

Development of Attributes for Moringa Date Palm Water Extract by Quantitative Descriptive Analysis

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Abstract

Quantitative descriptive analysis (QDA) is a widely used descriptive sensory technique utilized in developing sensory descriptions of food products that have multiple attributes and corresponding references, as well as a specific score. This analysis involves trained panelists. The QDA analysis comprises directed focus group discussions (FGD), panelist training, and sensory evaluation. This study evaluated the sensory attributes of moringa date palm water extract and their references using QDA. FGD collected data on twelve sensory attributes of moringa date palm water extract. The appearance and color attributes identified in moringa date palm water extract comprise of greenish level, brownish level, settling level, viscosity level, and turbidity level. Similarly, aroma attributes identified in the extract include grassy/leafy and sweet aromas. Two taste attributes detected in moringa date palm water extract comprise of the sweet and bitter taste. Langu flavor is one of the flavor attributes identified in moringa date palm water extract. The aftertaste attributes identified in moringa date palm water extract comprise of langu and astringent taste. According to QDA sample evaluation results, greenness level in appearance/color and grass/ leafy in aroma were found to be strong attributes of moringa date palm water extract.

Keywords: Focus group discussion, moringa date palm water extract, quantitative descriptive analysis, sensory attributes

Full-length article

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1. Introduction

The leaves of *Moringa Oleifera* are mainly used for medicinal purposes as well as for human nutrition as they are rich in antioxidants and other nutrients that are often deficient in people living in underdeveloped countries (Popoola J. O *et al.*, 2013). *Moringa Oleifera* leaves have been used for the treatment of various diseases ranging from malaria and typhoid fever to hypertension and diabetes (Sivasankari B *et al.*, 2014). Dates can be a natural sweetener when added to beverage products. Dates (*Phoenix dactylifera* L.) have a high nutritional nutrient content, especially sugar, fiber and source of sugar, dietary fiber, and antioxidants.

The sugar in dates consists mainly of fructose and glucose, which can reach 70% of the dry weight (Habib and Ibrahim, 2011). Although they contain relatively high levels of sugar, dates relatively low glycemic index value compared to granulated sugar. glycemic index value is relatively low compared to granulated sugar, this is because the sugar in because the sugar in dates is a simple sugar that is easily absorbed by the body (Chaudhary and Pankaj, 2018). Generally, when developing new food products and

monitoring their quality, one cannot separate it from the sensory aspects of these food products. Sensory analysis is conducted as one of the methods to provide information on the quality of food products. One of the sensory analysis methods used to identify, describe, and quantify sensory attributes of food products is Quantitative Descriptive Analysis (QDA), which involves using panelists who have received special training to conduct the test (Setyaningsih *et al.*, 2010).

The QDA method is commonly employed for developing terminology and quantitatively evaluating food products. When evaluating the sensory characteristics of food products, the QDA method is utilized to appraise attributes such as aroma, texture, flavor, taste, and aftertaste of a product (Leighton *et al.*, 2008). In the food industry, the QDA method finds application in various fields. For example, in product development, manufacturers use this method to describe products, test formulation changes, and evaluate long storage and packaging effects. Regarding quality control, the QDA method can be a useful parameter to verify the product's consistency and identify process

changes. For marketing purposes, the QDA method is advantageous in obtaining competitor product descriptions and monitoring food products during marketing (Kemp et al., 2009).

Several studies have used the QDA method to determine the sensory description of foods, including research conducted by Medeiros, A *et al.* (2022) namely sensory testing using the QDA method on peach juice products, the results of the study showed that the sweeteners neotame and sucralose sweetening power, and different concentrations of rebaudioside A did not affect the sweetening power of had no effect on the sweetness of stevia extract. Samples sweetened with stevia containing 40% and 95% rebaudioside were characterized by the sensory attributes of bitter taste, bitter aftertaste, astringency, and black tea flavor, showing that the higher the percentage of rebaudioside A, the lower the bitterness of peach juice. In addition, Kostyra, E *et al.* (2021) conducted a study to determine the attributes of mixed organic juices based on kiwiberry fruits the results obtained are the increasing addition of apple and pear juice to kiwi-based juices in varying proportions contributed to the contributed to the release of volatile compounds responsible for floral, sweet and fruity aromas. The juice blends with higher apple or pear juice additions were more harmonious in terms of sensory image and had higher overall consumer liking.

Based on these references and research, this study aims to identify sensory attributes in moringa date palm water extract products, determine the standards of each sensory attribute of moringa date palm water extract and quantitatively assess the sensory attributes of moringa date palm water extract using the QDA method.

2. Materials and Methods

2.1. Materials

The ingredients used in the production of moringa date juice include dried moringa leaves and sukkari dates. dried moringa leaves are sourced from BLORA PT. Moringa Organik Indonesia, Central Java and other ingredients such as Sukkari dates are sourced from premium date importers in the city of Jakarta. The tools used in making Moringa Date Juice are knives, scales, plastic measuring cups, spoons, pans, mixers, glass bottles, filter cloths, wire filters, pots, stoves.

2.2. Research Methods

Formulation of Moringa Date Palm Water Extract. The method of making moringa date palm water extract refers to the research used by Agustina *et al.* (2019) and Aljasass *et al.* (2010). The process of making moringa date palm water extract begins with moringa juice and date palm juice made separately by mixing filtered and boiled There are 3 formulas in making moringa date palm water extract the addition of date palm juice (30%, 35% and 40%) and stirring for 3 minutes. The resulting Moringa Date Palm Water Extract is then placed in a sterilized glass bottle and tightly sealed. The Moringa Date Palm Water Extract was stored at freezer temperature (minus 18°C) for 16 hours before sensory testing. The preparation of Moringa date palm water extract in this study was carried out as much as 1500 ml.

2.3. QDA Analysis (Meilgaard, 1999)

Panelist Training. Panelists required in QDA testing are trained panelists. The panelist training stage in the QDA method is carried out to train panelists and increase the sensory sensitivity of panelists to the aroma and flavor attributes of moringa date palm water extract. Panelist training was conducted qualitatively and quantitatively. Qualitative panelist training was carried out using the focus group discussion (FGD) method to identify sensory attributes (taste and aroma) detected in moringa date palm water extract. According to Setyaningsih *et al.* (2010) the FGD method is in the form of a discussion system where the researcher acts as a moderator. During the FGD discussion, the moderator does not participate in it, but only monitors the course of the discussion, providing discussion needs such as attribute standards, samples and test sheets. In the product description, each attribute of taste and aroma in moringa date palm water extract is equalized perception or terminology so that all panelists have the same perception of moringa date palm water extract products.

2.4. Analysis of the Samples

The final evaluation of the samples was conducted under the same conditions as the training session. session, except that the panelists did not have a reference to use at this time. Samples were collected in disposable plastic cups with a capacity of 50 mL, containing approximately 30 mL of each sample and coded with a three-digit number. three-digit number. Samples were presented monadically according to the complete counterbalanced block design of Wakeling and Macfie (1995) and repeated three times in different taste session formulas to see the consistency of the panelists and to avoid any bias. Therefore, panelists recorded the intensity of each attribute on a 9-cm scale. The QDA test training was conducted until the sensitivity of the panelists was consistent, showing that the standard deviation value of the panelist training had a value less than one for all sensory attributes (Hadi, 2011). The results of the evaluation of all panels were processed and presented in the form of a spider web to compare the intensity of each sensory attribute of the Moringa date water extract.

2.5. Data analysis

Data was tabulated in the form of a web spider using Microsoft excel for windows version 2023. In addition, data analysis was carried out using the Duncan's further test between formulas.

3. Results and Discussion

QDA identifies the sensory characteristics that characterize a food product and also describes quantitatively the intensity of the product characteristics (Hunaefi and Ulfah 2019). This data is the result of the panelist's average value from the QDA test three times with an intensity scale of 0-9. The average yield value is then presented in the form of a spider web. Mean QDA values of attributes of moringa date palm water extract are presented in Table 1.

Table 1: Mean QDA values of attributes of moringa date palm water extract

Attributes	Mean
Appearance/color	
Greenness level	6.75±0.92
Browning level	2.91±0.88
Deposition level	3.20±0.56
Viscosity level	1.95±0.11
Turbidity level	4.16±0.73
Aroma	
Grass/Leavy	6.00±0.72
Sweet	1.16±0.48
Taste	
Sweetness	4.50±0.74
Bittersweet	1.87±1.06
Flavor	
Langu	4.66±0.75
Aftertaste	
Langu	1.95±0.59
Astringent	1.04±0.35

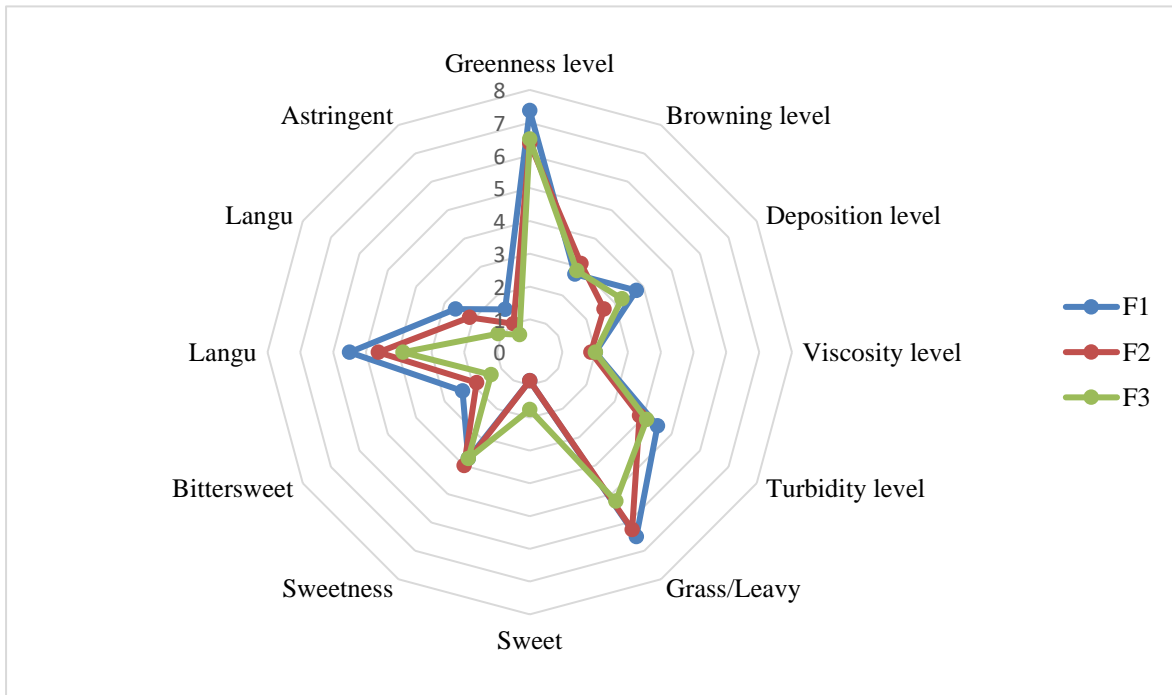


Figure 1: Spider web QDA test results for all attributes

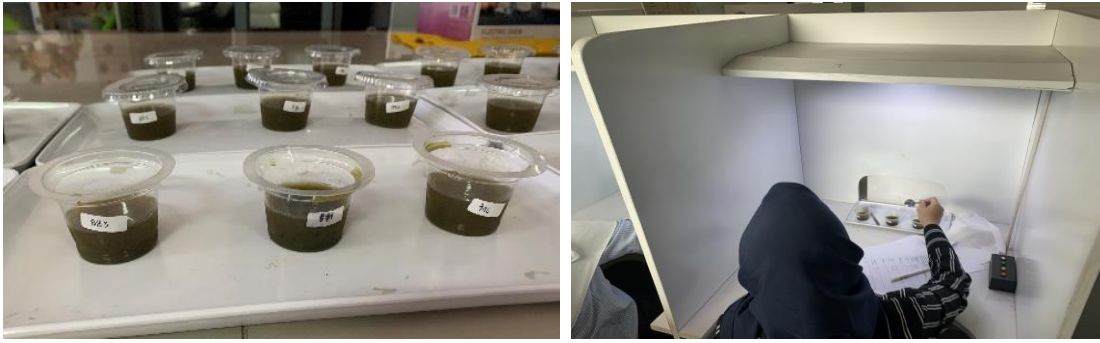


Figure 2: QDA implementation of each formula (F1, F2 and F3) in a 50 ml cup

3.1. Appearance/color

a) Greenness and Browning level

Color perception involves physical and visual evaluation following specific wavelengths of light, such as those between 500 to 600 nm for green and brown colors (Meilgaard et al. 1999). The visual appeal of a product is strongly influenced by its color. The assessment results of the color attributes for moringa date drink have an average value ranging from 6.75, indicating that panelists' evaluations placed the color of the drink on a dark green color scale, but somewhere between light green and dark green. Panelists rated the color of the date palm juice drink formula with 40% date palm juice as the highest on average, while the lowest rating was in the formula with 30% date palm juice. The drink's color varies with the date juice concentration in each formula. The addition of date juice is limited to 30%, 35%, and 40%, and it dissolves in water before mixing with the other components, including moringa leaves, which provide the initial drink color. The difference in the moringa and date ratio has no significant impact ($p < 0.05$) on the greenish and brownish hues. Based on the results of Duncan's additional test, it is evident that formulas F1, F2, and F3 do not show significant differences.

b) Deposition, Viscosity, Turbidity level

The deposition, viscosity, and turbidity level of this cider drink are affected by the addition of date juice. Technical term abbreviations used will be explained when first mentioned. The viscosity attribute value is a measure of the drink's thickness, with lower values indicating a runnier consistency. On average, the viscosity of the cider drink formulated with date palm juice falls between 1.88 and 2.00, which suggests a medium to strong thickness, but still relatively weak. The formula with 40% added date juice yielded the highest average value, while the lowest was obtained with 30% added juice. According to Duncan's additional test results, the concentration of date palm juice does not significantly affect ($p=0.385$) the viscosity quality of the juice.

c) Aroma's

Aroma is a scent detected when vaporous substances enter the nasal cavity and are perceived by the olfactory system (Meilgaard et al., 1999). Moringa contains volatile components, resulting in a distinctive fruit aroma, and the release of aromatic compounds in Moringa leaves Yuliyana et al., 2023

can persist throughout processing and storage (Chen et al., 2015). Based on the results of Duncan's additional testing, it was found that the F3 formula demonstrated a significant difference from F1 and F2. However, there was no significant difference between the F1 and F2 formulas. The taste of Moringa is a combination of sweet and bitter, attributable to the presence of theaflavin, a polyphenolic compound, and one of several flavonoids (Nurhasanah, 2016).

a) Taste

Taste perception is the result of stimulation of the taste buds on the tongue. According to Meilgaard et al. (1999), taste is defined by several distinct components: aromatics, olfactory perception due to volatile compounds released from products in the mouth that travel through the posterior nares; taste buds, the perception of salty, sweet, sour, and bitter tastes caused by substances dissolved in the mouth; and chemical feeling factors, involving the final stimulation of smooth membranes in the buccal area and nasal cavity (including astringency, spice heat, cooling, bite, metallic flavor, and umami taste). The taste of the cider is sweetened by the addition of date juice, which masks the bitterness of the Moringa leaves. The taste of the cider is sweetened by the addition of date juice, which masks the bitterness of the Moringa leaves. Different concentrations of date juice are added to achieve the appropriate flavor blend that consumers find agreeable. The taste of the cider is sweetened by the addition of date juice, which masks the bitterness of the Moringa leaves. The more date juice added, the less bitterness is tasted, in line with the juice's masking properties. According to Febriyanti and Yunianta (2015), substituting date juice for sugar in beverages improves both flavor and health benefits. However, Duncan's subsequent test results indicate that the addition of date juice had no significant effect ($p=0.532$) on the bitter taste of the cider. This lack of impact is likely due to the small difference in concentration of the date palm juice.

e) Aftertaste

According to the assessment by the panelists, the inclusion of date palm juice alters the aftertaste of the Moringa leaf beverage. The disagreeable and puckering aftertaste intensifies with an increase in the proportion of date juice. As per Fatimah et al. (2021), Moringa possesses a taste that tends to be bitter and slightly sweet. The aftertaste

resulting from consuming date moringa juice is attributed to its theaflavin content, which is a type of polyphenol flavonoid characterized by a conjugated aromatic system (Nurhasanah 2016). Incorporating date juice yielded a significant difference ($p < 0.05$) in the aftertaste parameter. Further testing using Duncan's method indicated that the three drink formulas (F1, F2, and F3) differed significantly.

4. Conclusions

The results of panelist training using FGD on the QDA method resulted in several attributes being identified in the moringa date palm water extract product. The appearance and color attributes identified in moringa date palm water extract comprise of greenish level, brownish level, settling level, viscosity level, and turbidity level. Similarly, aroma attributes identified in the extract include grassy/leafy and sweet aroma. Two taste attributes detected in moringa date palm water extract comprise of sweet and bitter taste. Langu flavor is one of the flavor attributes identified in moringa date palm water extract. The aftertaste attributes identified in moringa date palm water extract comprise of langu and astringent taste. Evaluation of the moringa date palm water extract sample using the QDA method showed that the greenness level attribute was the dominant appearance/color attribute in the moringa date palm water extract, while the dominant aroma attribute in the moringa date palm water extract sample was grass/leafy.

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