

CONSUMER PREFERENCES FOR DRIED APPLES OF CULTIVAR FLORINA

KABADZHOVA, MONIKA¹,
DIMITROV, NIKOLAY²

Abstract

Regarding the World Health Organization's prescription to consume more fruits and vegetables to make people healthier, the article gives particular consideration to consumers' preferences about fruit consumption. In the study, apple fruits of the cultivar Florina were chosen. The type of fruits that respondents should rate in the study were dried. Four apple drying methods were used: in sun, in shade, in dehydrator, and in lyophilizer. The study found that freeze-dried apples are the most preferred, followed by those in a dehydrator and sun. These types were also rated highest in taste, while shade-dried fruits were rated negatively. According to the respondents, dried apples of the cultivar Florina can be consumed year-round; they are healthy and suitable for young children and diabetics and do not have added sweeteners. In addition, freeze-dried apples resemble fruit chips, they are crunchy and have a nice, unchanged color. Regarding consumers' willingness to purchase dried Florina apples, it was found that consumers are willing to pay the most for dried apples between BGN 1 and BGN 2. In contrast, the apples dried in a lyophilizer were rated higher over BGN 5. As a result of the study, it can be summarized that each consumer's taste is different. Also, each type of dried fruit has different consumer groups. The most preferred types include dried apples in a lyophilizer, dehydrator, and sun.

Key words: apple, drying methods, consumer behavior, willingness to pay

JEL: Q10, Q13

Introduction

Apples (*Malus domestica* Borkh.) are an essential part of a healthy human diet. They are a source of valuable nutrients such as carbohydrates, phenolic compounds, pectin, antioxidants, dietary fiber and minerals. Consumption of different varieties of apples contributes to improving human health by reducing the risk of cardiovascular diseases and cancer (Petkova et al., 2019).

China is the world's largest apple producer, with an annual production of 47573200t in 2022 (FAO Stat, 2022). The leading apple producers are Turkey, USA, Poland, India, Russia, Italy, Iran, France, and Chile. At the national level, apple production is 34933t, with 3562ha of harvested areas in 2023 (MZH, 2024). At the regional

¹ Chief Assistant, PhD, Agricultural Academy, Institute of Agriculture, Kyustendil, Bulgaria, e-mail: monika.kabadjova@gmail.com

² Assistant, Agricultural Academy, Institute of Cryobiology and Food Technologies, 1407, Sofia, Bulgaria

level, the South-Central Region (1370ha) has the most apple harvested areas and, accordingly, the largest amount of apple harvested production (11752t).

Consumer behavior as a part of human behavior is focused on the sphere of consumption, which is expressed in the consumer process of searching, buying, and using the goods (Atanasov, 2020). According to some authors (Naim, 2023), four factors determine consumer behaviour: personal, psychological, social, and cultural. Other authors (Pirvutoiu and Popescu, 2013) have also argued that socio-economic factors influence consumer behavior, and third authors (Zlatanova-Pazheva, 2024) have also argued that personal, situational, and technological factors also play a role.

Also, in some articles have studied consumers' perceptions of organic foods as factors related to a healthy lifestyle and good health (Vasileva et al., 2014). According to other authors, achieving a higher level of consumer understanding and beliefs through consumer awareness is important, which is a key factor in determining market behavior and developing the market for organic products (Dzhabarova, 2011). Prodanović et al. (2023) identified the factors influencing the behavior of Serbian consumers when buying apples by examining the frequency, the place of purchase and others. In the research was found that the most important factors influencing the decision to buy apples are taste, freshness, health impact, product quality and origin. In the study, some consumers prefer imported apples because of their better availability and appearance.

At the national level, consumers' attitudes towards purchasing Bulgarian and imported fruits and vegetables have been analyzed (Slavcheva, 2014). The research found that the leading factors in consumers' choice of fruits and vegetables are quality and price. However, the producers and convenience of shopping are also important for consumers. Also, consumers evaluate Bulgarian products as being of better quality than imported ones, but when the quality and price change, they tend to buy imported fruits and vegetables.

The study aims to evaluate consumers' preferences regarding consuming dried apple fruits of cultivar Florina. The research provides information on consumer behavior regarding consumers' preferences for consuming dried apples and their willingness to pay.

Methodological framework

The methodological part includes drying methods, questionnaires, analysis of consumer preferences, and recommendations based on the results.

In the study, the apple fruits were harvested from the experimental plantation at the Institute of Agriculture – Kyustendil in 2023. Before drying, the fruits were washed, cleaned, weighed and cut into slices 0.5-0.7 cm thick, which were not treated with

acid before drying. The drying methods – in sun, shade, and dehydrator were applied at the Institute of Agriculture – Kyustendil, and freeze-dried method was applied at the Institute of Cryobiology and Food Technologies – Sofia (Figure 1).

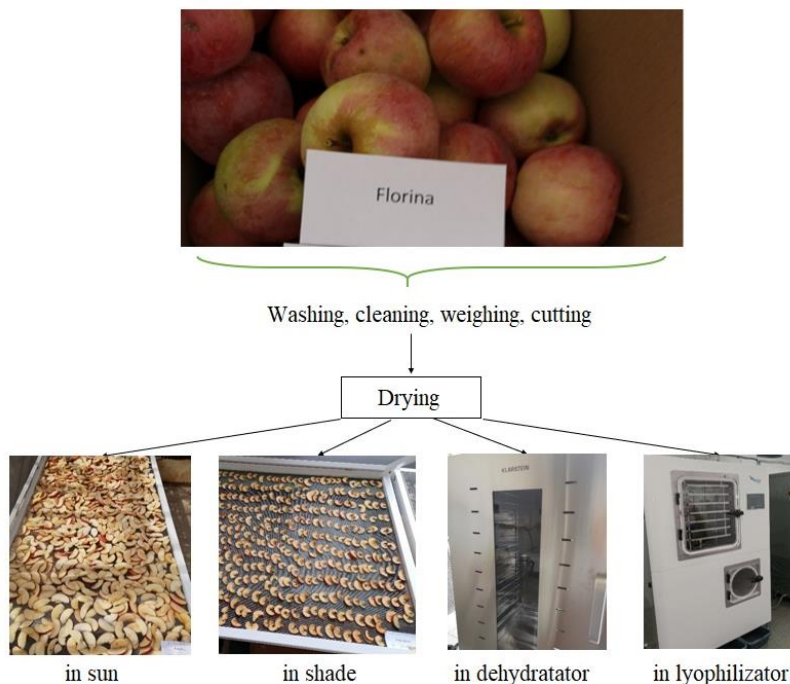


Figure 1. Preparation and drying methods

The sun-dried and shade-dried fruits were dehydrated at 13°C average daily temperature and 75% average air humidity during the studied period. The fruits dried in dehydrator “Klarstein Master Jerky 16” with a heat output of 1500 W were dried for 24 h per 1 kg at a temperature of 70°C. The fruits that were dried in the “Hochvakuum-TG – 16.50” lyophilizer were dried for three days per 1 kg under the following conditions: freezing of the native product at a temperature of –25°C, sublimation at –25/–35°C under deep vacuum, and heating under deep vacuum, at temperatures from +25°C to +35°C. The apples were washed, cleaned, weighed, and cut into 3 cm thick slices in this method.

The survey was conducted in 2024 in the South-West region of Bulgaria, including the districts of Blagoevgrad, Kyustendil, Pernik, Sofia, and Sofia-capital. face-to-face. The survey card was conducted face-to-face among consumers in each of the districts.

The main section of the questionnaire consists of six questions. Two of the questions ask about consumer preferences for consuming dried fruits, two assess the

visual and flavour characteristics of dried apples from the cultivar Florina, and two are aimed at consumers' willingness to pay for the purchase of different dried apples. Additionally, three questions are provided to identify the demographic features of each user.

The study included 215 participants, with 50.2% female and 49.8% male. The age categories 18 – 29 and 30 – 39 have the highest percentage of survey participants (36% and 35%, respectively), while those over 50 have the lowest percentage (8%).

Results and discussion

Regarding the questions in the main part of the survey, it was found that 67% of respondents consumed dried fruit, with apples being the most preferred, followed by plums, pears, apricots, raisins, and sweet cherries (Figure 2).

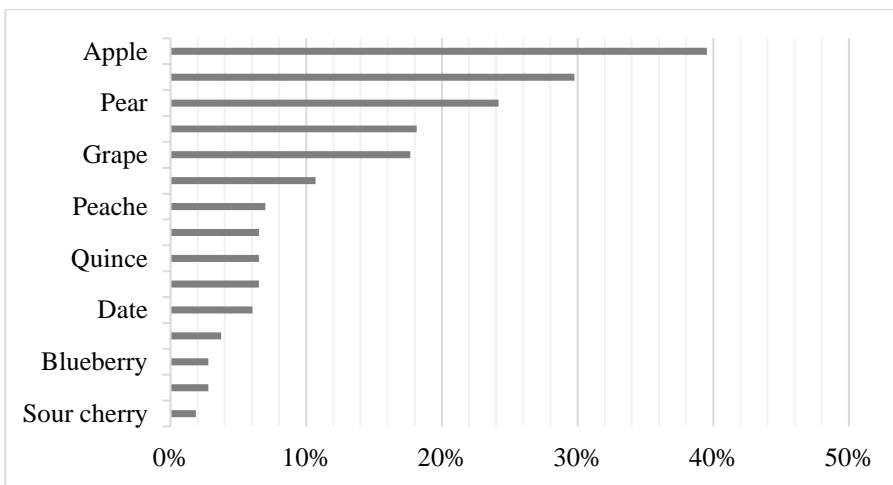


Figure 2. Fruit dried preferences

In the study, respondents rated the appearance of dried apples (Figure 3), with lyophilized apples being the most desired (79%), followed by those dried in dehydrator (56%), and those dried in sun (46%). The respondents did not rank shade-dried apples highly.

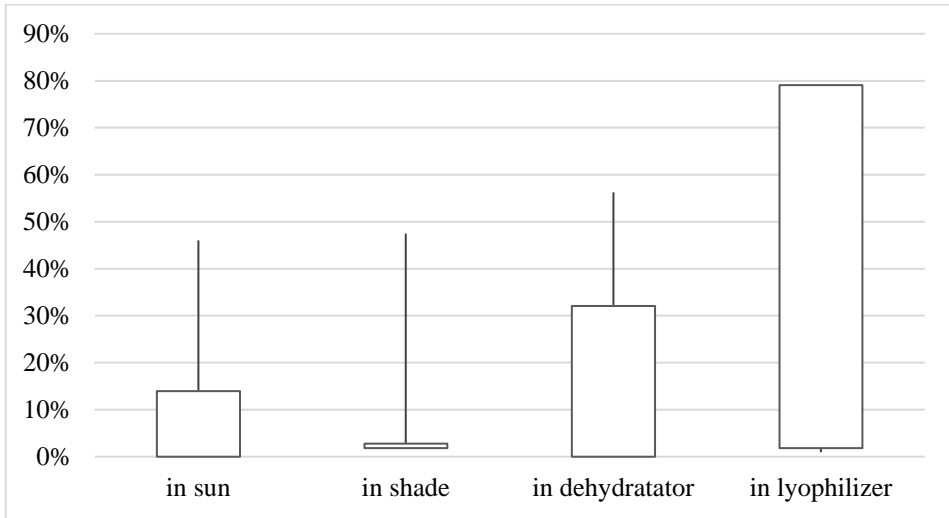


Figure 3. Degree of preference for appearance of the dried apple fruits Florina

In terms of flavour (Figure 4), consumers choose lyophilized apples (60%), followed by dehydrated apples (46%), and sun-dried apples (39%). The respondents assessed shade-dried apples as having the worst taste (41%).

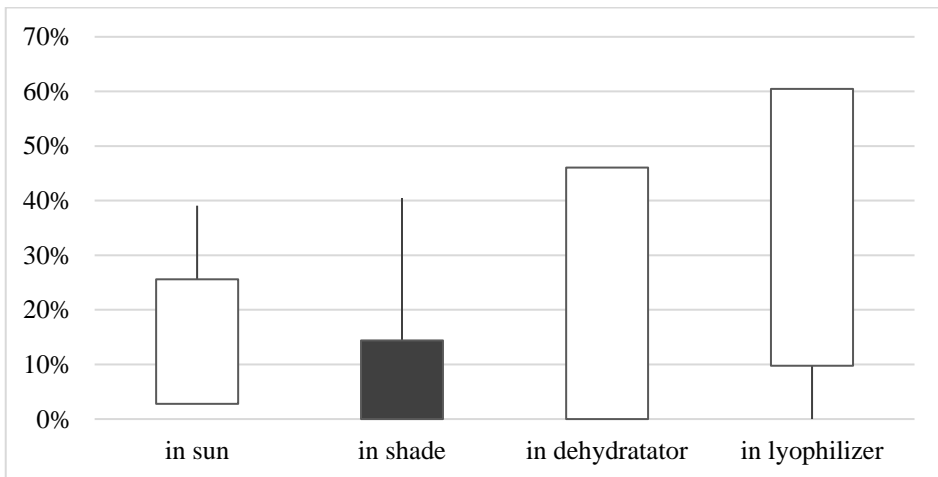


Figure 4. Degree of preference for flavor of the dried apple fruits Florina

Generally, consumers share that Florina dried apples are suitable for people with diabetes. In their opinion, each dried apple is different but well-liked. Also, the consumers' feedback is that dried apples can be eaten year-round.

Regarding freeze-dried apples, consumers share that they look like fruit chips, and they are more acidic than the other dried apples. Also, they are crunchy, have a nice, preserved color, taste, and shape, look natural, healthy, and suitable for small children without added enhancers and colorings, and retain their taste qualities. However, some consumers consider them dry and fake. Also, freeze-dried apples were defined as strange and even totally different products from other dried apple types. In addition, the respondents shared those freeze-dried apples should have a higher price, but they are not available by the retailers. Also, the freeze-dried apples can be used as fruit flour for various sweets in the food industry.

Regarding dehydrator-dried apples, consumers report that they are liked, tastier than sun-dried and shade-dried apples, suitable for eating, sweeter and softer than other types, and better preserved as dried apples that have passed through hot air. They are edible and can be eaten all year round. While other consumers share that they were drier and difficult to chew.

In terms of sun-dried apples, consumers share that they are also liked, they have normal sweetness, preserved organoleptic indicators, naturally dried, and soft texture. Another part of consumers says that they are tasteless than freeze-dried apples, lack sweetness, drier, and difficult to chew.

Consumers report that shade-dried apples are juicier than those dried in the sun but lack sweetness, darkened, difficult to chew, and tasteless.

Considering all comments in the study, it can be summarized that every consumer's taste is different. Dried apples in lyophilizer, in dehydrator and in sun can be singled out as more preferred.

Also, in the study was assessed consumers' willingness to pay a specific price for 100 g of dried Florina apples (Figure 5). It was found that a big share of consumers is willing to pay between BGN 1 and BGN 2 for dried apples in sun and shade (90%). For dehydrator-dried apples, consumers would pay between BGN 2 and BGN 5 (81%), a higher price than previous apple types. The study established that consumers most commonly would also pay the highest price from BGN 5 for freeze-dried apples (46%). In the study, it was established that consumers from Sofia-capital and Sofia-district are willing to pay a much higher price for freeze-dried apples than consumers in the other researched areas.

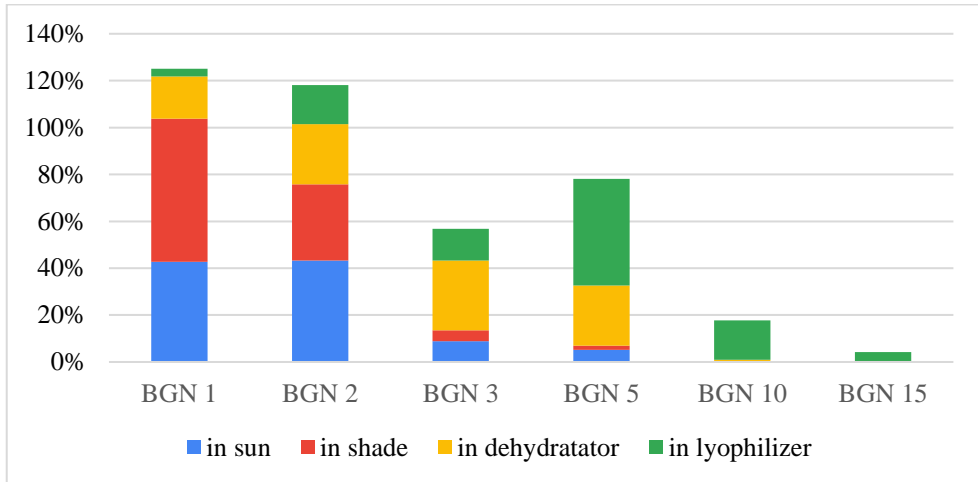


Figure 5. Consumer willingness to pay for different dried apple fruit Florina

In addition, a set of recommendations was made based on the results. In compliance with the World Health Organization's recommendations for a healthier lifestyle, consumers are encouraged to consume more fruits and vegetables. This is the reason that the study pays special attention to the preferences of end consumers regarding fruit consumption. As a result of the study, recommendations were made to consumers to consume fresher and dried fruits. As for dried fruits, they should be dried without added sugars to be natural and healthier. Also, different methods can be applied in drying, each of which has advantages. According to consumers, price was also a determining factor in their willingness to pay, with consumer attitudes proving to be a determining factor.

Conclusion

The study found that freeze-dried apples were most preferred, followed by those dried in dehydrator and sun. In terms of flavor, freeze-dried apples are also the most highly rated, followed by those dried in dehydrator and sun. The shade-dried fruits were evaluated negatively in terms of flavor.

The respondents liked the dried apples of the cultivar Florina. It was found that dried apples are generally suitable for people with diabetes and can be consumed all year round. Also, freeze-dried apples have been likened to fruit chips, which they are more acidic than other dried apples. Also, they are crunchy, have a nice and unaltered color. Advantages of all Florina dried apples are that they are healthy, suitable for young children, and have no added sweeteners.

Regarding consumers' willingness to purchase Florina dried apples, they were found to be willing to pay the best price between BGN 1 and BGN 2, while freeze-dried apples were assessed at a higher price of BGN 5.

According to the findings, each consumer's taste is unique, and there are distinct consumer groups for each kind of dried apple. However, dried apples made in lyophilizer, dehydrator, or sun can stand out as more preferred.

Acknowledgements

The article is written as a part of the research project “Study of quality parameters and economic efficiency of fruits and vegetables depending on drying methods”, funded by the National Science Fund of Bulgaria (BNSF), according to contract KII-06-M-66/4 – 15.12.2022.

References

- Atanasov, B. (2020) A study of consumer behavior in purchasing foodstuffs: a case study of Sofia, Bulgaria. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 20(4), 65 – 70.
- Dzhabarova, Y. (2011) The level of awareness – a driving factor in the consumer behavior on the Bulgarian organic market. *Agrarni Nauki*, 3(7), 101 – 105.
- Food and Agriculture Organization of the United Nations (2022) Crops and livestock products data, *FAO Global Statistical Yearbook*, <https://www.fao.org/faostat/en/#data/QCL>
- Ministerstvo na zemedeliето i hranite (2024) Proizvodstvo na plodove v Bulgaria – rekolta 2023. *Agro statistika*, byuletin № 438, 1 – 4.
- Naim, A. (2023) Consumer behavior in marketing patterns, types, segmentation. *European Journal of Economics, Finance and Business Development*, 1(1), 1 – 18.
- Petkova, N., Bileva, T., Valcheva, E., Dobrevska, G., Grozeva, N., Todorova, M., Popov, V., (2019) Bioactive compounds and antioxidant activity in apple fruits cultivar Florina. *Bulg. J. Agric. Sci.*, 25 (Supl. 3), 13 – 18.
- Pirvutoiu, I., Popescu, A. (2013) Research on consumer behavior in Bucharest poultry meat market. *Scientific Papers: Animal Science & Biotechnologies*, 46(1), 389 – 396.
- Prodanović, R., Dimitrijević, L., Ivanišević, D. (2023) Influencing factors on consumer behavior when purchasing apples. *Ekonomija-teorija i praksa*, 16(4), 82 – 99.
- Vasileva, E., Ivanova, D., Zabunov, G., Tipova, N., Stefanov, S. (2014) Consumers' Perceptions of Organic Foods in Bulgaria: Evidence from Semantic Differentials Application. *Building Organic Bridges*, 1, 89 – 92.
- Zlatanova-Pazheva, E. (2024) Model of consumer behavior when applying ai at every point of consumer contact. *International Journal of Engineering Technologies and Management Research*, 11(3), 1 – 16.