



Assessment of the Nutritional Content and Hedonic Test on Pameling Avocado from Three Different Altitudes

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Abstract— *Malang Regency has superior avocado commodity which is so-called Pameling. Superiorities of the fruit are indicated by the large size of the fruit and quality of the fruit flesh which is liked by the consumers. Today, the development of Pameling avocado has expanded from the lowlands to the highlands in diverse regions. In order to obtain optimal harvest yields, both quantity and quality, the research affirmed the quality of Pameling avocado, which is grown at the lowlands and the highlands. The research was conducted by testing quality (nutritional content) and organoleptic. Results of the research showed that the avocados grown at the highlands were more preferred by the panelists based on the organoleptic test from the assessment aspects of appearance, texture, aroma, and taste. The lowlands produced preference of the color flesh which is mostly preferred by the panelists. Results of the nutritional test (quality) on fruits grown at the lowlands showed the highest level of sugar and protein. The middle plains are superior in fat content. Moreover, the highlands produce fruits with the highest coarse fibers. However, the differences in cultivation methods on three different altitudes will be the subject of further studies that need to be considered.*

Keywords— *altitude, nutritional content, fruit nutrition, organoleptic*

I. INTRODUCTION

Avocado (*Persea americana* Mill.) is known as fruit that having soft texture as butter. Avocados originally came from Meso America and eventually spread to around the world including Indonesia. Avocado is mostly consumed as a source of healthy fats along with various processing, for instance, as dessert such as *es campur* (mixed ice) from Indonesia, as sauce such as in Mexican foods or protein companions such as in sushi from Japan. Malang Regency has superior avocado commodity which is so-called Pameling. Superiorities of the fruit are indicated by the large size of the fruit and quality of the pulp (mesocarp) which is liked by the consumers. Today, the development of Pameling avocado has expanded from the lowlands to the highlands in diverse regions. In order to obtain optimal harvests, both quantity and quality, the research affirmed the quality of Pameling avocado, which is grown at the lowlands and the highlands. It is expected that results of the

study will be able to provide information about altitude categories which can produce the best quality of Pameling avocado. So that the grading process of the avocados will be conformed to the processing goal post-harvest in accordance with the area characteristics where the avocados grown particularly the altitude.

II. MATERIAL AND METHODS

2.1 Material

Fresh Pameling avocados were collected from several regions in Malang Regency with variation in altitudes. Each avocado represented the highlands, middle plains, lowlands, and the avocado that derived from the parent trees. The harvests of avocado were stored at room temperature (26-28°C) in the Laboratory of Plant Physiology, Faculty of Agriculture, Brawijaya University.

2.2 Fruit Nutritional Variable

The nutritional variables of Pameling avocado are protein, fat, carbohydrate, coarse fiber, and total sugar. The nutritional content test was conducted at the Central Laboratory of Biology in Brawijaya University and Food Laboratory in University of Muhammadiyah Malang.

2.3 Organoleptic Test

Pameling avocados were evaluated in accordance with the hedonic organoleptic test with testing parameters for appearance, texture, aroma, taste, and color. The hedonic test criteria are scores 1-7, whereas 1 represents the opinion of really like and 7 represents really dislike. The hedonic test was conducted toward 30 panelists with the ages range 18-24 years old. The test was conducted at the Laboratory

of Plant Physiology, Faculty of Agriculture, Brawijaya University.

III. RESULTS

3.1. Fruit morphological characteristics

Based on results of the observation on morphological characters of the Pameling avocado with the guidance of UPOV (2005) the seed shape in the elongated part (lateral) from 3 plains belong to the group 4, the elliptic.

Based on results of the observation on morphological characters of the Pameling avocado with the guidance of UPOV (2005) diameter of the base part of the peduncle from 3 plains belong to the group 5, the medium.

3.2. Fruit Nutrition

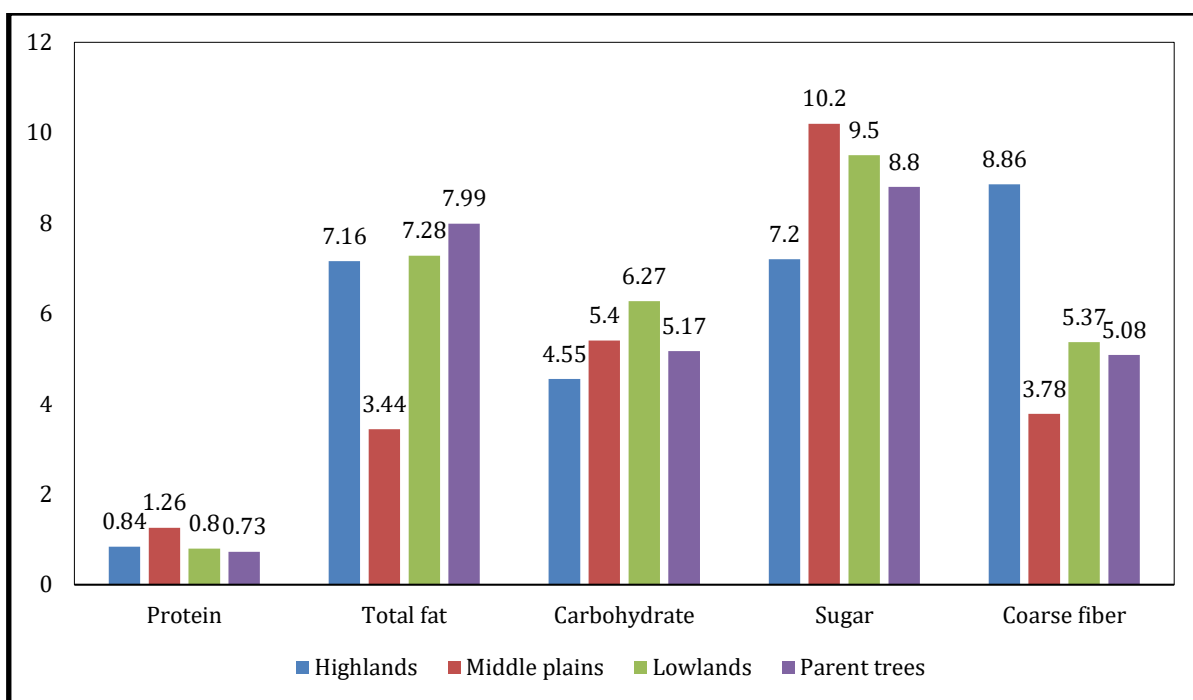


Fig.1. Nutritional Content of the Pameling Avocado that Derived from Three Different Altitudes

The nutritional test on avocado used proximate analysis that include protein, fat, carbohydrate, coarse fiber, and total sugar. Figure 1 shows the results of nutritional content in Pameling avocado. Results of the research showed that avocados grown in the lowlands have the highest content of protein and sugar. The middle plains are superior in fat content. Moreover, the highlands have the highest content of coarse fibers.

3.3. Result of the Hedonic Test

The hedonic test was conducted to find out preference of the consumers on parameters of appearance, texture, aroma, taste, and color. Results of the hedonic test are presented in Figure 2. Avocados from the highlands were more preferred by the panelists in accordance with the organoleptic test from the assessment aspects of appearance, texture, aroma, and taste of the fruits. Meanwhile, avocados from the lowlands were more preferred by the panelists based on the color of the pulp (mesocarp).

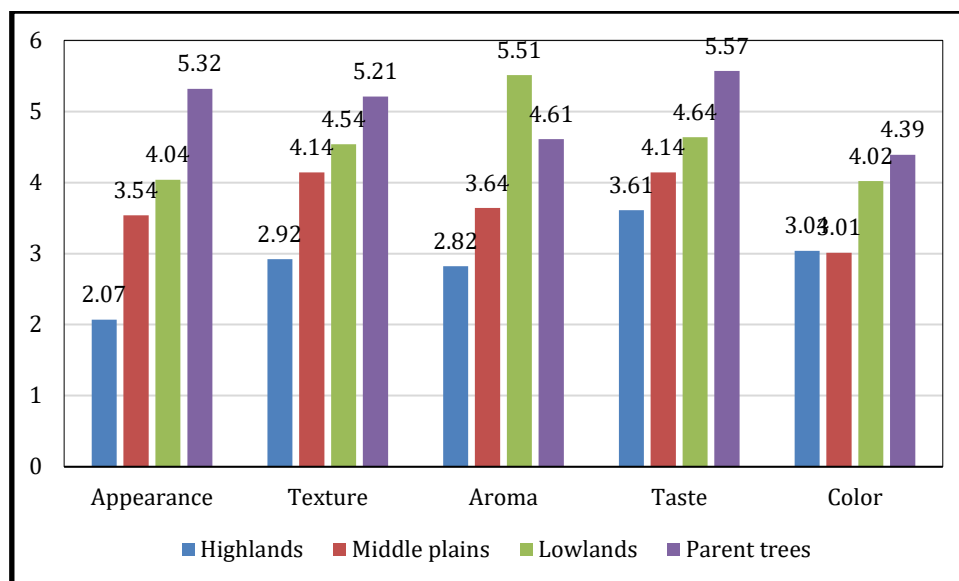


Fig.2. Preference Values of the Consumers toward Quality of the Pameling Avocado from Three Regions with Different Altitudes

IV. DISCUSSION

The highest contents of protein and sugar were found in avocados grown at the middle plains, but they have the lowest content of fat and coarse fibers compared to other avocados. Moreover, the carbohydrate content was 1.8 g lower than in avocados grown at the lowlands.

According to the health attribute, the consumers give higher assessment on the higher fat than lower calories (Ballen *et al.*, 2022). Based on the analysis results, the highest fat contained in fruits which derived from the parent tree at the middle plains. According to NHANES analysis (Dreher and Davenport, 2013) the average consumption is a half of the avocado (68 g), which provide high nutritional and phytochemical foods, such as: fibers (4.6 g), total sugar (0.2 g), high-acid monounsaturated fats (6.7 g) and 114 kcal or 1.7 kcal/g, which help to promote a healthy blood lipid profile and to increase bioavailability of fat soluble vitamins and phytochemicals of the avocado or other fruits and vegetables, naturally low in fat, consumed with avocados.

In relation to the quality attribute of the avocado. The consumers are affected by quality of the fruits, both external and internal. The external qualities include weight (commercial size), shape (oval or piriformis), color of the rind (green or black), rind texture (smooth or rough), no blemish (for example, sunburn); and the internal factors include taste, pulp (flesh) texture, pulp color, and seed size.

Avocados grown at the highlands have lower scores, and it indicates that the avocados are preferred by the consumers. However, avocados grown at the lowlands are only superior in color parameters.

On data analysis using ANOVA and SPSS, it showed that F values for appearance, texture, aroma, taste, and color were 17.3, 7.5, 7.8, 3.5, and 4.8, respectively. These values were compared with F table values with df panelist 108 and df sample 3. F table value was 1.7. Based on the value, it showed that F values for appearance, texture, aroma, taste, and color were higher than F table. F table value is F value when α 5%. When F count values were higher than F table, it means that the error is below 5% so that H₀ is rejected, H₁ is accepted. H₁ in ANOVA test is data of the sample is significantly different. It means, there is a significant difference between the appearance sensory attributes.

The consumers' choices depend on quality character of the products and consumers' preferences. Such consumers' preferences are varying in accordance with subjectivity of the consumers. Moreover, the quality character can be classified into intrinsic and extrinsic. The intrinsic quality refers to the attribute of the product appearances, such as color, shape, and size, while the experience attributes are taste, aroma, and ripeness. The extrinsic quality refers to food safety, sustainable production process and where the avocado comes from. Information on extrinsic quality will build the consumer trust over the related producer. Knowledge about the origin of the product is a potential factor to change evaluation and perception of the consumers toward the product. However, the consumers assumed that local products are synonymous with high quality, even though it could change in relation to products that being considered and the geographical context (Migliore *et al.*, 2017). Avocado tends to thicken its epidermis rind to reduce water loss in warm climate with low humidity such as at the lowlands (Henao-Rojas *et al.*, 2019).

Based on results of the organoleptic test, avocados grown at the highlands are preferred by the panelists in relation to the attributes of appearance, texture, aroma, taste, and color. It conformed to the literature about the avocado consumption, in which the ripeness level of the fruit consumed can affect the quality of eating, especially through the firmness of the pulp and “soft” texture. The consumers tasted the avocados that fall into “hard” category are significantly less likely to purchase compared to the fruits that fall into the “medium” and “soft” categories. (Migliore *et al.*, 2017)

Taste is considered as an important element of quality that has positive and significant influence on intention of the consumers to purchase. Taste is twice as important as the price when it determines the consumers desire to purchase the fruit. It is expected that taste is an attribute of important experience quality which has significant influence on possibility of repeated purchase (Ballen *et al.*, 2022).

Pameling avocado from Malang has become a major player in developing high-value products, given the superiority of the brand identity that is made or grown in Malang. Also, there is a changing trend for food consumers to show great interest in knowing the origin of their foods, with a preference for locally grown foods.

V. CONCLUSION

Avocados grown at the highlands were more preferred by the consumers based on the organoleptic test. Based on results of the research, it could not be concluded which altitudes could produce the best quality avocados. This is due to differences in the implementation of the SOP for farmers in the three areas with different altitudes.

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