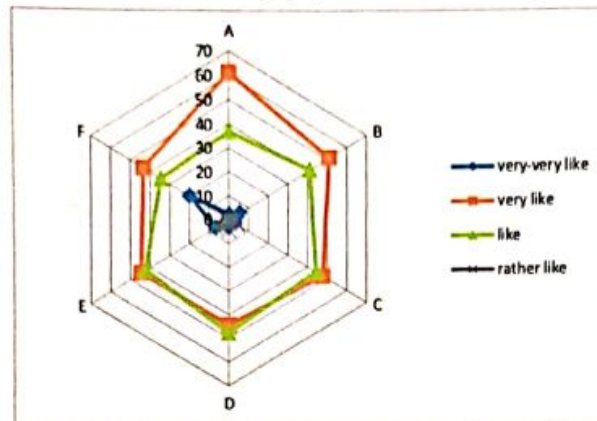


Figure 4: Graph of green tea taste with the addition of red ginger powder

From Figure 1 it can be seen that the highest percentage favored by panelists is found in the F treatment found in very, very liked parameters, whereas the lowest percentage is found in the treatment E in the rather favorable parameters.

b). **Aroma:** The percentage value of aroma green tea with the addition of red ginger powder result of organoleptic assessment can be seen in Table 4.

TABLE 4: PERCENTAGE VALUE AROMA OF GREEN TEA WITH RED GINGER ADDED

Treatment	Aroma value (%)				
	Very-very like	Very like	like	rather like	dislikes
A (0%)	21,11	33,33	38,90	6,67	-
B (1%)	14,44	38,90	40	6,67	-
C (2%)	15,56	38,90	36,67	8,90	-
D (3%)	20	40	36,67	2,22	1,11
E (4%)	12,22	37,78	44,44	5,56	-
F (5%)	11,11	11,44	41,11	3,33	-

Description: value of aroma include 7 = very very like, 6 = very like, 5 = likes 4 = rather like 3 = dislike

Table 5 shows that green tea with treatment A of the addition of 0% red ginger powder showed the highest percentage very very like 21.11%. While on the treatment of F the addition of red ginger powder 5% showed the lowest result very much like 11.11%. In the D treatment the addition of red ginger powder 3% showed the highest percentage result is very liked by 40%. In the F treatment the addition of red ginger powder 5% showed the lowest percentage result is very like 11.44%. In the E treatment the addition of red ginger powder 4% showed the highest percentage likes by 44.44%. While in treatment of C and D the addition of red ginger powder of 2% and 3% showed the lowest percentage likes 36.67%. In the C treatment the addition of red ginger powder 3% showed the highest percentage results rather like 8.90%. While on treatment D the addition of red ginger powder 3% showed the lowest result of percentage rather like 2.22%. In the D treatment the addition of red ginger powder 3% showed the lowest result of the dislike percentage of 1.11%.

The role of the smell of a product is very important because it will determine the acceptance of a product. From the table above, the result of organic aroma organoleptic percentage on green tea with the most preferred red ginger powder variation is treatment D addition of red ginger powder 3% with percentage value 40% which means very like. This is because the aroma of red ginger powder has been felt at the percentage of red ginger powder added over 2%. The aroma of ginger powder derived from essential oils containing chemical compounds such as eugenol and benzyl benzoate so as to provide a distinctive aroma in food and drink. The main component of a typical aroma of dried ginger is an aromatic ketone called gingerol composed of 6, 8, and 10 gingerol [19].

Graph on the aroma of green tea with the addition of red ginger powder can be seen in Figure 5.

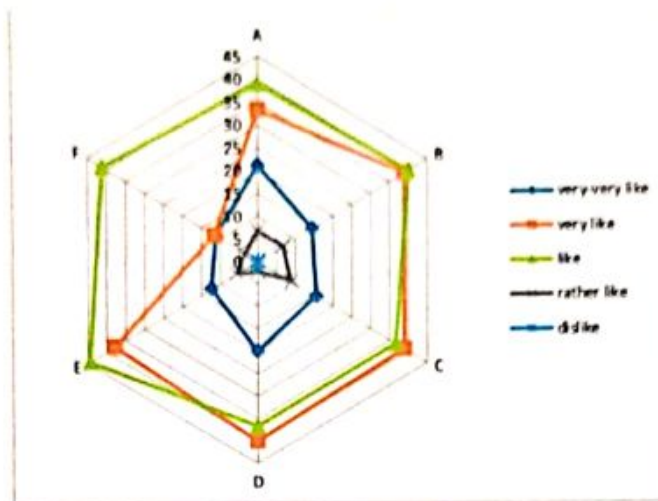


Figure 5: Graph of green tea aroma with the addition of red ginger powder

From Figure 2 it can be seen that the highest percentage of favored panelists is found in the treatment D which is in the likes parameter, while the lowest percentage is in the treatment of C, B and A are in the rather favorable parameters.

c). **Color:** The percentage of green tea color values with the addition of red ginger powder of organoleptic assessment results can be seen in Table 5.

TABLE 5: PERCENTAGE VALUE COLOR OF GREEN TEA WITH RED GINGER ADDED

Treatment	Value Color (%)				
	Very-very like	Very like	Like	Rather like	dislike
A (0%)	14,44	33,33	47,78	4,48	-
B (1%)	21,11	31,11	40	7,78	-
C (2%)	18,90	30	41,44	8,90	1,11
D (3%)	23,33	37,78	33,33	5,56	-
E (4%)	15,56	38,90	37,78	7,78	-
F (5%)	18,90	41,11	28,90	11,11	-

Description: value includes 7 = very like 6 = very like 5 = likes 4 = rather like 3 = dislike

Table 6 shows that green tea with D treatment of 3% red ginger powder showed the highest percentage of very 23%. While on treatment A, the addition of 0% red ginger powder showed the lowest result very low percentage of 14.44%. In the F treatment the addition of red ginger powder 5% showed the highest percentage result is much liked 41.11%. While on the C treatment the addition of red ginger powder 2% showed the lowest result percentage like 30%. In treatment A, the addition of 0% red ginger powder showed the highest percentage likes by 47.78%. While in the treatment of F the addition of red ginger powder 5% showed the lowest percentage of 28.90%. In the F treatment, the addition of red ginger powder 5% showed the highest percentage result rather like 11.11%. While in treatment A, the addition of 0% red ginger powder shows the lowest percentage results rather like 4.48%. In the C treatment the addition of red ginger powder 2% showed the result of the percentage did not like equal to 1.11%.

Color is the first parameter that lowers the level of consumer acceptance of a product. Subjective studies with vision are still crucial in color organoleptic testing [25]. From the table above can be seen that the results of the percentage of organoleptic color green tea with the variation of the addition of red ginger powder is the most preferred panelist is the treatment of F with the addition of red ginger powder 5% with a value of 41.11% percentage which means very, very like.

Graph of green tea color with the addition of red ginger powder can be seen in figure 6.

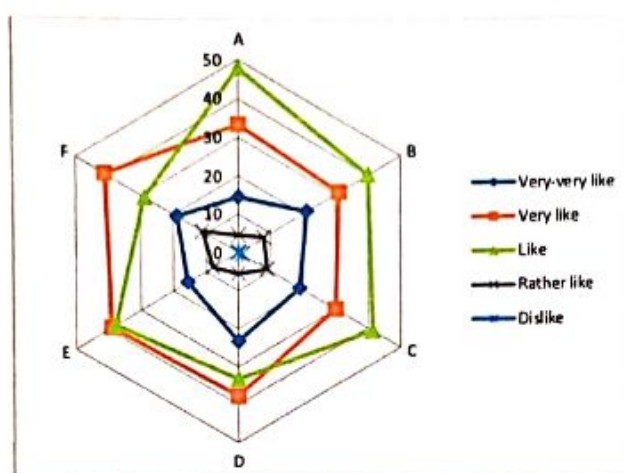


Figure 6: Graph color green tea with the addition of red ginger powder

From the figure above it can be seen that the highest percentage of preferred panel is found in the F treatment found in the parameters is very like, while the lowest percentage is in the treatment of F also found in the parameters rather like.

IV. CONCLUSIONS

Conclusion, from the above description can be drawn conclusion as follows: The addition of red ginger powder 5% effect on organoleptic test most favored panelist and microbial content already fulfill SNI. Formulation The addition of the right red ginger powder is on the treatment of F (the addition of red ginger powder 5%).

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