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Development of a Specific Lexicon to Describe Sensory and Textural Characteristics of Olive Paté

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Featured Application: A detailed description of the products of interest is particularly interesting for trained descriptive panels that rely on specific descriptors and definitions. The effectiveness of the experimental method proposed could represent an important innovation toward the development of an official sensory standard for olive paté to increase global quality and certify the typicality of the product. It could be helpful for manufacturers to know the sensory characteristics of olive paté to make it competitive in the marketplace. This will also result in increased attention from consumers. The developed lexicon could also promote communication regarding product quality among sensory scientists and many stakeholders, such as product developers, marketing professionals, and suppliers.

Abstract: Olive paté is a traditional Italian food typical of the Mediterranean diet, derived from debittered, pitted, and crushed table olives. Currently, there is no sensory standard for the quality of the product. In this research, a specific lexicon and an innovative profile sheet for sensory analysis of olive paté have been developed and tested to fill the gap. The list of descriptors was set in terms of negative sensations, olfactory/gustatory sensations, and kinaesthetic attributes. The assessors of a professional panel were first trained with and then used the profile sheet to characterize 40 olive paté commercial samples from five different *Olea europaea* L. cultivars. From a sensorial point of view, Nocellara del Belice paté was perceived as the saltiest, Nocellara etnea as the bitterest, and Hojiblanca and Bella di Cerignola were the most balanced and characterized on the olfactory/gustatory level. In terms of texture, Hojiblanca paté is the most consistent and grainiest. To support and verify kinaesthetic descriptors, textural analysis by back extrusion was performed. Through the agglomerative hierarchical analysis, the various paté showed a clear clusterization into two clusters: Nocellara del Belice-Itrana and Hojblanca-Nocellara etnea-Bella di Cerignola. The results obtained showed the validity of the profile sheet to correctly assess the different products.

Keywords: *Olea europaea* L.; olive paté; sensory analysis; texture analysis; profile sheet

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1. Introduction

Olive paté made from green and black table olives is a commercial product widely spread throughout Italy, typical of Mediterranean culinary tradition. In Italy, it results from debittered table olives, then pitted, crushed at low temperature, and finally added with varying amounts of extra-virgin olive oil (about 10%) and sometimes with spices, such as oregano, chili, fennel, thyme, and marjoram. It is mainly used as a seasoning to flavor pasta dishes, or it can be used as a spreadable cream for Italian bruschetta or tarts. Its relevance in Mediterranean food is also underlined by the existence of a Turkish standard for black olive paste, even if there is a lack of a standard for green olive paste [1].

Table olives are rich in antioxidant and nutraceutical compounds [2], so olive paté diffusion is increasing not only for its gastronomic employment but also for its positive effects on human health. Recent studies evaluated the nutraceutical effects of olive paté in addition to antioxidants extracted from olive mill wastewater [3].

The manufacturing process of olive paté is simple, so it can be largely produced, yet there are still many uncertainties about its sensory and nutritional profile, which are strictly related to cultivars, ripening stages, and debittering methods.

Literature related to the production and quality of olive paté is very small [4,5], and it is not always considered a stand-alone product but instead found in association with other creams, both of vegetal and animal origin [6].

The dynamic system of the food industry is constantly looking to develop new foodstuffs for consumers' satisfaction. Among the aspects that should be considered for marketing new products, kinaesthetic properties play an essential role [7].

Little is also known about table olive consumers' preferences related to kinaesthetic properties that are considered extremely interesting as they characterize elements of a food. The texture impact on food choices and preferences is significant (more than 30%) [8]. Textural changes in a food can also affect flavor perception through the olfactive pathway [9]. So, textural properties represent a real control point for food quality perception.

Instrumental texture for viscous samples can be assessed by a back extrusion method that is relatively simple, fast, and cheap for characterizing food and determining quality control [10]. This test can be applied to a wide range of products, such as stirred yoghurt [11], kiwifruit [12], soy protein concentrates [13], porridge and garlic paste [14,15], acid milk gel [16], and honey [17]. It was also used to evaluate *dodol*, a traditional Asian food known for its unique mouth-feel properties [18].

This study aimed to develop a sensory lexicon to characterize olive paté in terms of sensorial and textural profiles, with the purpose of enhancing this emerging and very promising product for the olive oil production chain.

2. Materials and Methods

2.1. Lexicon Development

We summarize lexicon development into several steps, according to the suggestions of Lawless and Civille [19]: (1) studying the bibliography on similar foods; (2) describing the olive paté product by using several terms; (3) removing generic and superfluous attributes; (4) developing and validating the final list of descriptors for the lexicon; (5) setting up the profile sheet for olive paté; and (6) training the panel by using references.

2.1.1. Panel and Panelists

CREA-IT in Pescara has a thirteen-member (+1 panel leader) tasting panel for table olives approved and recognized by the International Olive Oil Council (IOOC), operating since 2006, and an official tasting panel for virgin olive oils too. This experience enabled the panelists to perceive specific attributes of olive paté and enhanced the panelists' skills to select a specific lexicon. For this project, twenty hours of training were necessary to instruct panel tasters. The panel group is composed as follows: 9F and 4M, in an age range from 32 to 65 years old. All of them possess at least 5 years of experience in sensory analysis of table olives, and all are certified as professional virgin olive oil tasters by the Italian Ministry of Agriculture, Forestry, and Food Sovereignty.

2.1.2. Sample Selection

The sample set was heterogeneous and representative of the entire product category, ranging from green to ripening to black olive paté, from grainier to less grainy pastes, etc.

All samples were supplied by Ficacci Olive Co. (Castel Madama, Rome, Italy) from December 2020 to December 2022.

Samples were obtained from five different olive cultivars, such as Nocellara del Belice, Bella di Cerignola, Nocellara etnea, Itrana, and Hojiblanca.

2.1.3. Evaluation Process

Quantitative descriptive analysis (QDA) was the sensory descriptive method chosen, being data both qualitative and quantitative; it is indeed able to create new attributes and assess the intensity of each one, followed by statistical analysis of the results and obtaining a sensory profile of the analyzed food.

The training phase was performed by a series of consensus panels; instead, the evaluations were carried out by individual repeated panels.

All samples were presented to the panelists in small cups at room temperature. The number of samples was always the same. The panelists were all equipped with palate cleaners (sparkling water) and coffee palettes. All samples were labelled with a blinded code for the panelists, so that only the panel leader knew the identity of the sample. Three to four samples were evaluated for each panel session.

2.1.4. Selection and Validation of Descriptors

The characteristic descriptors are identified by consent obtained through a roundtable [20]. In the round table, the panel supervisor leads a discussion based on a series of samples obtained from products of known origin by showing the most important specific characteristics of olive paté. The round table method is a very powerful tool for extrapolating the specific descriptors of a product directly from the sensations perceived by the panel. It allows for much more robust descriptors, as they are the direct result of the descriptive abilities of the panel members. After this discussion involving all the panelists, a list of all the possible descriptors is drawn up. The list of descriptors should follow a precise, logical order where the sensory variables are arranged in terms of:

- negative sensations, meaning the defects that can be found in paté samples, from those typical of table olives to some characteristic of olive oils;
- olfactory/gustatory sensations;
- kinaesthetic attributes (texture) [21].

At the end of the assessment, the reliability and validity of each descriptor can be evaluated from the sequence of + (presence) or—(absence) assigned by each taster for the descriptor [20].

If the sequence is at least 80% uniform, it means that the descriptor has been interpreted unequivocally by the whole panel. Conversely, if the sequence has the same number of (+) and (−) signs, the descriptor has not been interpreted correctly or unequivocally by the whole panel. In this case, there are two possible solutions: either to delete the descriptor or, if it is of some importance, to intensify panel training by repeating the discussion from the round table for the specific descriptor. The descriptor recognized by <50% of panelists is deleted during validation because it is not always clearly found in the product.

The following is a sensory lexicon for Olive Paté, including all the definitions of the chosen descriptors.

Negative sensations:

- *Putrid fermentation*: an olfactory sensation perceived directly and/or retronasally reminiscent of sewage or rotten eggs smell; characteristics of abnormal fermentations due to the development of decomposing organic matter microorganisms [22,23].
- *Butyric fermentation*: an olfactory sensation perceived directly and/or retronasally reminiscent of butter or cheese; characteristics of abnormal fermentations due to the development of butyric anaerobes [22,23].
- *Zapateria*: olfactory sensation perceived directly and/or retronasally reminescent of rotten leather; characteristics of abnormal fermentations due to the development of microflora that metabolize lactic acid to produce propionic acid and volatile fatty acids [22,23].
- *Alcoholic/acetic fermentation*: olfactory/gustatory sensation perceived directly and/or retronasally reminescent of wine or vinegar; characteristics of abnormal fermentations due to yeasts or heterofermentative bacteria [22,23].

- *Musty*: olfactory/gustatory sensation perceived directly and/or retronasally, characteristic of olives attacked by molds [23].
- *Cooking effect*: olfactory sensation perceived directly and/or retronasally, characteristic of olives that have undergone excessive heating in terms of temperature and/or duration during pasteurization or sterilization, reminiscent of boiled vegetables or caramelized sugar [23].
- *Soapy*: an olfactory/gustatory sensation reminiscent of soap; characteristics of olives treated with lye (Sevillan and Castelvetramo systems) that are insufficiently rinsed or consumed shortly after debittering [23].
- *Metallic*: an olfactory/gustatory sensation reminiscent of metals. The metallic sensation is caused by the presence of Fe ions. It is found above all in olives blackened by oxidation followed by the addition of ferrous salts, such as gluconate or ferrous lactate, used as color stabilizers (Californian system and oven-dried black olives) [23].
- *Rancid*: an olfactory sensation perceived directly and/or retronasally, characteristic of olives that have undergone a process of rancidity [23].

Olfactory/gustatory sensations:

- *Salty*: sensation perceptible mainly in the lateral-anterior area of the tongue. It is associated with the aqueous solutions added with sodium chloride and, therefore, with the concentration of the fermentation or packaging brines [23].
- *Bitter*: sensation perceptible mainly at the base of the tongue. It is associated with the presence of bitter substances, mainly polyphenols. It can therefore be more intense in preparations in which an incomplete debittering does not take place chemically but occurs microbiologically (in the Greek or natural system) [23].
- *Acid*: sensation perceptible mainly in the latero-posterior area of the tongue. It is associated with the presence of acids naturally present (e.g., tartaric, malic, or citric acid) or produced during lactic fermentation by homo and heterofermentative lactic bacteria (e.g., lactic acid, acetic acid), but it can also depend on an inappropriate use of acids such as acidity regulators or antioxidants (e.g., citric acid, ascorbic acid). The sensation of acidity is also found in those olives whose preparation involves the addition of vinegar (e.g., Kalamata olives) [23].
- *Pungency*: a stinging tactile sensation (tingling) similar to burning but not associated with high temperatures. The sensation is caused by some chemical substances capable of directly stimulating the heat receptors present on the mucous membranes (in this case, the throat) with which they come into contact. It is mainly associated with green olives with a high oleocanthal content [24,25]. It can also depend on the added oil or on hot spices (e.g., chilli).
- *Fruity*: olfactory sensations perceived directly and/or retro-olfactory, depending on the variety of olives and characteristics of healthy and fresh fruit, both green and ripe.
- *Astringency*: dryness of the oral cavity induced by the loss of lubricating capacity of the saliva, characterized by contraction of the gums, roughness on the tongue, and a marked decrease in salivation.
- *Aromatic/spicy*: olfactory sensations perceived directly and/or retro-olfactory, due to the release of aromatic substances of vegetable origin from the added spices (for example, oregano, fennel, thyme, and marjoram). It can also depend on olive varieties.

Kinaesthetic attributes (texture):

- *Consistency*: an attribute relating to the resistance that a food offers to deformation. It is evaluated through the perception of the force necessary to press the food into the mouthparts.
- *Fibrousness*: an attribute relating to the perception of the shape and orientation of the elongated particles of the food (vegetable fibers). It is evaluated through the perception of the fibers between the tongue and the palate during chewing.
- *Cohesiveness*: an attribute that describes the tendency, during chewing, to form a compact mass that is difficult to swallow.

- *Adhesiveness*: an attribute that describes the degree of adherence of a food to the teeth and/or palate during chewing.
- *Solubility*: an attribute that measures the speed with which the food melts with the saliva.
- *Oiliness*: an attribute linked to the perception of a greasy film that covers the surface of the oral cavity during chewing and remains until the end of chewing.
- *Chewiness*: an attribute relating to the number of chewings necessary to reduce a food to a consistency that allows it to be swallowed.
- *Graininess*: an attribute perceptible on the palate due to the presence of particles (grains) in the structure of the food.

2.1.5. Creation of a Specific Profile Sheet

This new sensory profile sheet kept the same setting as the table olive sensory-profile sheet [23], where on top there are negative sensations, in the middle are olfactory-gustatory ones, and on the bottom are kinaesthetic properties. At the end of the profile sheet, a five-point Likert hedonic scale with emojis was added to evaluate the acceptability of the product since it is a new entry for our panel. Each taster chooses one of the emojis depending on their personal global satisfaction level, from the most disappointed, corresponding to score 1, to the most pleasant, corresponding to score 5 [26]. Moreover, the use of emojis for the Likert hedonic scale makes the evaluation easier if applied to children.

Figure 1 shows the experimental sensory profile sheet used for tasting.

2.2. Training of Panelists

Selection of References

The training of the tasters was performed by using foods of constant quality that can be easily found all over the world. For the negative and olfactory/gustatory sensations, we have relied on previous experience in table olives and olive oil fields using some chemical substances, such as 2-mercaptoethanol, butyric acid, and cyclohexanecarboxylic acid for abnormal fermentations, rancid olive oil for rancid defect, and NaCl, quinine, and lactic acid for salty, bitter, and acidic sensations, respectively [27]. For every kinaesthetic attribute, we chose as standards a couple of foods that can be placed in the lowest and highest part of the scale, with median values of 2.0–3.0 and 8.0–10.00, respectively (Figure 2), such as: Philadelphia and Leerdammer cheeses to evaluate consistency; peaches and pineapples in syrup for fibrousness; rusks and sandwich breadcrumbs for cohesiveness; low-fat yogurt and peanut butter for adhesiveness; boiled egg yolk and Calvé mayonnaise for solubility; full-fat cow milk and margarine for oiliness; banana and pitted dried plums for chewiness; chickpea hummus and cous-cous for graininess (Figure 3).

2.3. Experimental Trial

2.3.1. Sampling

The Italian company Ficacci Olive Co. (Castel Madama, RM, Italy) supplied 40 olive paté samples from five different *Olea europaea* L. cultivars (Bella di Cerignola, Nocellara del Belice, Hojiblanca, Nocellara etnea, and Itrana). The timeline of the project has scheduled four batches to be sent to our research center from December 2020 to December 2022.

2.3.2. Sensory Analysis

The samples are evaluated as described in Section 2.1.3. using the profile sheet shown in Figure 1.

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PERCEPTION OF NEGATIVE SENSATIONS

Abnormal fermentations (specify) ____________________

☐ putrid ☐ butyric ☐ zapateria ☐ alcoholic/acetic

Other defects (specify) ____________________

☐ musty ☐ cooking effect ☐ soapy ☐ metallic

Rancid ____________________

PERCEPTION OF OLFACTORY/GUSTATORY SENSATIONS

Salty ____________________
Bitter ____________________
Acid ____________________
Pungency ____________________
Fruity ____________________
Astringency ____________________
Aromatic/spicy ____________________

PERCEPTION OF KINAESTHETIC ATTRIBUTES

Consistency ____________________
Fibrousness ____________________
Cohesiveness ____________________
Adhesiveness ____________________
Solubility ____________________
Oiliness ____________________
Chewiness ____________________
Graininess ____________________

Name of taster: *Sample code:* *Date:*

LIKING:

Figure 1. Sensory profile sheet for olive paté.

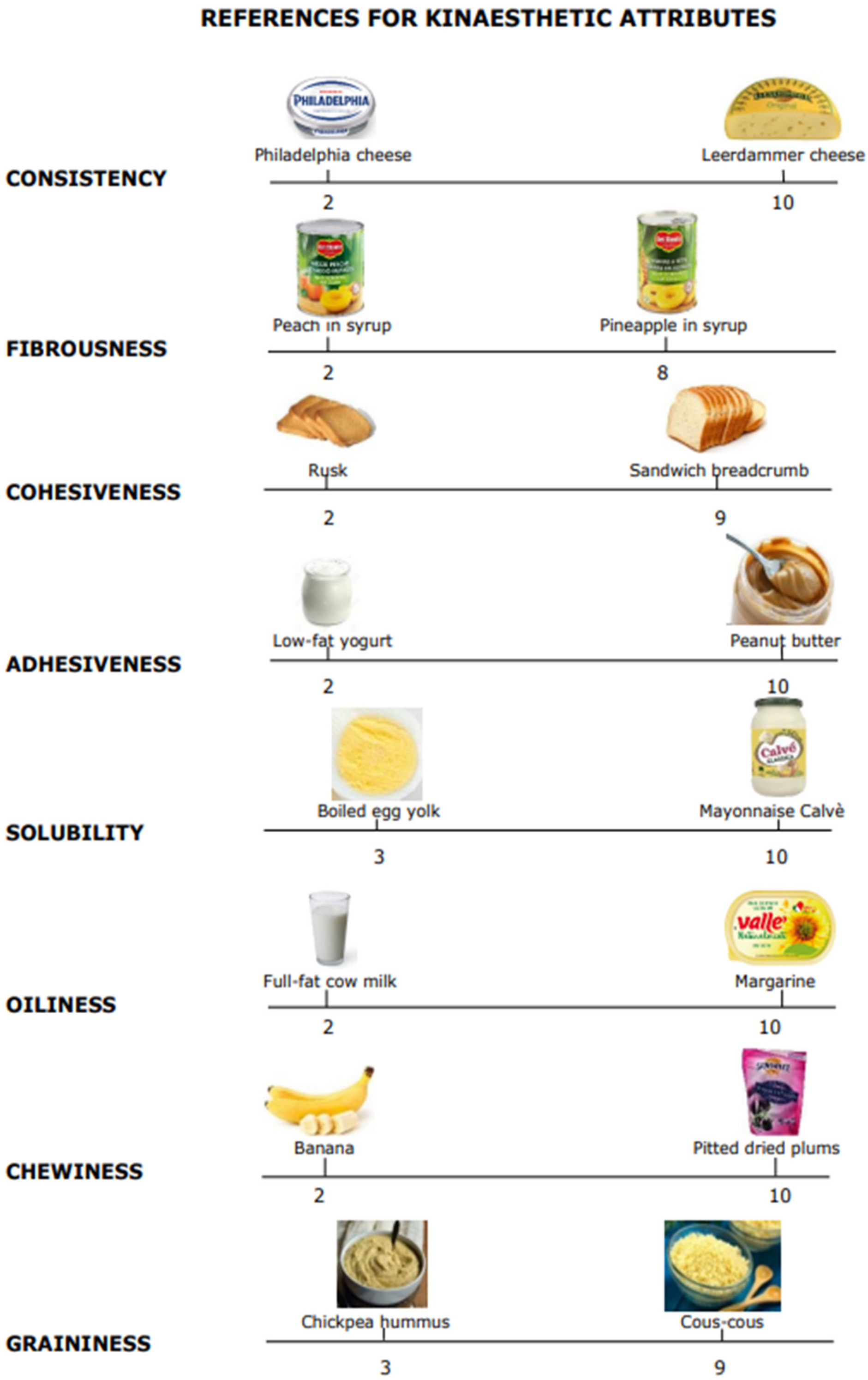

Figure 2. Median values of standards for kinaesthetic attributes.

Figure 3. A picture of the final food standards chosen for kinaesthetic properties.

2.3.3. Textural Analysis

Textural analysis was performed with the Texture Analyser TA.XT_PlusC TM (Stable Micro Systems Ltd., Godalming, UK) with a 10 kg load cell carrying out a "back extrusion" test by using a 4 cm circular probe (P/40) and a 5 cm cylindrical plexiglass container where the sample was placed. The probe runs a compression, pushing down the sample until the product is extruded up and around the circular disc, as shown in Figure 4. The emitted signal is detected and sent to the PC by using specific proprietary software (Texture Exponent Connect version 7.0). The signal is turned into a force/time graph, as shown in Figure 5.

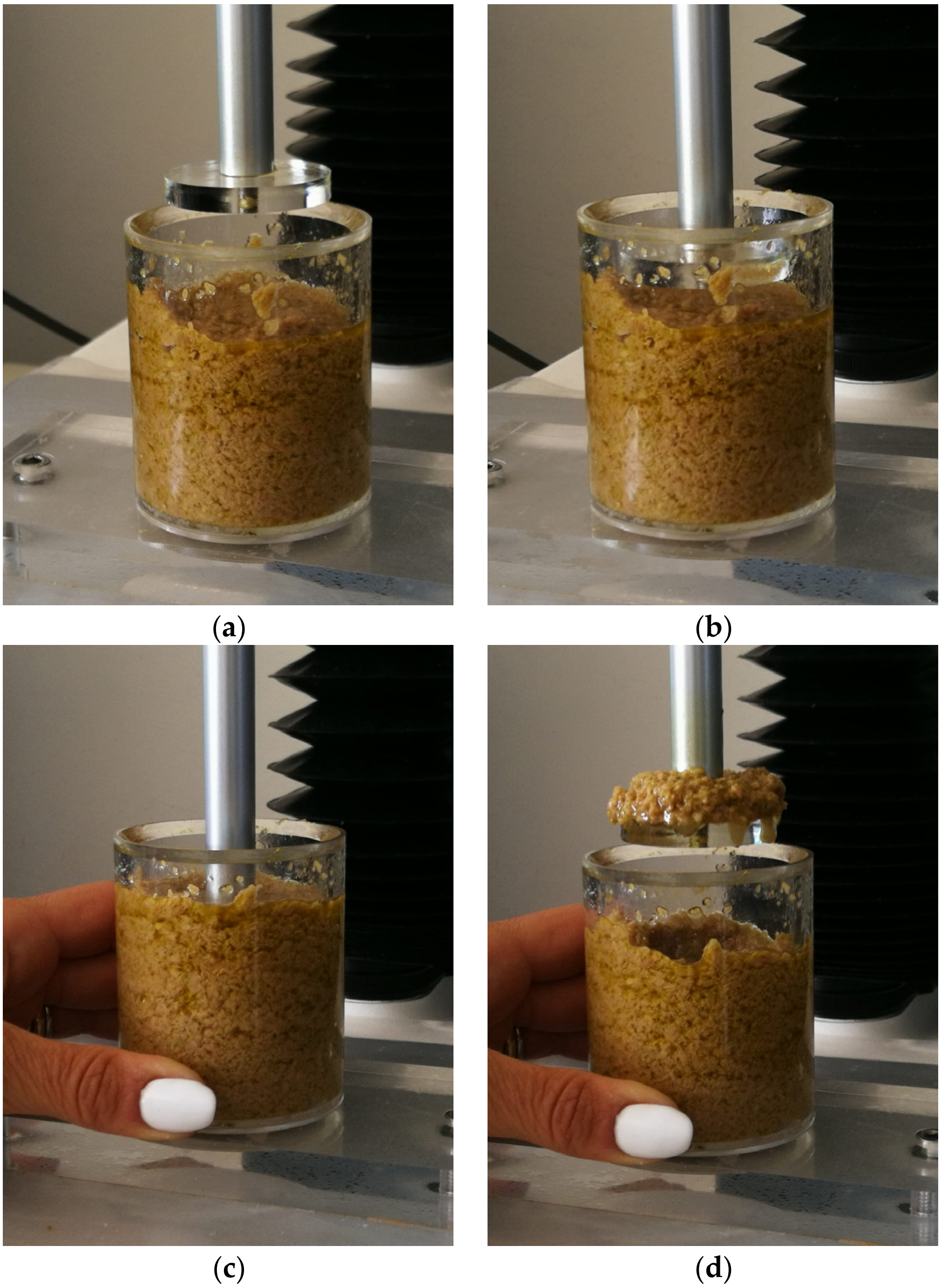

Figure 4. Back extrusion test. (**a**–**d**) main operation steps with an olive paté sample.

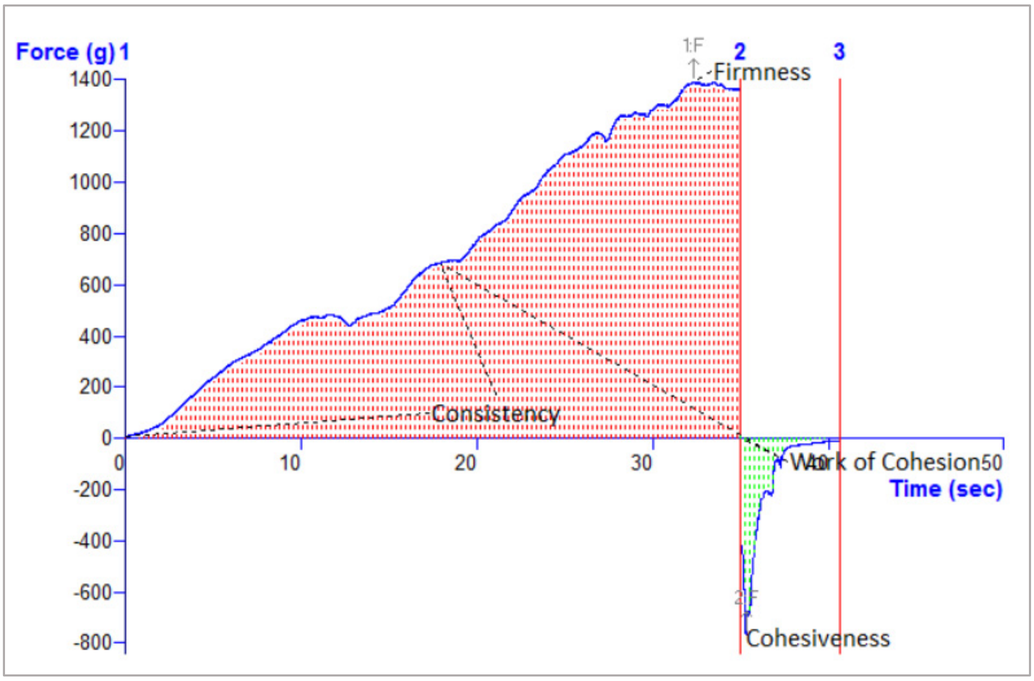

Figure 5. The force/time graph resulting from the emitted signal by the probe during the back extrusion test.

The parameters considered in the back extrusion test are:

- Firmness
- Consistency
- Cohesiveness
- Work on cohesion

Firmness is the maximum force applied by the probe to fit inside the sample. It is a property describing the slight resistance of the product to deformation. In Figure 5, it is displayed as the positive peak of maximum force. Higher firmness values mean a higher solidity of samples.

Consistency is a textural property related to the firmness, thickness, and viscosity of a liquid or semi-solid material. It is represented in the graph as the area under the positive curve.

Cohesiveness expresses the force that the probe needs to detach from the sample, and it is determined by intramolecular attractions. It is related to inner viscosity, and it is represented by the negative peak in the force/time graph. The more negative the values, the more cohesive the samples.

The work of cohesion is a viscosity index displayed in the graph in the negative area under the curve. It gives us information about the viscosity and cohesiveness of the sample since the peak is higher when the sample is more resistant to the probe lift.

2.3.4. Statistical Analysis of Data

Statistical analysis of sensory data was carried out by considering median values, robust coefficient of variation (CVr%), and robust standard deviation by referring to the statistical program specific to table olives provided by COI/OT/MO/Doc.1/Rev.3 Annex 3: *Sensory analysis of table olives-computer program* [14]. It allows for relating sensory profiles (spider plots). Statistical analyses of textural data were carried out through a one-way ANOVA test and ascending hierarchical classification (AHC) with the XLStat Premium—Student license (Lumivero, Denver, CO, USA).

3. Results

Sensory data were validated from CVr% values, resulting in all being under 20%.

Olive paté sensory profiles resulted from all the descriptors of the profile sheet expressed as median values and are displayed as spider plots, with distinct colors for each cv. and overlapped with each other's (Figure 6).

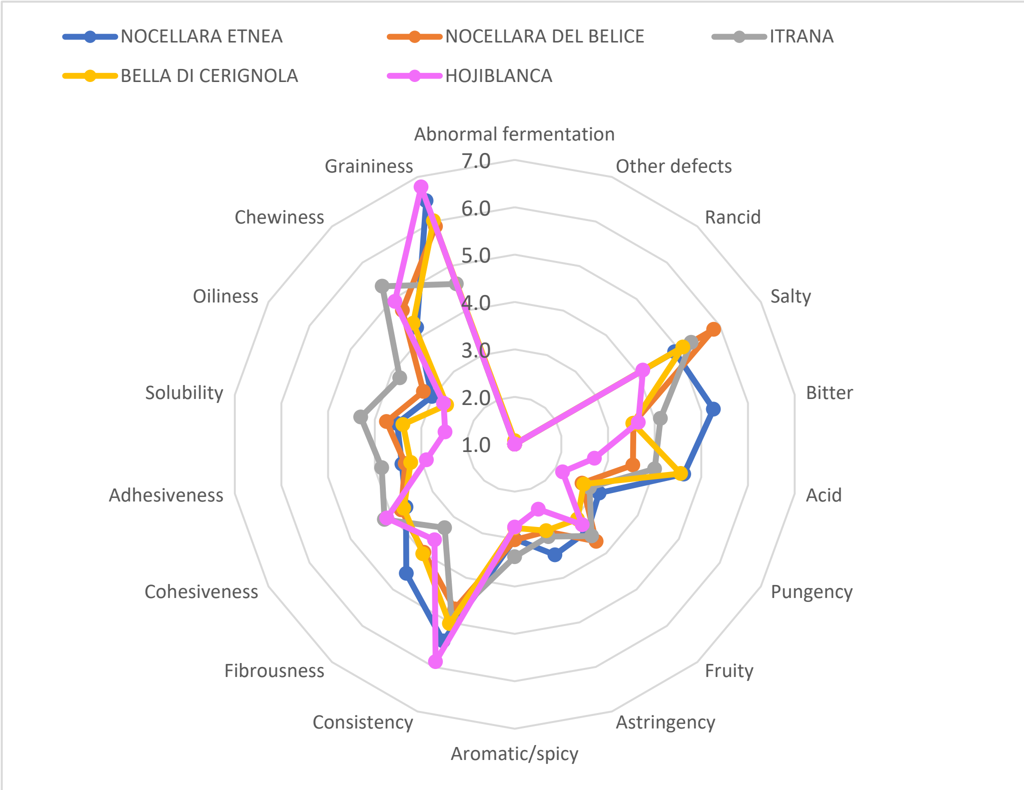

Figure 6. Spider plots resulting from sensory analysis of olive paté samples.

None of the samples resulted in defects. Nocellara del Belice samples were perceived as the saltiest, while those of Nocellara etnea were perceived as the bitterest. Hojiblanca samples resulted in being more balanced on the olfactory/gustatory level since the descriptors are closer to each other than the other cultivars; they also appeared to be less acidic. In terms of texture, Hojiblanca olive paté seemed to be more consistent and grainier than the others but less fluid and less adhesive, so it hardly merged with saliva and barely adhered to the palate and teeth when chewed.

Itrana samples have the highest adhesiveness, solubility, oiliness, and chewiness of all the other CVs. Bella di Cerignola olive paté is mostly characterized by olfactory/gustative attributes rather than textural ones since these descriptors have extremely low values, mainly for oiliness, being a cultivar with very low oil content.

By analyzing the tasters likings (Figure 7), it can be noted that Itrana samples were the most appreciated (about 20% of tasters liked it), followed by Hojiblanca samples that scored a liking of 4 for about 75% of tasters. Nocellara etnea samples also recorded a high liking (score 4) for about 45% of the tasters, reaching 77% with the lower score (3). Nocellara del Belice, Bella di Cerignola, and Itrana samples were less appreciated by adding scores of 3 and 4 for 60% of the tasters.

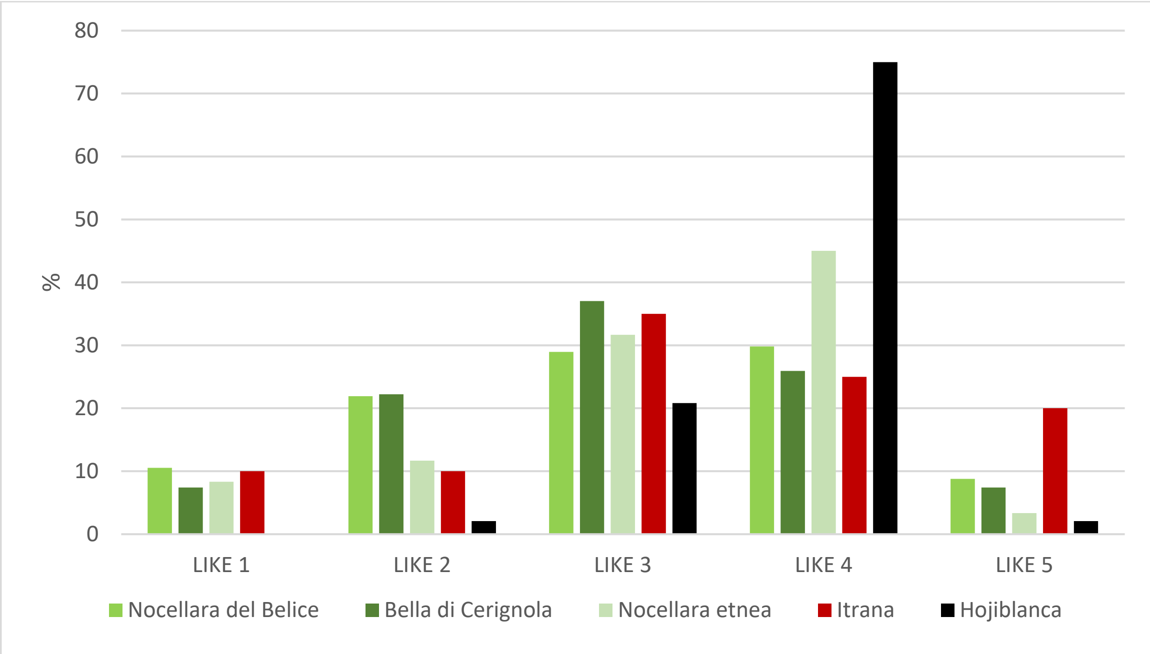

Figure 7. Graph of liking distribution among the tasters.

Due to the qualitative nature of the data shown in Figure 7, it is possible to obtain only the median and related standard deviation of each single CV analyzed, as shown in Table 1.

Table 1. Likert scale: median and standard deviation values.

Statistic Parameters	Nocellara del Belice	Bella di Cerignola	Nocellara Etnea	Itrana	Hojiblanca
Median	3	3	3	3	4
St. Dev.	1.140	1.041	0.998	1.226	0.515

The textural parameters of olive paté samples resulting from the back extrusion test were analyzed by a one-way ANOVA statistic test, which highlighted many differences among various olive paté types (Table 2).

Table 2. Textural parameters of olive paté samples resulting from the back extrusion test. The data are expressed as the mean and DS of ten replicates, followed by a one-way ANOVA test. Significant differences are indicated by different letters ($p < 0.05$) along the same column. ns, not significant.

Cultivar	Firmness (g)	Consistency (g/s)	Cohesiveness (g)	Work of Cohesion (g/s)
Nocellara del Belice	2600.48 (286.42) a	44,379.18 (11,666.80) a	−695.74 (150.64) a	−719.72 (226.43) ns
Bella di Cerignola	6513.95 (1006.36) b	72,989.2 (30,418.06) b	−829.46 (443.01) ab	−934.39 (574.48) ns
Nocellara etnea	6309.97 (806.03) b	69,483.23 (16,394.43) b	−1095.85 (576.68) a	−667.85 (422.09) ns
Itrana	2170.29 (775.11) a	32,693.32 (6903.52) a	−741.31 (227.71) a	−724.23 (56.06) ns
Hojiblanca	8284.12 (1523,32) bc	88,283.62 (18,857.78) b	−1140.81 (287.99) ab	−957.54 (197.70) ns

Nocellara del Belice samples' firmness is significantly different from Bella di Cerignola, Nocellara etnea, and Hojiblanca olive paté, but closer to Itrana samples. The consistency attribute of Bella di Cerignola olive paté is statistically similar to all the other cultivars, except for the Nocellara del Belice and Itrana samples. The cohesiveness of Nocellara del Belice is significantly different from that of Bella di Cerignola and Hojiblanca samples; it is the least cohesive olive paté, meaning that it has a lower adhesion between its particles. Nocellara del Belice samples resulted in being closer only to Itrana samples, considering general textural parameters. For the work of cohesion, statistical differences do not emerge between samples.

After conducting a correlation test between firmness evaluated by sensory analysis and firmness and consistency measured by Texture Analyzer, the following R values were obtained:

$$R = 0.8515 \text{ (S\_Firmness vs. BE\_Firmness)}$$

$$R = 0.8200 \text{ (S\_Firmness vs. BE\_Consistency)}$$

where S_Firmness is the firmness evaluated by sensory analysis; BE_Firmness is the firmness measured by Texture Analyzer; BE_Consistency is the consistency measured by Texture Analyzer.

The data show a good correlation between sensory and texture analysis.

Analyzing dissimilarities between samples and considering all kinaesthetic parameters obtained by sensory and textural analyses through agglomerative hierarchical analysis (AHC), the various samples showed a clear clusterization into two groups (clusters): C1 and C2. The same clusterization results, but with different dissimilarity values, were obtained using both single linkage (Figure 8) and complete linkage (Figure 9) agglomeration methods.

As shown, dissimilarity values logically differ between the two different agglomeration methods, except for subcluster C1-Nocellara etnea-Bella di Cerignola. The clusterization used is a dissimilarity Euclidean distance using the Hartigan Index for truncation (default values: from 2 to 5).

Inside the C1 cluster, three cultivars are grouped: Hojblanca, Nocellara etnea, and Bella di Cerignola. These last two cultivars are sub-clusterized together with an even lower dissimilarity value that is exactly the same using both the single and complete linkage methods (3532.059).

Inside the C2 cluster, with a dissimilarity value of 11,693.865, the two remaining cultivars are found: Nocellara del Belice and Itrana. The dissimilarity value between the two clusters is 55,927.403.

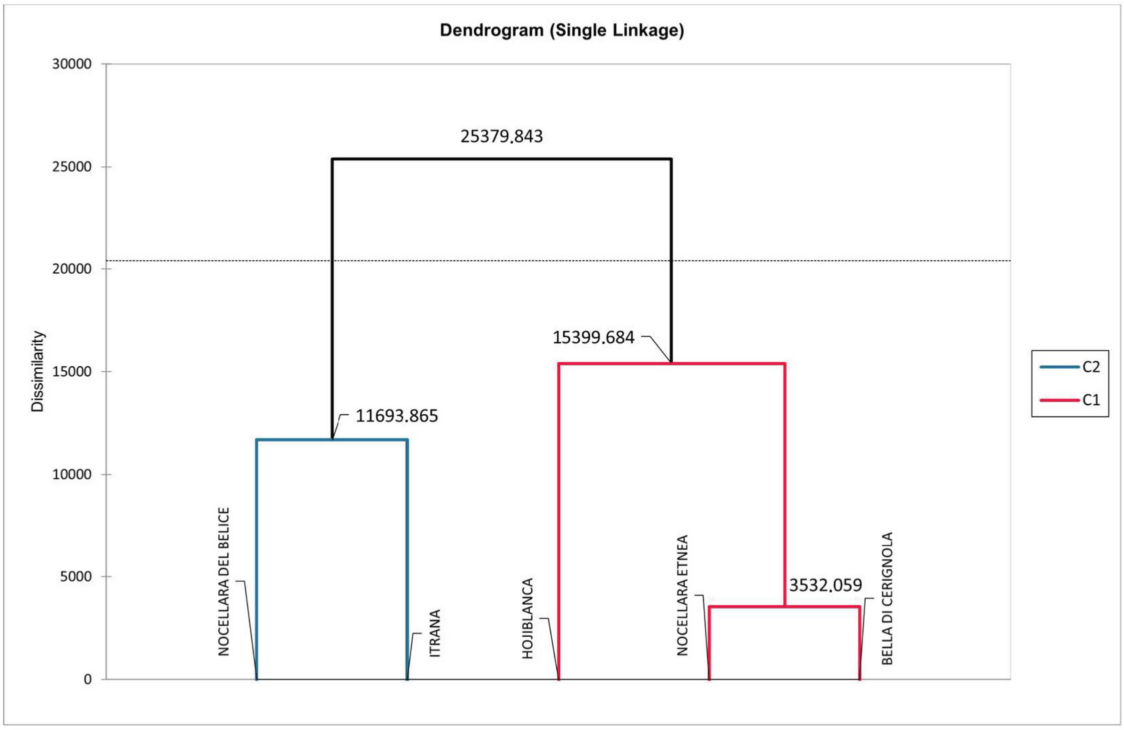

Figure 8. AHC dendrogram obtained using single linkage agglomeration method.

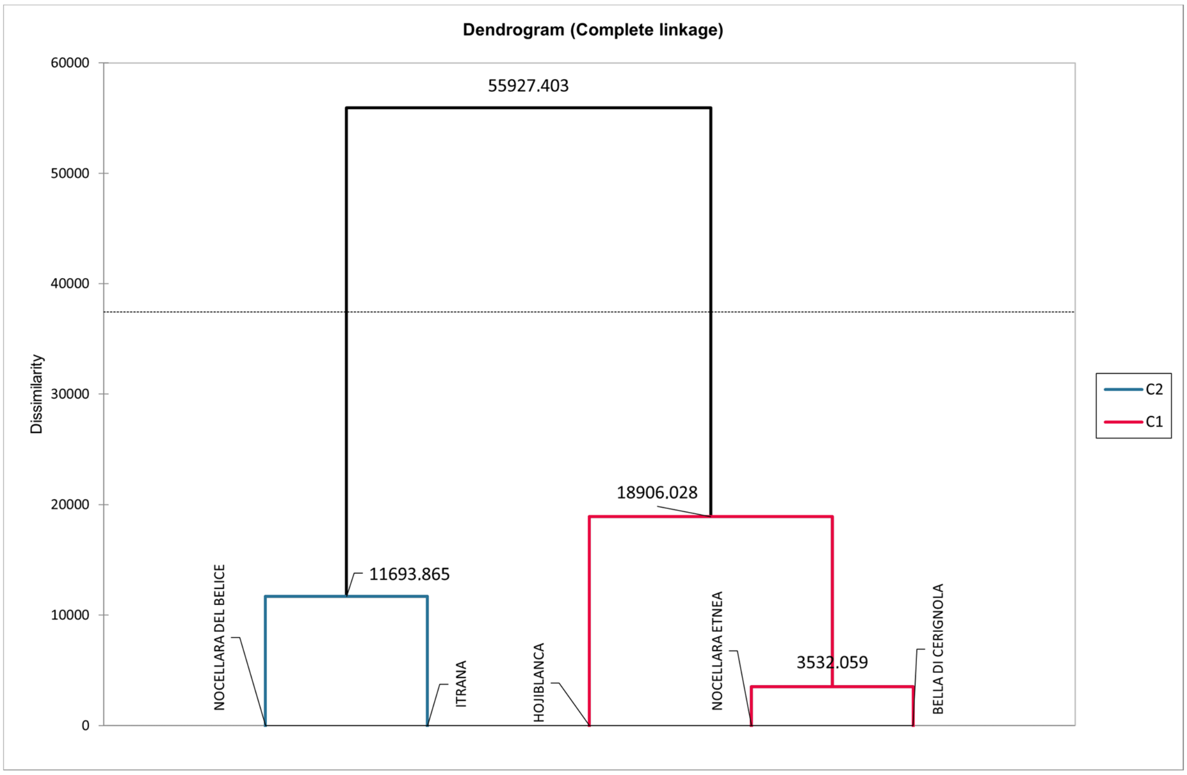

Figure 9. AHC dendrogram obtained using complete linkage agglomeration method.

4. Discussion

Concerning the development of negative sensations in the experimental sheet, the rancid defect is highlighted since it can derive both from the oil inside the drupe and from the olive oil added to make the olive paté. For similar reasons, the kinaesthetic properties selected are 8 because of the complexity of the analyzed matrix, which has many different rheological attributes. Moreover, the chosen olfactory-gustatory sensations involve not only the specific features of table olives but also all the characteristics that can derive from any possible additive included in the manufacturing process. Due to the nature of a food that can vary in its composition—ranging from those with big grains to those with tiny grains, those with more oil and those with less, those with different solubilities, etc.—the profile sheet had to be as exhaustive as possible.

Nocellara del Belice samples were assessed as the saltiest. This is unexpected since the processing method (Castelvetrano) involves, after a debittering period in a NaOH solution, a brief storage in water or in low-salt brine [2]. Due to processing company specifications, no addition of salt to the paté recipe was made, so this result could be due to a high-salt content brine (>5%) to improve the shelf-life of table olives before their transformation, so that the final product resulted in being saltier than others.

Nocellara etnea samples resulted as the most bitter; this could be explained because they were early harvested, then cut and crushed; they held a high pulp consistency and were resistant to tanning, so that the debittering process could be less successful.

Hojiblanca olive paté samples were perceived as having the least acid; this could be due to the transformation process (Californian method) involving the use of ferrous gluconate or lactate, which could easily reduce acid perception.

Textural similarity among Bella di Cerignola, Nocellara etnea, and Hojiblanca samples can be explained because these olive paté are made by bigger particles, which results in a more solid and rough texture paté; for this reason, they need to be deformed by a higher force. Nocellara del Belice olive paté samples were less firm, but Itrana samples showed lower firmness.

The lowest cohesiveness of Nocellara del Belice samples can be caused by the higher consistency of the flesh, which is extremely compact and hard, resulting in an olive paté that hardly separates from the probe.

5. Conclusions

Results obtained by sensory analysis, textural analysis by a Texture Analyzer equipped with a back extrusion device, and statistical processing of the data obtained showed the validity of the profile sheet to correctly assess the different products.

Since olive paté is becoming a popular flavoring ingredient, it could be helpful for manufacturers to know its sensory characteristics to finally enhance the quality of the product and make it competitive in the marketplace. This will also result in increased attention from consumers. A new specific lexicon and an innovative sensory profile sheet can help determine the sensory quality of olive paté accurately and, in time, become a "standard" to certify typical productions. The profile sheet developed and tested in this research demonstrated its effectiveness and will be further tested in future research. The developed lexicon could also promote communication regarding product quality among sensory scientists and many stakeholders, such as product developers, marketing professionals, and suppliers.

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