SENSORY ANALYSIS EVALUATION STUDY OF FOREIGN AND NATIONAL APRICOT VARIETIES

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Abstract

This research aimed to investigate the significant consumer indicators in apricot fruit by different groups of Romanian and foreign cultivars. The sensory analysis was carried out in three harvest seasons during 2021-2023, and the method used was questionnaires (tasting sheets). The analyzed parameters were: the appearance of the fruit given the size (1-3), form (1-3), color (1-3); pulp firmness (1-4), pulp juiciness (1-5), taste (1-6), and flavor (1-4). The evaluation of the size and shape of the fruits in the Romanian and foreign cultivars showed that in both batches, in general, the fruits had very good ratings and were very well appreciated. The fruit color index varied between 2 and 3 in both studied groups. Pulp firmness analysis showed that the uniformity of this index was higher in the foreign cultivars. Examining fruit taste and pulp juiciness showed that the fruits of both groups were almost in the same range and had similar grades. The best taste among the foreign cultivars was observed in Pisina/M29C and among the Romanian cultivars in Amiral and Orizont.

Key words: Flavor, sensory analysis, panel test.

INTRODUCTION

Apricot (*Prunus armeniaca* L.) belongs to the *Rosaceae* family (Ahmadi et al., 2008). Apricots became endemic in large areas such as Iran, Turkey, Afghanistan, the Middle East, and East China more than 5,000 years ago (Faust et al., 1998; Buttner, 2001). This fruit grows in areas with moderate climates (Topcu & Uzundumlu, 2010; Ucar & Engindeniz, 2018). Apricot is one of the fruit trees cultivated on a high scale in southern Europe. One of the main reasons for diverse research to create new varieties consistent with European climatic conditions is the high nutritional value of apricots and products produced based on this fruit (Iordanescu et al., 2018). The nutritional value of this fruit is high (Iordanescu & Micu, 2012; Hegedus et al., 2010; Ali et al., 2011), and from the distant past, it has been used in home remedies (Kan & Bostan, 2010). Apricot is used in fresh, dried, and processed forms (Altindag et al., 2006; Özdoğru et al., 2015). Improving fruit's sensory characteristics is an important factor in increasing the sense of pleasure of tasting fruit (Joanna et al., 2019). Rootstock influences cultivar growth characteristics, fruit size, plant performance, and growth under stress conditions

(Zhebentyayeva et al., 2012). It should be mentioned that other factors such as variety, geographical conditions of cultivation place, tree cultivation system, and fruit ripening process also affect the characteristics of the fruit (Mratinic et al., 2011; Iordanescu et al., 2012; Milosevic et al., 2010; Campbell et al., 2011; Leccese et al., 2010; Ayour et al., 2017). Understanding the sensory characteristics that affect consumers' choice of fruit significantly increases their marketability (Dawson & Healy, 2018). In sensory evaluation, responses to product features perceived by the senses are analyzed and interpreted (Stone & Sidel, 2004). Sensory characterization is used as an analytical test in breeding programs (Lawless & Heymann, 2010). In strawberries, sensory analysis showed that local cultivars were selected for color, foreign samples for aroma, and self-produced samples for flavor, texture, and overall (Hasna et al., 2022). The study of some sensory characteristics in apricots showed that some physicochemical characteristics of the fruit positively correlated with the sensory characteristics (Lespinasse et al., 2006). The study of eight apricot cultivars in Italy found that the overall quality of the fruit has a positive correlation with its taste, sweetness, and juiciness. In addition, fruits with a proper

sugar-to-acid ratio balance were more appreciated (Valentini et al., 2006). Since the characteristics related to the fruit significantly affect its marketability and its choice by the consumer, this research investigated the sensory factors of fruits of foreign and Romanian cultivars by different parameters.

MATERIALS AND METHODS

The sensory analysis of the quality of apricot fruits obtained in the Experimental Fruit Field of the Faculty of Horticulture was carried out in three harvest seasons during 2021-2023. The method used was questionnaires (tasting sheet) in which several 224 people participated (Tables 1, 2, and 3).

Table 1 Participants distribution
to the questionnaire by gender

No.	Gender	No	%
1	Male	102	45.54
2	Women	122	54.46
	Total	224	100%

Table 2. Participants distribution
to the questionnaire by age

No.	Age	No.	%
1	10-20	8	3.57
2	21-30	56	25.00
3	31-40	50	22.32
4	41-50	55	24.55
5	51-60	37	16.52
6	Over 60 year	18	8.04
	Total	224	100%

Table 3. The analyzed groups by employment status

| No.	Occupation	No.	%
1	Professor	26	11.61
2	Assist. Univ.	5	2.23
3	Researcher	13	5.80
4	PhD	7	3.13
5	Master stud.	5	2.23
6	Engineer	22	9.82
7	Lawyer	22	9.82
8	Employee	79	35.27
9	Student	28	12.50
10	Retired	5	2.23
11	No answer	12	5.36
	Total	224	100%

To evaluate the fruits, the answers were scored using the scoring scale with an interval from 1-6, where 1 was the lowest value and 6 was the highest. The analyzed parameters were: the appearance of the fruit given the size (1-3), form

(1-3), color (1-3); pulp firmness (1-4), pulp juiciness (1-5), taste (1-6), and flavor (1-4). 16 foreign and 15 Romanian cultivars were tasted. The analysis included the 'Early orange' cultivar, in the Romanian group, being in the same cultivation plot.

RESULTS AND DISCUSSIONS

Fruit size
The evaluation of the fruit size in the Romanian and the foreign cultivars in the research showed that the fruits were generally well and very well appreciated in both batches. Primaya/SJA (Trident) (2.82), Primaya/SJA (Bi-Baum) (2.85), Vitillo/M29C (2.79), Medflo/M29C (2.75), Pisana/M29C (2.85), Delice/M29C (2.87), and Bergeron/M29C (2.72) had been the better evaluated fruits compared to other cultivars. In the Romanian cultivars, the size of the fruits was appreciated more in the cultivars Amiral (2.72), Hybrids (2.73), and Orizont (2.84) compared to other cultivars (Figure 1).
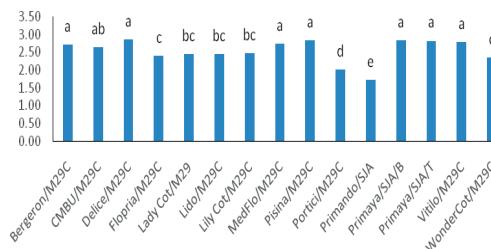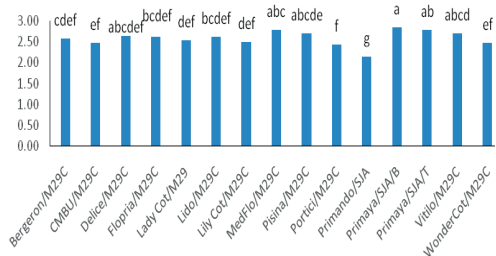

Foreign cultivars
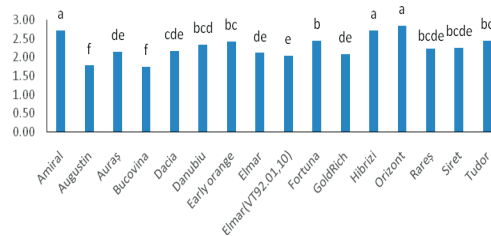
Romanian cultivars (*)

Figure 1. Fruit size evaluation in tested cultivars
(the scores, represented on the Y-axis, were statistically
compared, using ANOVA and Duncan test for p≤0.5)
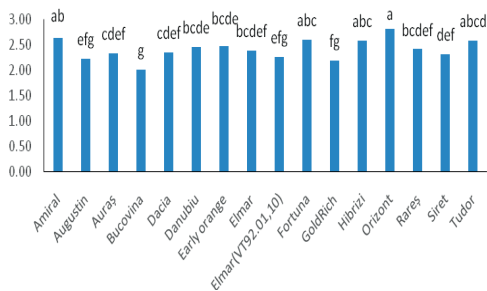(*except Early orange)

Fruit shape
The evaluation of the fruit shape in the foreign and Romanian cultivars showed that all the

varieties examined received good and very good ratings. The best appreciations were attributed to the cultivars Primaya/SJA (Trident) (2.79), Vitillo/M29C (2.71), Medflo/M29C (2.78), and Pisina/M29C (2.70). Among the Romanian cultivars, the most appreciated for this attribute was the cultivar Orizont (2.82), followed by Amiral (2.64) (Figure 2).

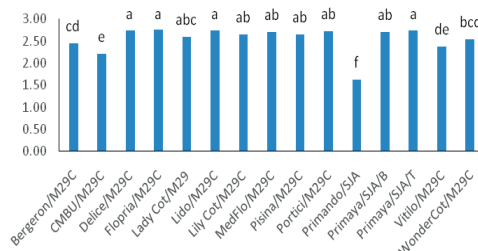**Foreign cultivars**

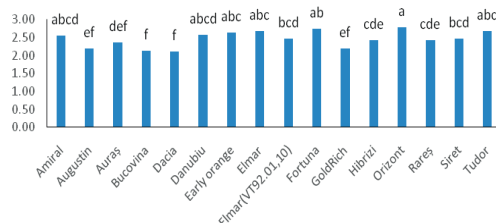**Foreign cultivars**

Romanian cultivars (*)

Figure 2. Fruit shape evaluation in the studied and Romanian cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Fruit color

The fruit color evaluation results showed close values between the cultivars tested, with some differences. The best appreciations were for the cultivars Delice/M29C (2.74), Flopria/M29C (2.75), Lido/M29C (2.74), and Primaya/SJA/T (2.74). Primando/SJA (1.62) was the lowest-rated of these cultivars. In the Romanian cultivars, the best evaluation was at Orizont (2.78) and the smallest at Bucovina (2.12) and, respectively, Dacia (2.10). Generally, this index was between 2 and 3 in the foreign and Romanian cultivars (Figure 3).
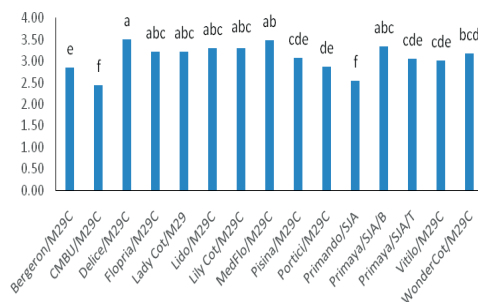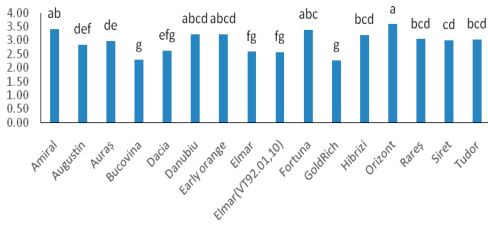

Romanian cultivars (*)

Figure 3. Fruit color evaluation in the studied and Romanian cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Pulp firmness evaluation

The examination of this parameter in apricot cultivars showed that the best appreciations were for the cultivar Delice/M29C (3.51), and the least appreciated being CMBU/M29C (2.43) and Primando/SJA (2.55). The value of this index in other cultivars of this group was higher than 3. The study of Romanian cultivars found that the highest value of this index was in the cultivar Orizont at the rate of 3.58 (Figure 4).
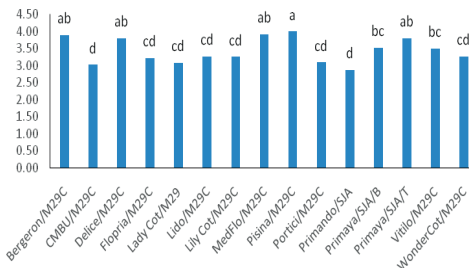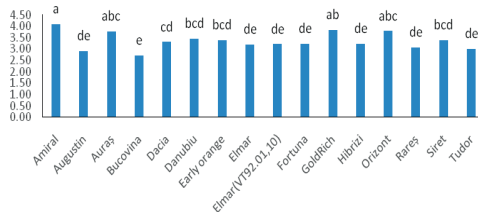

Foreign cultivars

Figure 4. Fruit pulp firmness evaluation in studied and Romanian cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Pulp juiciness evaluation

In terms of pulp juiciness evaluation, the results determined that the highest value was attributed to the cultivar Pisina/M29C (4.00).

The lowest value of this index was observed in cultivars Primando/SJA (2.87) and CMBU/M29C (3.02). This index was higher than 3 and lower than 4 in other cultivars in this group. Among the Romanian cultivars, it was established that the Amiral cultivar had the highest index value (4.09). This index was less than 2 in Augustin (2.91) and Bucovina (2.72). Other cultivars were placed in the same range and less than 4 (Figure 5).
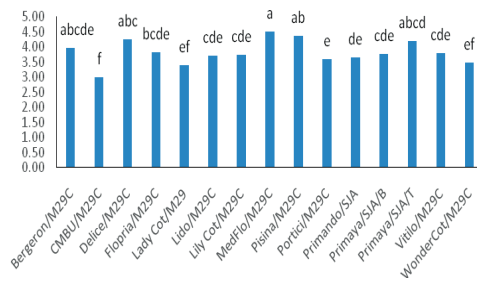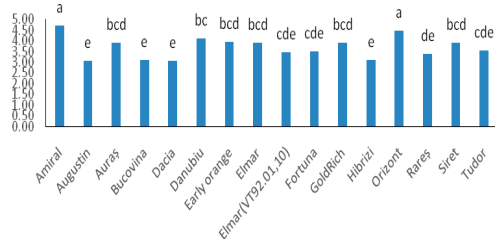

Figure 5. Fruit pulp juiciness evaluation in the studied cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Fruit taste evaluation

Examining the fruits of different apricot cultivars from the two studied groups, it was found that the fruits of both groups were almost in the same range and had similar grades. In the cultivars studied, only four cultivars, including Delice/M29C (4.25), MedFlo/M29C (4.50), Pisina/M29C (4.37), and Primaya/SJA (Trident) (4.19), had a rating higher than 4. Other cultivars had a value lower than 3 and higher than 2. The evaluation of the taste index of the Romanian cultivars also showed that in this group, the cultivars Danubiu (4.10) and Orizont (4.45) had a higher value compared to other foreign cultivars (Figure 6).

Figure 6. Fruit taste evaluation in the studied cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Flavor evaluation

Following the analysis of the flavor index of the studied cultivars, it was found that the highest value of this index was observed in Pisina /M29C (3.45), followed by Medflo/M29C (3.16). The aroma index value for other cultivars studied in this group was less than 3. It should be noted that the fruits of the cultivar CMBU/M29C had the lowest value of this index (2.39). In the Romanian cultivars, only four cultivars, Amiral (3.37) and Auraș (3.11), Danubiu (3.06), and

Orizont (3.23), obtained a higher index value compared to other cultivars (Figure 7).

Foreign cultivars
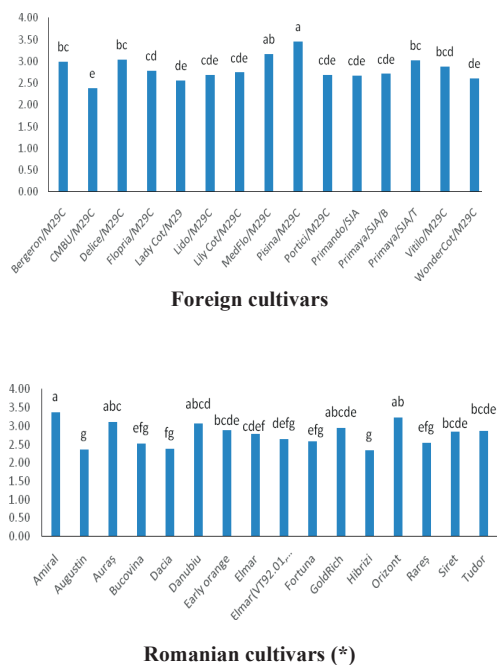

Romanian cultivars (*)

Figure 7. Fruit flavor evaluation in the studied and Romanian cultivars
(the scores, represented on the Y-axis, were statistically compared, using ANOVA and Duncan test for p≤0.5)
(*except Early orange)

Classification of the tested varieties according to the evaluated parameters

By analyzing the cultivar groups based on the studied traits, it was found that they were divided into four separate groups. The cultivars Portici/M29C, Pisina/M29C, Bergeron/M29C, CMBU/M29C, and Delice/M29C were placed in a group; the cultivars Lido/M29C and Medflo/M29C in another group; while Flopria/M29C, Wonder Cot/M29C, and Rubista/M29C in another separate group and finally Primaya/SJA (Bi-Baum), Lilly Cot/M29C, Primaya/SJA (Trident), and Lady Cot/M29C were grouped. The study of Romanian cultivars also showed that the cultivars Elmar (VT92.01,10), Siret, Tudor, Orizont, Hibrizi, and Amiral were classified into a group, while cultivars Augustin and Bucovina in another group, as well Fortuna, Rareș in a group and the cultivars Danubiu, Elmar and Auraș in a group. The Cultivar Dacia stood out

through the ratings it received, distancing itself from the others (Figure 8).
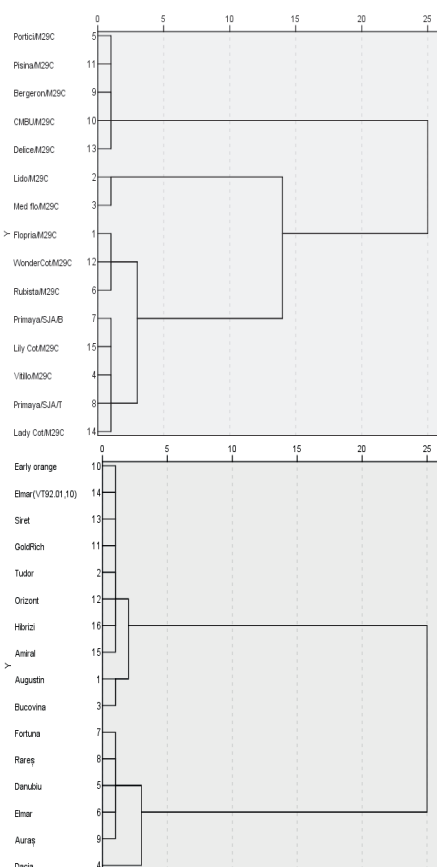

Figure 8. Cluster analysis of the studied cultivars

Discussions

One of the primary things that attract the consumer's attention is the fruit's appearance and quality, which significantly affects its marketability and selection (Gatti et al., 2009). Furthermore, fruit quality, influenced by sensory properties such as aroma, texture, appearance and taste, nutritional value, and chemical compounds, is one of the critical factors in the acceptance of different apricot cultivars by consumers (Abbott et al., 2006). As a result, evaluating sensory characteristics in apricots is one of the practical and essential tools in describing and introducing different cultivars. Several studies have evaluated the sensory parameters of apricots (Infante et al., 2008; Defilippi et al., 2009; Robini et al., 2006; Infante et al., 2006). In these studies, it has

been stated that there is a correlation between the sensory indicators of the fruit and the physical and chemical characteristics. Factors such as fruit appearance, texture, color, and taste during ripening determine the final quality of the fruit. Therefore, sensory evaluation of apricot fruit should be done at the right time of fruit ripening according to the right balance between sugar and acid and the right quality of the fruit texture (Egea et al., 2007). This research investigated sensory indicators such as fruit size, shape, color, flavor, taste, pulp firmness, and pulp juiciness. The results showed that the appreciation of the fruit size in the Romanian cultivars was somewhat lower than in the foreign cultivars. Primando/SJA had the lowest value among the foreign cultivars. In the research of Azodanlou et al. (2003), the parameters of flavor, acidity, juiciness, sweetness, flesh firmness, and aroma were used to evaluate the sensory properties of apricots. In the research conducted in Spain on two different genotypes of apricots, it was found that the sensory evaluation of the fruit by assessors can determine the best ripening time of the fruit (Egea et al., 2006). Valentini et al. (2006) found that the overall quality of apricot fruit correlates with flavor, juiciness, and sweetness. It has been stated that using sensory evaluation is the best option for juiciness, melting, and floury texture (Lespinasse et al., 2006).

CONCLUSIONS

In general, it can be considered that sensory features allow the introduction and comparison of varieties. The research results showed the difference in sensory characteristics between foreign and Romanian cultivars. Furthermore, the results showed that Primando/SJA obtained lower scores concerning fruit size, shape, color, pulp firmness, and pulp juiciness indices among the foreign cultivars. It should be mentioned that the lowest scores of fruit taste and flavor in foreign cultivars was observed in the CMBU/M29C cultivar. In Romanian cultivars, Amiral and Orizont cultivars registered the highest values in most sensory analysis parameters evaluated in this study.

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