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# THE EFFECT OF ADDING EGG WHITE ON THE PHYSICAL AND ORGANOLEPTIC PROPERTIES OF GRAPE JUICE (Vitis vinifera, L.)

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**ABSTRACT**

*Grapes (Vitis vinifera L) are a recommended fibrous food, advised to be consumed in quantities of 300g – 400g per capita per day. Grapes are popular due to their delicious, sweet, and fresh taste, and their high nutritional content, especially vitamins C and A. However, grapes are climacteric fruits that quickly deteriorate and contain tannins, which can impart an astringent, bitter, and cloudy taste if not processed into juice. Therefore, it is necessary to conduct research on grape juice processing to extend its shelf life and enhance the quality of the juice. The method used in this research is an experimental method with a Completely Randomized Design (CRD), consisting of 5 treatments with one factor. The treatment variations are: 250 ml grape juice with 0% egg white (albumin), 250 ml grape juice with 7.2% egg white (albumin), 250 ml grape juice with 14.4% egg white (albumin), 250 ml grape juice with 21.6% egg white (albumin), and 250 ml grape juice with 28.8% egg white (albumin). An organoleptic test on the grape juice was conducted using a preference or hedonic test on each variable: color, aroma, taste, and viscosity. The results of these 5 treatments were then analyzed using analysis of variance (ANOVA), and if there were significant differences between treatments, they were further tested with the Least Significant Difference (LSD) test at a 5% significance level. The results of adding egg white to grape juice processed into grape juice were analyzed with the following average values: color with an average value ranging from 2.20 (A) to 3.40 (E), aroma with an average value ranging from 2.07 (A) to 3.60 (B), taste with an average value ranging from 2.20 (A) to 4.20 (C), and viscosity with an average value ranging from 1.93 (A) to 4.33 (C). This research shows that the best formulation for making grape juice (Vitis vinifera L) with the addition of 36 ml or 14.4% egg white (albumin), 250 grams of grapes, 500 grams of granulated*

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*sugar, and 2500 ml of distilled water has the highest score of 15.19 compared to other treatments.*

**KEYWORDS** *Grape Extract, Egg White, Grape Juice*



## INTRODUCTION

Grapes are an important source of vitamins and minerals essential for human body development. Fresh grapes have natural characteristics that must be carefully considered. Freshly harvested grapes are still alive because they continue their metabolic functions. However, this metabolism differs from the parent plant growing in its original environment since the harvested product undergoes various physical changes, such as the loss of water content and nutrients, a process known as respiration. The respiration rate increases to obtain energy for survival activities. In this process, plant material, primarily complex carbohydrates, is broken down into simpler carbohydrates (sugars) and then oxidized to produce energy. Byproducts of this respiration are carbon dioxide (CO2), water vapor (H2O), and heat. The higher the respiration rate, the faster these breakdowns occur, leading to the deterioration of the product and accelerating its spoilage.

Given the nature and characteristics of horticultural fruits, it is necessary to process them into products such as juice to extend their shelf life. Fruit juice beverages are light drinks made from fruit juice and drinking water, with or without added sugar and permitted food additives. Factors to consider in making fruit juice include using fresh, abundant, juicy fruits that are not bland, damaged, or rotten. Therefore, processing fresh grapes into grape juice can extend their shelf life. However, grapes also contain tannins or polyphenols, which are anti-nutritional compounds found in grapes and various other fruits. Tannins give grapes their distinctive astringent and bitter taste but unfortunately play a role in reducing iron absorption (Fe). Additionally, tannins can bind to proteins and minerals, making them unusable by the body.

Tannins also affect carbohydrate metabolism by binding to starch, making it difficult for amylase enzymes to digest. Tannins bind not only to proteins and starch but also to cellulose, pectin, alkaloids, and vitamin B12. The wide-ranging effects of tannins on metabolism can cause general growth depression. Making grape juice is a way to save excess fruit production and avoid dependency on seasonal availability. Furthermore, making fruit juice aims to enhance the storage durability and utility of fruits. The juice-making process requires a substance that can eliminate tannins to make the juice more palatable. One such substance is egg white (albumin), which binds with tannins and precipitates the protein-tannin complex, resulting in clear grape juice due to its coagulation properties. Egg albumin can coagulate under acidic conditions and heat. At certain temperatures, albumin can coagulate with compounds. The use of egg white must be calculated carefully since excessive addition can cause a fishy odor, so the optimal amount of addition needs to be determined. The protein-tannin interaction is influenced by the protein's characteristics, such as amino acid composition and isoelectric point, tannin characteristics like molecular weight, structure, and heterogeneity, and reaction conditions like pH, temperature, solvent composition, and time.

**Previous Study.**

The rationale in the study entitled The Effect of Adding Egg White on the Physical and Organoleptic Properties of Grape Juice (*Vitis vinifera* L), which is based on several previous studies as a reference used as motivation by the following research:

| No | Researchers/ Writer | Year | Title of study | Methodology | Results obtained |
|---|---|---|---|---|---|
| 1 | Rucitra Widyasari | 2007 | Aplikasi Flokulan terhadap pengolahan Sari buah jambu mete (*Anacardium Occidentale* L. | Analisa laboratorium untuk menguji kadar tanin jambu mete. (*Anacardium Occidentale* L. | Tepung putih telur 0.01%, pengenceran 1:3, kemanisan 11.5° brix. pH rata-rata 4.34, kekentalan 3.5 cp, kadar air 85.70 % (bb), abu 0.02 % (bb), protein 0.25 % (bb), lemak 0.05 % (bb), serat kasar 0.06 % (bb) karbohidrat 13.92 % (bb |
| 2 | Febriana W. Natarini | 2007 | Perbandingan anti bakteri jus anggur merah (*Vitis vinifera* ) pad Berbagai konsentrasi terhadap Streptococcus mutans. | Metode eksperimental dengan post test only control group design. | Anggur merah bersifat bakteriostatik dan bakterisid terhdap *S. mutans*. KHM jus anggur merah terhadap *S. mutans* adalah pada konsentrasi 50%, KBM pada konsentrasi 100%. |
| 3 | Efran Japin Tandi | 2010 | Pengaruh Tanin terhadap aktivitas enzim protease | Analisa laboratorium untuk mengetahui pengaruh tanin terhadap aktivitas enzim protease. | Kadar tanin 0, 2, 4, 6 dan 8 persen dalam substrat menyebabkan aktivitas enzim protease masing-masing adalah 4,700; 3,555; 2,590; 1,190 dan 0,190 µmol *amino acid*, g prot-1 jam-1. |
| 4 | Americo P. Da Cruz | 2013 | Pengaruh penambahan Putih Telur terhadap sifat fisik dan | metode experiment RAL dengan uji hedonik dan uji sensories | Hasil penelitiaan ini menunjukkan bahwa formulasi terbaik pada pembuatan jus buah anggur (*Vitis vinifera* L) |

| | | | |
|---|---|---|---|
| | Organoleptik Jus buah Anggur (*Vitis vinifera* L | untuk parameter organoleptik | dengan penambahan putih telur (*Albumin*) 36 ml atau 14.4%, buah anggur 250 gram, gula pasir 500 gram, air aqua 2.500 ml. dan memiliki skor tertinggi 15,19 dibandingkan dengan perlakuan lainnya. |

**Theoretical Studies**

***Grapes (Vitis vinifera L)***

Grapes are a recommended fibrous food to be consumed at a minimum of 300g – 400g per capita per day. Everyone enjoys grapes because they are delicious, sweet, fresh, and highly nutritious, especially rich in vitamins C and A. The fiber in grapes is essential for the body as it influences cancer risk, aids digestion, and maintains or enhances immunity (Rukmana, 1999: 15).

**a. Grape classification (*Vitis vinifera* L)**

Taxonomically, grapes are classified as follows (Rukmana, 1999 : 19) :

*Kingdom* : *Plantae*
*Divisio* : *Magnoliophyta*
*Class* : *Magnoliosida*
Ordo : *Vitales*
Family : *Vitaceae*
Genus : *Vitis* L
Species : *Vitis vinifera, Vitis labrusca,Vitis rotundifolia.*

***Nutritional Content of Grapes***

Grapes are known as fruits that have excellent nutritional value, especially the content of vitamins such as vitamin C, vitamin B1, vitamin B6, and minerals such as manganese and potassium**.** Rukmana, 1999: 15) The nutritional content of grapes can be seen in the following table:

| No | Nutritional composition | Concentration per 100 grams |
|---|---|---|
| 1 | Water | 70% - 80% |
| 2 | Karbohidrat | 15% - 25% |
| 3 | Asam organic | 0,3% - 1,5% |
| 4 | Tannin | 0,01% - 0,10 % |
| 5 | Protein | 0,0001%- 0,01% |
| 6 | Amino | 0,017%-0,11 % |
| 7 | Amoniak | 0,001 % - 0,012% |
| 8 | Mineral | 0,3 % - 0,6 % |
| 9 | Vitamin C | 100 ml |

| | | |
|---|---|---|
| 10 | Vitamin B | 100 ml |
| 11 | Etil alcohol | 244.000 mg/ton |
| 12 | Methanol | 3 mg-7 mg. |
| 13 | Zat resveratrol | 50-100 mikrogram |
| 14 | Etanol | 111mg |
| 15 | Mangan | 0,07mg1% |
| 16 | Kalium | 191mg 4% |

The manganese content in grapes is particularly beneficial due to its high nutritional value. Manganese is essential for energy synthesis, helping to maintain blood sugar stability. It is also necessary for fat metabolism and the formation of connective tissue and bones. The concentration of manganese in grapes is 0.07 mg per 100 grams of fruit. Grapes contain 100 mg of vitamin C per 100 grams. Vitamin C is crucial for various important processes in the body, including collagen synthesis, fat transportation, electron transport in enzymatic reactions, promoting healthy gums, regulating cholesterol levels, and boosting immunity (Rukmana, 1999: 15). Potassium in grapes (191 mg/100 g) is known to help control blood pressure, stimulate muscle and nerve function, enhance oxygen delivery to the brain, and maintain fluid balance in the body. Grapes also contain phenolic compounds like resveratrol and tannins. Resveratrol, mainly found in grape skins, inhibits cancer development by blocking agents that cause cancer, slowing tumor growth, and reverting precancerous cells to normal.

***The structure of grape plants***

Grapevines generally grow by climbing and have tendrils that serve as gripping tools when climbing. Different types of grapes can be distinguished by variations in fruit color, size, and shape. The grape plant structure includes stems, branches, shoots, and leaves. According to Rukmana (1999: 20), stems support branch and twig growth and facilitate the transfer of nutrients from roots to leaves and food from leaves to the entire plant. Mature branches become the main branches, which then sprout new branches. These branches have buds from which twigs and flowers or fruits grow. Flowers appear opposite the tendrils about 6-10 weeks after young shoots emerge. Grape flowers usually self-pollinate. After 2-3 days of pollination, the fruit starts to grow and develop into mature grapes. The fruit consists of skin, flesh, and seeds. The skin makes up about 5-12% of the fruit, the flesh 80-90%, and the seeds 0-5% (Rukmana, 1999: 21).

Grape roots can penetrate soil up to 1.5 meters, even 3 meters deep, depending on the thickness of the topsoil, soil fertility, and soil composition. This study uses Probolinggo red grapes, also known as black or purple grapes. Probolinggo red grapes are characterized by thin leaves with light green or slightly reddish tips, alternating tendrils every two leaf nodes (where flowers grow), dense flowers that self-pollinate, large fruit clusters with 15-40 grapes, easily raisin when small, and ripening to a reddish-brown, sweet, fresh, and slightly astringent taste. They are susceptible to fungal diseases, do not grow well in humid areas (high rainfall), and prefer loose to gravelly soil, thriving at low altitudes around 300 meters above sea level.

***Grape Varieties in Timor Leste***

According to statistics from the department of Food Crops and Horticulture, there are only a few types of grapes that can grow according to Timor-Leste's natural conditions, namely Vitis vinifera and Vitis labrusca. Varieties of Vitis vinifera that grow a lot are Probolinggo blue and probolinggo white and probolinggo red which can grow well in Timor leste.

***Tannin***

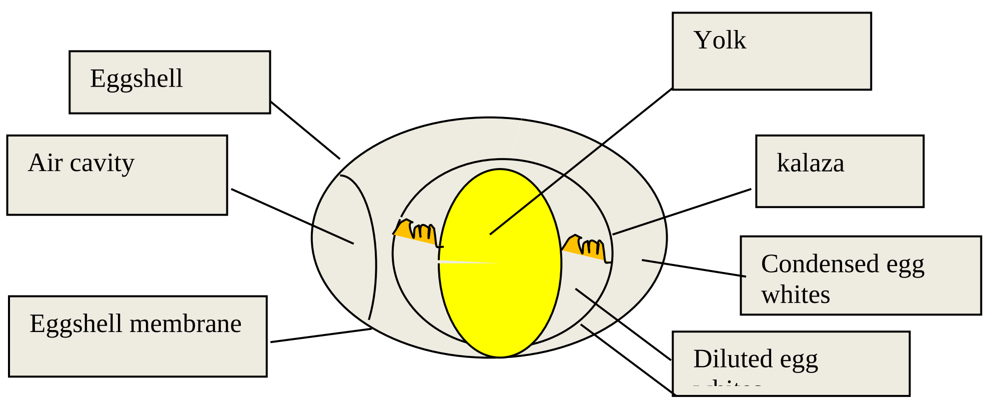
According to Winarno (1992), tannins are a group of phenolic compounds with molecular weights of 500-3000 that can react with proteins to form insoluble protein-tannin complexes at certain concentrations and pH levels. This occurs with low molecular weight tannins and low complex stability, while high molecular weight tannins are ineffective for tanning due to their size. Tannins are not always yellow or brown. Commercial tannic acid has a molecular weight of 1,701, likely composed of nine gallic acid molecules and one glucose molecule (Widyasari, 2007: 7). Tannins in vascular plants can be extracted from wood and bark using water or organic solvents like acetone or ethanol. Tannins in various plants have different chemical structures and reactions but share the ability to precipitate gelatin and protein. Natural tannins are water-soluble and can cause color changes in solutions from light to dark red and brown, giving each tannin a distinct color based on its source. Oxidized tannins produce brown compounds that cannot precipitate protein. Tannins include catechins, leucoanthocyanins, and hydroxy acids, each capable of causing color changes when reacting with metal ions. Tannins used in food come in two types: condensed tannins, polymers of catechin (flavan-3-ol) and leucoanthocyanin (flavan-3,4-diol), and hydrolyzable tannins, including gallotannins and ellagitannins (Winarno, 1992).

Condensed tannins cannot be hydrolyzed by acids, bases, or enzymes, while hydrolyzable tannins are polyesters and glycosides linked by oxygen atoms and easily hydrolyzed by acids and enzymes (Widyasari, 2007: 7). Condensed tannins are found in fruits, grains, and plants consumed by humans, while hydrolyzable tannins are mainly in non-food plants but play important roles in food, beverage, and pharmaceutical industries. Bambang (1982) noted that tannins cause astringency due to cross-linking with proteins or glycoproteins in the mouth, reducing saliva secretion and causing dryness and wrinkling. Reduced saliva secretion may result from salivary duct shrinkage or glycoprotein precipitation blocking the ducts, although the exact initial mechanism is unclear (Widyasari, 2007: 8).

**Egg White *(Albumin)*.**

Albumin or egg white is composed of four layers, namely the outer thin layer, firm layer, inner thin layer, and chalaziferous layer. The composition of egg white consists mainly of protein as the main component. The fat content in egg white can be neglected because it is very minimal. The carbohydrate content in egg white consists of free carbohydrates and carbohydrates bound with protein, with about 98% of the free carbohydrates in egg white being glucose (Winarno, 1992). The following are the parts of the egg:

**Classification of egg parts, Gaman (1994: 192).**




Egg white or albumin contains high enough protein. The protein contained in eggs is the best quality protein and is considered to have a biological value of 100. Egg albumin is commonly used to reduce the astringent taste of red wines by lowering tannin levels. Egg albumin can also be used to purify syrups, soups, and jelly, due to its ability to coagulate. Egg albumin can be coagulated by acid as well as heat. The temperature range for coagulation is 63°C, and it starts completely at 71°C. Egg white flour is flour made from egg white liquid. The quality requirements for egg white flour are shown in Table 2.2 Quality Requirements for Egg White Flour.

**Quality Requirements for Egg White Flour (SNI 01-4323-1996)**

| No | Types | Unit Test | Requirement |
|---|---|---|---|
| 1 | pH | - | 6,5-7,5 |
| 2 | Kadar Air, | b/b % | Maks. 8 |
| 3 | Kadar Abu Total | , b/b % | Maks. 5 |
| 4 | Kadar Lemak, | b/b % | Maks. 1 |
| 5 | Kadar Protein, | b/b % | Min. 75 |
| 6 | Gula Pereduksi, | b/b % | Maks. 0,5 |
| 7 | Cemaran Mikroba : | - | - |
| | 1.Total Bakteri | koloni/g | Maks. 1 x 103 |
| | 2. Coliform | koloni/g | Maks. 1 |
| | 3. Salmonella | - | Tidak boleh ada |
| 8 | Cemaran Logam : | - | - |
| | 1.Tembaga (Cu) | mg/kg | Maks. 6,0 |
| | 2.Zeng (Zn) | mg/kg | Maks. 10,0 |
| | 3.Timbal (Pb) | mg/kg | Maks. 1,0 |

**Sugar (Sukrosa)**

Sucrose is a disaccharide compound that is chemically systematically called α-D-gluco-pyranosyl-β-D-fructofuranoside and the molecular formula C12H22 011. Commercially, sucrose is produced from cane sugar or beet sugar and obtained in the form of granulated sugar or syrup. Sucrose has a molecular weight of 342.30 and consists of glucose and fructose groups. Sucrose has a very important role in food technology, because of its diverse functions, namely as a sweetener, texture former, preservative, flavor former, as a filler, solvent and as a carrier of trace elements (Nicol, 1979, in Widyasari, 2007). The main function of sucrose as a sweetener plays an important role, because it can increase the acceptance of a food, namely by covering up unpleasant tastes. The sweet taste of sucrose is pure, because there is no after taste, which is the second taste that arises after the first taste. In addition, sucrose also strengthens the taste of food, because it balances sour, bitter and salty tastes through chemical reactions such as caramelization. Sucrose is commonly used as a standard level of sweetness for other sweeteners (Nicol, 1979, in Widyasari, 2007). The concentration of sugar added to the manufacture of fruit juice ranges from 11-15%.

**Water**

a. **Water for Food Treatment**
   Water related to the products of the food processing industry must meet at least the quality standards required for drinking or drinking water. But each part of the food processing industry may need to develop specific water quality requirements to achieve satisfactory processing results. In many cases drinking

water is needed, where additional handling is needed so that all ingredients in the water that may affect the appearance, taste, and stability of the final result (Buckle, 1985: 203).

**b. Water for the manufacture of carbonated beverages.**

Water quality control is very important especially for the manufacture of carbonated drinks or soft drinks, because high carbonate hardness (alkalinity) can cause acidic drinks to become unpleasant or taste tasteless. Also, since this drink is essentially water, any unpleasant taste or smell present in the water will affect the taste of the final product. The high clarity of most soft drinks is an important factor in terms of marketing, (Buckle, 1985: 204). Additional methods of handling water commonly used for the manufacture of soft drinks include chemical purification and clogging, precipitation, sand filtration, chlorination and absorption with activated carbon, (Buckle, 1985: 204).

**Fruit extract / Fruit Juice**

Fruit juice is a liquid that results from squeezing or crushing fresh fruit that has ripened. In principle, 2 (two) kinds of fruit juice are known, namely: 1. Diluted fruit juice (can be drunk directly), which is fruit liquid obtained from pressing fruit flesh, followed by the addition of water and sugar. 2. Concentrated fruit juice / Syrup, which is a liquid produced from pressing fruit flesh and continued with the concentration process, either by ordinary boiling or by other means such as evaporation with vacuum, and others. This syrup cannot be drunk immediately, but must be diluted first with water, 1 part syrup with 5 parts water, (Sulintriani, 1981: 39-43).

## RESEARCH METHOD

The method used in this study was an experimental method using a Complete Randomized Design and one factor, namely the addition of egg whites (*Albumin)* consisting of five treatments and 3 repeats (Sastrosupadi; A, 2000: 53-64) with a combination of treatments as follows;

SA0 $PT_0$ = 250 gr Wine Cider : 0 ml Egg White (Albumin) or 0 % (w/w)

SA1 $PT_1$ = 250 gr Grape Cider : 18 ml Egg White (Albumin) or 7.2 % (w/w)

SA2 $PT_2$ = 250gr Wine Cider : 36 ml Egg White (Albumin) or 14.4 % (w/w)

SA3 $PT_3$ = 250gr Wine Cider : 54 ml Egg White (Albumin) or 21.6 % (w/w)

SA4 $PT_4$ = 250gr Grape Juice : 72 ml Egg White (Albumin) or 28.8 % (w/w)

**Data Observation and Analysis Techniques**

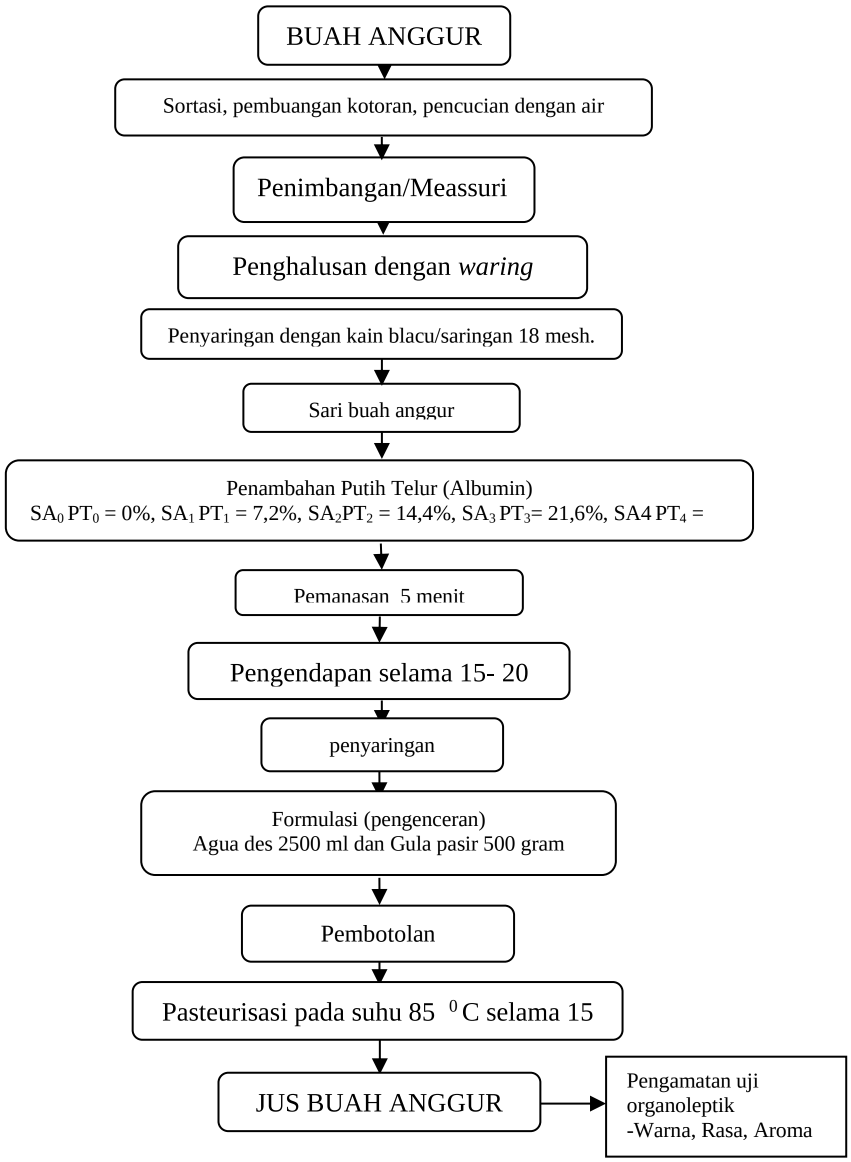
In this study, observations and analysis of the level of liking were carried out. That is; Taste, Aroma, Color and Viscosity (viscosity) of grape juice. With organoleptic tests, the test scoring method is that panelists are asked to give an assessment to samples that are available with different treatments. Observation of the level of liking using a rating test scale (Sastrosupadi: A, 2000: 53-64): Very disliked, Disliked, Somewhat liked, Liked and Very liked.

Data analysis used is fingerprint analysis to determine the effect of adding egg whites on making Angur Fruit Juice. If there is an effect due to addition, further tests will be carried out at the level of significance of BNT 5%. The variables tested, the Organoleptic Test was carried out by liking test which included a favorability test for the liking of Color, Taste, Aroma and Viscosity using the scoring scale test method and panelists used as many as 15 panelists, (Sastrosupadi, A, 2000: 53-64)

**Research Procedure**

The grapes used are red probolingo grapes obtained from the Lita store supermarket, with a maturity rate of ± 90%, with a total weight for all treatments of 1,250 grams of fresh grapes. Then the grapes are sorted to separate rotten or diseased fruits, then the fruits are weighed with a weight of 250 grams each. After that the grapes are washed then the grapes are put into the waring blender and then blended, then the blended grapes are filtered with an analytical filter measuring 18 inch liner to obtain grape juice. Furthermore, grape juice is measured according to the treatment, namely: SA0 PT0 = Without the addition of egg white 0 ml or 0% (b / w), SA1 PT1 = Addition of Egg White 18 ml or 7.2% (b / w), SA2 PT2 = Addition of Egg White 36 ml or 14.4 % (b / w), SA3 PT3 = Addition of Egg White 54 ml or 21.6 % (b / w), SA4 PT4 = Addition of Egg White 72 ml or 28.8 % (b / w).

After that the grape juice is heated to a temperature of 100 $^{o}$C for 5 minutes, then the grape juice is precipitated for 15-20 minutes, then filtered and added sugar according to the size of each treatment. If the product is continued for industrial processing, fresh drinks, grape juice is packaged in bottles, then pasteurized at 85oC for 15 seconds. *(Grape juice making process flow chart)*




## RESULT AND DISCUSSION

### Preference Level for the Color of Grape Juice (Vitis vinifera L.)

Color plays an important role in the acceptance of food and beverages. Additionally, color can indicate chemical changes in food, such as caramelization and Maillard reactions. The color of food is caused by natural pigments, a group of compounds found in products derived from animals or plants. Based on the analysis of variance (ANOVA) on the color of grape juice, the calculated F-value (6.59) is greater than the tabulated F-value (3.69), meaning H1 is accepted. This indicates that there is at least one pair of treatments that significantly differ at the 5% significance level. This means that the addition of egg white (albumin) has an effect on the color of the resulting grape juice. To determine the extent of this effect on the organoleptic value of the grape juice color, refer to the following table: **ANOVA of preference for the color of grape juice (Primary data tabulation, 2013).**

| SV | Db | JK | KT | F. hitung | F. Tabel 5% | F. Tabel 1% |
|---|---|---|---|---|---|---|
| Perlakuan | 4 | 21,57 | 5,375 | 6,59** | 3,69 | 4,50 |
| Galat | 70 | 57,13 | 0,816 | | | |
| Total | 74 | 78,7 | | | | |

** ⟶ Real different

Conclusion: $F_{count}$ (=6.59) > from $F_{Table}$ (=3.69), ⟶ then we receive H1, i.e. there is at least a pair of unequal middle values of treatment. So it needs further tests to find BNT (the smallest real difference) 5%.

$$1.BNT_a = t_{a\ (db\ galat)} \sqrt[x]{\frac{2 \text{ x kt galat}}{\text{Ulangan}}}$$

$$BNT_{0,05} = t0,05_{a\ (70)} \sqrt[x]{\frac{2 \text{ x kt galat}}{\text{panelis}}}$$

$$= 2.00. \sqrt[x]{\frac{2 \text{ x } 0,618}{15}}$$

$$= 2.00 \text{ x } \sqrt{0,082}$$

$$= 2,00 \text{ x } 0,29 , = \mathbf{0,58}$$

**Average Preference Test Results for Grape Juice Color (*Vitis vinifera*, L.)**

| Treatment | Percentage of egg whites | Average | Notation |
|---|---|---|---|
| A | 0% | 2.20 | a |
| B | 7,2% | 3.33 | b |
| C | 14,4% | 3.13 | b |
| D | 16,21% | 3.27 | b |
| E | 28,8% | 3.40 | c |
| **BNT 5%** | **0,2** | | |

The analysis of the average organoleptic value for the color of grape juice shown in Table (4.2) indicates that the highest preference for the color of grape juice was in treatment E with an average score of 3.40, which was highly preferred by consumers (represented by panelists). This shows that the addition of 54 ml/28.8% egg white in the fifth treatment (E) is acceptable or preferred by consumers (represented by panelists) in the organoleptic test for the color of the resulting grape juice. The lowest preference for the color of grape juice was in treatment A with an average score of 2.20, which was not preferred.

**Preference Level for the Aroma of Grape Juice (Vitis vinifera L.)**

Aroma is often described using human senses based on widely recognized taste and smell perceptions. Such a system can provide an orderly and reliable basis for comparing taste and smell exposures by different tasters, with aroma being the result of complex interactions between various taste and smell components. Organoleptically, aroma is a food product property that stimulates the human sense of smell to determine whether a processed food product is liked or disliked. Based on the analysis of variance (ANOVA) on the aroma of grape juice, the calculated F-value (6.09) is greater than the tabulated F-value (2.50), meaning H1 is accepted. This indicates that there is at least one pair of treatments that significantly differ at the 5% significance level, meaning that the addition of egg white (albumin) affects the aroma of the resulting grape juice.

**Anova of Preference for the Aroma of Grape Juice (*Vitis vinifera, L)***

| SV | Db | JK | KT | F. count | F. Table 5% | F. Table 1% |
|---|---|---|---|---|---|---|
| Perlakuan | 4 | 23.4 | 5.85 | 6.09** | 2.50 | 3.60 |
| Galat | 70 | 67.3 | 0.96 | | | |
| Total | 74 | 90.7 | | | | |

☆☆ ⟶ Different is very real

Conclusion: $F_{count}$ (= 6.09) > from $F_{Table}$ (= 2.50.), ⟶ then we receive H1 , i.e. there is at least a pair of unequal middle values of treatment. So further tests are needed to find 5% BNT (the smallest real difference).

$$1.BNT_a = t_{a\,(db\ galat)} \sqrt[x]{\frac{2 \times kt\ galat}{Ulangan}}$$

$$BNT_{0,05} = t0,05_{a\,(70)} \sqrt[x]{\frac{2 \times kt\ galat}{Panelis}}$$

$$= 2.00 \sqrt[x]{\frac{2 \times 0,96}{15}}$$

$$= 2.00 \sqrt[x]{0,128}$$

$$= 2,00 \times 0,36$$

$$= \mathbf{0,72}$$

**Average test results on aroma parameters of grape juice (*Vitis vinifera L)***

| Treatment | Percentage of addition | Average | Notation |
|---|---|---|---|
| A | 0% | 2.07 | a |
| B | 7,2% | 3.60 | c |
| C | 14,4% | 3.53 | b |
| D | 16,21% | 3.10 | b |
| E | 28,8% | 3.33 | b |
| BNT 5% | | 0,27 | |

Note: Different notations indicate a significant difference between treatments at a 5% significance level

Based on the analysis of variance (ANOVA) for the aroma of grape juice, the addition of egg white (albumin) shows a significant difference between treatments regarding the aroma of the resulting grape juice at a 5% significance level. The highest preference for the aroma of grape juice was shown in treatment B with an average score of 3.60, indicating that it was highly preferred. In contrast, the preference for the aroma of grape juice decreased in treatment A with an average score of 2.07, indicating that it was not preferred. This is due to the varying concentrations of egg white addition, which significantly influenced the aroma of the grape juice.

**Preference Level for the Taste of Grape Juice (Vitis vinifera, L)**

Taste is generally agreed to be composed of four basic or true tastes: Sweet, Bitter, Sour, and Salty. Sensitivity to taste is found in the taste buds of the tongue. Taste buds are grouped in papillae, which appear to be sensitive to more than one taste. The sensitive areas (tongue) as receptors can detect taste in different regions as follows: Sweet at the tip of the tongue, Bitter at the back of the tongue, Sour at the sides, and Salty at both the sides and tip of the tongue. Taste, in terms of organoleptic properties, is a key quality criterion in food products that can influence consumer acceptance. Based on the analysis of variance (ANOVA) for the taste of grape juice, the calculated F-value (13.32) is greater than the tabulated F-value (2.50), indicating that H1 is accepted, meaning there is at least one pair of treatments that significantly differ at the 5% significance level. This indicates that the addition of egg white (albumin) has an influence on the resulting grape juice. To determine the level of its influence, refer to Table 4.5 below:

**Anova fondness for the Taste parameter Grape juice (*Vitis vinifera L)***

| SV | Db | JK | KT | F. count | F. Table 5% | F. Table 1% |
|---|---|---|---|---|---|---|
| Treatment | 4 | 38.9 | 9.73 | 13.32** | 2.50 | 3.60 |
| Error | 70 | 51.1 | 0.73 | | | |
| Total | 74 | 90 | | | | |

☆☆ ⟶ Different is very real

Conclusion: $F_{count}$ (= 13.32) > from $F_{Table}$ (= 2.50.), ⟶ then we receive H1, i.e. there is at least a pair of unequal middle values of treatment. So it needs further tests to find 5% BNT (the smallest real difference)

$$1.BNT_a = t_{a\ (db\ galat)} \sqrt[x]{\frac{2 \times kt\ galat}{Ulangan}}$$

$$BNT_{0,05} = t0,05_{a\ (70)} \sqrt[x]{\frac{2 \times kt\ galat}{Panelis}}$$

$$= 2.00 \sqrt[x]{\frac{2 \times 0,73}{15}}$$

$$= 2.00. \sqrt[x]{0.097}$$

$$= 2.00 \quad x \quad 0,31$$

$$= \mathbf{0.62.}$$

**Average test results on taste parameters of grape juice (*Vitis vinifera L*).**

| Treatment | Percentage of addition | Average | Notation |
|---|---|---|---|
| A | 0% | 2.20 | a |
| B | 7,2% | 3.80 | b |
| C | 14,4% | 4.20 | c |
| D | 16,21% | 4.07 | c |
| E | 28,8% | 3.73 | b |
| **BNT 5%** | **0.19** | | |

**Note:** Different notations indicate there is a real difference between treatments at the level of Significance 5%.

Based on the results of fingerprint analysis on taste parameters that there is an Effect of Adding Egg White to Grape Juice presented in Table (4.6) shows that there is a real difference between treatments of grape juice taste produced at a signification level of 5%. The highest favorability value for the taste of grape juice was shown in treatment C and D with an average value (4.07 - 4.20) of the parameter was preferred to very preferred. While the favorability value for taste parameters that are not significantly different is found in the B and E treatment with an average value (3.70 – 3.80) the parameters are somewhat preferred until they are preferred. Consumer favorability began to decline in treatment A with an average favorability score of 2.20

parameters was very unfavorable. This is due to high tannin levels in the grape juice produced.

**Preference Level for Viscosity of Grape Juice (Vitis vinifera, L)**

Viscosity is defined as the rate of flow per unit force or a combination of properties that are viscous and elastic. Viscous liquids flow slowly and do not reverse when subjected to small pressures. Organoleptically, viscosity is a quality criterion for liquid products that can be used to measure consumer preference for the quality of fruit beverages. These qualities include; thin, watery, thick, creamy, brothy, oily, fatty, and sticky. Based on the analysis of variance (ANOVA) on the viscosity of grape juice, the calculated F-value (15.84) is greater than the tabulated F-value (2.50), meaning H1 is accepted. This indicates that there is at least one pair of treatments that significantly differ at the 5% significance level. This means that the addition of egg white (albumin) affects the viscosity of the resulting grape juice. To determine the extent of this effect on the organoleptic value of the viscosity of grape juice, refer to the following table: ANOVA of preference for the viscosity parameter of grape juice (Vitis vinifera, L).

**Anova preferences for parameters Viscosity Grape juice (*Vitis vinifera, L)***

| SV | Db | JK | KT | F. count | F. Table 5% | F. Table 1% |
|---|---|---|---|---|---|---|
| Treatment | 4 | 47.5 | 11.9 | 15.84** | 2.50 | 3.60 |
| Error | 70 | 52.7 | 0.75 | | | |
| Total | 74 | 100.2 | | | | |

☆☆ ⟶ Different is very real

Conclusion: $F_{calculate}$ (=15.84**) > from $F_{Table}$ (= 2.50.), ⟶ then we receive H1 , i.e. there is at least a pair of unequal middle values of treatment. So further tests are needed to find 5% BNT (the smallest real difference)

$$1.BNT_a = t_{a\ (db\ galat)} \sqrt[x]{\frac{2 \text{ x kt error}}{\text{ulangan}}}$$

$$BNT_{0,05} = t0,05_{a\ (70)} \sqrt[x]{\frac{2 \text{ x kt galat}}{\text{panelis}}}$$

$$= 2.00. \sqrt[x]{\frac{2 \text{ x } 0,75}{15}}$$

$$= 2.00. \sqrt[x]{0,1}$$

$$= 2,00 \text{ x } 0,32$$

= **0.63**

**Average test results on viscosity parameters of grape juice *(Vitis vinifera* L)**

| Treatment | Percentage of addition | Average | Notation |
|---|---|---|---|
| A | 0% | 1.93 | a |
| B | 7,2% | 3.35 | b |
| C | 14,4% | 4,33 | d |
| D | 16,21% | 3.73 | d |
| E | 28,8% | 3,53 | c |
| **BNT 5%** | | **0,2** | |

Note: Different notations show there is a real difference between treatments at a signification level of 5%.

Based on the results of fingerprint analysis of viscosity parameters that there is an effect of adding egg white to grape juice presented in table 4.8 shows that there is a real difference between treatments of grape juice viscosity produced at a signification level of 5%. The highest value for the viscosity of grape juice was shown in treatment C with an average value (4.33) of the parameter was preferred to very preferred. While the favorability value for viscosity parameters that are not significantly different is found in the treatment of B, D and E with an average value of -(3.35 – 3.73) the parameters are somewhat preferred until they are preferred. Consumer favorability began to decline in treatment A with an average favorability score of 1.93 parameters, which was very unfavorable. This is because there are still high levels of tannins in the grape juice produced.

**Best Treatment of Grape Juice (*Vitis vinifera* L)**

Based on the results of measurements and calculations on each organoleptic test parameter of grape juice *(Vitis vinifera* L*)* can be presented in table 4.9 of the following best treatment. **Average results of the best treatment for grape juice (*Vitis vinifera*, L)**

| Treatment | Variable | | | | Total |
|---|---|---|---|---|---|
| | Color | Aroma | Taste | Viscosity | |
| A | 2,20 | 2,07 | 2,20 | 1,93 | 8.4 |
| B | 3,33 | 3,60 | 3,80 | 3,53 | 14.26 |
| C | 3,13 | 3,53 | 4,20 | 4,33 | **15.19** |
| D | 3,27 | 3,10 | 4,07 | 3,73 | 14.17 |
| E | 3,40 | 3,33 | 3,73 | 3,53 | 13.99 |

Note: The best treatment is shown in treatment C with a total value of **15.19**

The results of the assessment of the organoleptic test of grape juice represented by 15 panelists showed that the addition of egg whites used in treatment C can be used as one of the treatment standards used to produce quality grape juice that can be liked by consumers, namely with the results of the panelists' assessment with the average value of each parameter, including; color with a value of somewhat like to be liked, while Aroma with a value of Somewhat like to like, Taste with a value of like to very liked, Viscosity with a value of like to very liked.

## CONCLUSION

Based on the results of research discussion on the effect of adding egg white *(Albumin*) on the physical and organoleptic properties of grape juice *(Vitis vinifera* L), the results of this study can be concluded that; (a). The addition of egg white *(Albumin*) to the physical and oraganoleptic properties of grape juice has a significantly different effect, (b) Based on the results of organoleptic tests it turns out that the addition of egg white *(Albumin)* to grape juice does not have a real different effect on the actual color of grape juice (original color) on visual views, but based on the results of anova shows a real influence between F. count and F. table. 5%, while for the aroma of adding egg white *(Albumin)* to grape juice gives a real different influence. For the taste of adding egg white *(Albumin)* to grape juice gives a real effect, and viscosity or viscosity with the addition of egg white *(Albumin)* to grape juice can have a real different effect, and (c) In this study the results that are stated to be good are in treatment C with the concentration of adding egg white *(Albumin)* 36 ml or with a percentage addition of 14.4% with grapes 250 grams. This treatment is considered good because it has the highest score compared to other treatments, this is evidenced in the best formulation in making grape juice (*Vitis vinifera L)* with the addition of egg white *(Albumin)* 36 ml or 14.4%, grapes 250 grams, sugar brand white goose 500 grams, aqua water 2,500 ml.

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