

Article

Native vs. Unique Fruit Popularity: Exploring the Sustainable Fruit Consumption in Poland—Research Report

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Abstract: As nutritional statistical data in Poland have provided very general information on this topic, the purpose of this online questionnaire survey was to investigate the trend of fruit consumption through the prism of consumers' awareness of the sustainability of fruit production (ecological cultivation and production—certified organic farming). Our research is based on a questionnaire prepared by the authors; it was supported by the desk research method. This study used descriptive analysis involving a summary of historical data and diagnostic analyses focusing on the causes of past events. Pivot tables created in Microsoft Excel, the chi-2 test, and content analysis were used in the analysis of the data. One of the main conclusions was that the aspect of sustainability was less significant than the convenience of purchasing fruits. The research also showed an imbalance in fruit consumption, which indicated the need to promote the positive aspects of fruit consumption, as well as the need to increase social education in terms of current knowledge about the beneficial aspects of a more balanced diet.

Keywords: fruit consumption; eating preferences; food market; harmonization; sustainable consumption



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1. Introduction

Eating plenty of fruit and vegetables every day is essential for maintaining a healthy diet. The World Health Organization suggests a minimum consumption of vegetables and fruit of 400 g per day, divided into five servings [1]. However, global fruit consumption per capita is less than half the minimum recommended consumption [2]. In addition, there is a decreasing tendency toward fruit consumption, both in terms of raw fruits and juices [3,4]. This tendency has also been observed among the youngest consumers (children) [5,6], youth and young adults (students) [7–9], and adults (professionally active people) [10,11]. With regard to children, it has been found that the younger they are, the lower their frequency of consuming processed fruit [6]. However, they prefer fruit juices (often sweetened) to raw fruit [12]. These trends are in opposition to the recommendations for healthy eating.

Research has highlighted the numerous benefits of consuming fruit-rich diets. These diets have been found to have a positive effect on cancer-induced mortality [13], improve mental well-being, reduce the risk of depressive symptoms [14], enhance digestive health [15], and promote the development of human bones and skin [16]. In addition, low consumption of fruit and vegetables has been identified as a major risk factor contributing to global mortality, causing cardiovascular diseases [17], strokes [18], cancer [19], and increased overall mortality [20,21]. Fruits play an important role in the prevention of civilization diseases [22]. The consumption of fruit seemed to be particularly important during the pandemic period (COVID-19), when it was crucial to maintain or even develop a good psychophysical condition and follow a diet rich in plant products that support the immune system (e.g., vitamin C, and natural antibiotics). The COVID-19 pandemic is associated with an ongoing sense of increased uncertainty and more stressful events. As a

result, eating convenience food (often processed, high in calories, and containing artificial sweeteners) is more justified (a reward, a moment of forgetfulness, etc.). All of the above is accompanied by so-called snacking or overeating, which results in an increased intake of carbohydrates [23]. Research conducted by Sidor and Rzymiski [24] in Poland showed that almost one-third of the respondents did not eat fruit at all but ate sweets at least once a day. This, along with limited physical activity due to the fear of infection, quarantine, or isolation, often results in weight gain. A diet low in fruit is a distinctive feature not only of physically inactive people but also of young adults, people with a low level of education, and smokers [25].

In terms of the disadvantages of eating fruit, studies mainly highlight oral health. According to some researchers, the higher the consumption of fruit, the greater the risk of cavities and the development of tooth decay [26]. However, the majority of studies refer mainly to the positive impact of fruit on the human psychophysical condition and stress the significance of developing appropriate eating habits in children. This habit may reduce chronic diseases in the future [12].

The latest research studies have emphasized that today's consumption habits and more active lifestyles determine the psychophysical condition not only of those who live today but also of those who will live in the future. This also includes preventing malnutrition and chronic diseases [7], such as being overweight and obese. Fruits can easily substitute high-energy foods, affecting the balance between energy consumption and expenditure [27]. Moreover, the economic aspect of a sustainable diet may also be significant as eating a diet low in fruit consequently increases expenditure on the health care system [3].

Nowadays, activities oriented toward sustainable development focus mainly on technological innovations and initiatives that transform the behaviour of individual consumers [28], enforcing sustainable consumption. Sustainable consumption is also one of the seventeen headline goals of sustainable development (Goal 12: responsible production and consumption). This goal concerns primarily the following aspects:

- Consumption of goods and services that meet basic needs and provide a better quality of life;
- Reducing the use of natural resources, toxic materials, waste emissions, and pollutants;
- Making it possible to meet the needs of future generations [29].

Sustainable consumption is particularly important due to the ongoing development of the consumer society.

The sustainability particularly related to fruit consumption may be investigated indirectly and directly. The indirect aspect may be seen as a consequence of the growing, processing, and distribution of fruit being linked to the side effect of producing greenhouse gases [30] and may be concerned with avoiding food-borne diseases—the so-called microbiological, chemical, and physical food safety [31,32]. The direct aspect is related to the protection and preservation of biodiversity in the natural environment, expanding and maintaining the workforce involved in the production of fruit in long-term scenarios, the impact on the health of the present and future generations reflected in the development of products corresponding to a balanced diet [30], and avoiding food waste. Especially freshly cut fruits are prone to losing their nutritional value (oxidation) and becoming waste [32]. In addition, about one-third of all produced food has been wasted or lost, especially in developed countries. Fruit can also be considered waste due to the fact that not all fruit meet the requirements of international trade regulations or the requirements of consumers in terms of their perception, i.e., size, weight, or shape [33].

Poland belongs to the group of countries that are leaders in fruit production in Europe [34]. However, despite the above, a wide range of fruit preserves, and the development of the fruit-import sector, fruit consumption in Poland is still considered insufficient and season-dependent [35]. The consumption of fruit and processed fruit products in Polish households (excluding mass-catering establishments) in the years ranging from 1996 to 2000, on average, came to 46.7 kg per person; in the years ranging from 2000 to 2005, the average was 47.5 kg/person [36]. In the years ranging from 2000 to 2019, a decrease in

fruit consumption was reported in Poland. In 2000, the average person consumed 4.10 kg of fruit; meanwhile, in 2019, on average, 3.79 kg of fruit was consumed per person per year. The highest average annual consumption was recorded in the Pomerania province (4.2 kg per person) and the lowest was recorded in the Lublin province (3.4 kg/person). According to the data reported by the Central Statistical Office (GUS) [37], the inhabitants of Polish rural areas reached for fruit more often than the inhabitants of cities. Moreover, the higher the consumers' education, the greater the consumption of fruit. On average, in Polish households, PLN 21.54 (USD 5.50) was spent on fruit per person monthly, including PLN 6.60 (USD 1.60) on citrus fruit and bananas; PLN 11 (USD 2.70) on other fresh fruit; and PLN 3.90 (USD 1) on dried and frozen fruit, nuts, and fruit preserves [38].

Studies have shown that Polish fruit production seems to be relatively well-explored and -discussed. Research studies have highlighted the development of the production of native species, such as apples, plums, pears, raspberries, and strawberries. The unpredictability of the selling prices of selected types of fruit has also been discussed [39]. On the other hand, fruit production in Poland has been considered fragmented, with a poor technological base and narrow marketing [40]. Nevertheless, Polish producers of apples, blackcurrants, strawberries [41], and highbush blueberries [42] adapted particularly well to the expectations of the EU market. However, fruit consumption in Poland, especially in the context of sustainable development, seems to be much less explored. An unfavourable upward tendency in the consumption of processed fruit has become evident, as well as a decline in the consumption of fresh fruit, the replacement of domestic fruit (seasonal and local) with imported species (especially exotic fruit, such as bananas and citrus [43]), and consumer choices enhancing short-term rather than long-term benefits [30].

Due to all of the above, the main purpose of this research was to determine the preferences of Polish consumers and their fruit purchasing and consumption habits based on the conducted research survey. An essential part of the research was the analysis of the respondents' awareness of ecological cultivation, the production of fruit, and, more specifically, certified organic farming. This information seems to be crucial in developing a policy that reduces food waste, as well as developing behaviours which enforce sustainable consumption, which is aimed at satisfying the needs of present and future generations in terms of their health and quality of life.

2. Materials and Methods

This research was based on a questionnaire prepared by the authors. The compacted version of the survey is presented in the Supplementary Materials section in Table S1. It was conducted between February and November of 2017 via the Interankiety.pl website. Additional characteristics of the conducted study included using:

- Non-probability sampling;
- Exponential non-discriminative snowball sampling [44];
- Virtual sampling (digital form);
- Scientific networks (for example ResearchGate or LinkedIn) for sharing the link to the survey;
- Social networks (for example Meta) for sharing the link to the survey.

The following types of fruit were analysed in this study (Table 1): gooseberry, pineapple, watermelon, chokeberry, avocado, banana, peach, lemon, cherry, hawthorn, pomegranate, grapefruit, pear, apple, blackberry, kiwi, berry/blueberry (berry, whortleberry, blueberry, etc.), raspberry, tangerine, mango, apricot, nectarine, nuts (walnut, peanut, cashew, hazelnut, pistachio, etc.), papaya, orange, currant (black, red), wild strawberry, rosehip, plum (Hungarian Mirabelle, etc.), strawberries, grapes (white, light, dark, raisin, wine, etc.), and cherries. The survey took into account the seasonality of certain types of fruit (e.g., strawberries, blueberries) and if, despite their seasonality, they are also consumed frozen in the off-season (e.g., berries).

Table 1. Description of the fruits investigated in this study.

No.	Common Name	Botanical Name	No.	Common Name	Botanical Name
1.	Ananas	<i>Ananas comosus</i>	17.	Lemon	<i>Citrus limon</i>
2.	Apple	<i>Malus domestica</i>	18.	Mango	<i>Mangifera indica</i>
3.	Apricot	<i>Prunus armeniaca</i>	19.	Nectarine	<i>Prunus persica</i> var. <i>nucipersica</i>
4.	Avocado	<i>Persea americana</i>	20.	Orange	<i>Citrus × sinensis</i>
5.	Banana	<i>Musa × paradisiaca</i>	21.	Papaya	<i>Carica papaya</i>
6.	Blackberry	<i>Rubus fruticosus</i>	22.	Peach	<i>Prunus persica</i>
7.	Black currant	<i>Ribes nigrum</i>	23.	Pear	<i>Pyrus communis</i>
8.	Bluberry	<i>Vaccinium myrtillus</i>	24.	Plum	<i>Prunus domestica</i>
9.	Cherry	<i>Prunus cerasus</i>	25.	Raspberry	<i>Rubus idaeus</i>
10.	Chokeberry	<i>Aronia melanocarpa</i>	26.	Red currant	<i>Ribes rubrum</i>
11.	Gean	<i>Prunus avium</i>	27.	Rosehip	<i>Rosa canina</i>
12.	Gooseberry	<i>Ribes uva-crispa</i>	28.	Strawberry	<i>Fragaria × ananassa</i> Duchesne
13.	Grapefruit	<i>Citrus × paradisi</i>	29.	Tangerine	<i>Citrus reticulata</i>
14.	Grapes	<i>Vitis vinifera</i>	30.	Walnut	<i>Juglans regia</i>
15.	Hawthorn	<i>Crataegus oxyacantha</i>	31.	Watermelon	<i>Citrullus lanatus</i>
16.	Kiwi	<i>Actinidia</i>	32.	Wild strawberry	<i>Fragaria vesca</i>

This survey revealed that the definition of fruit was ambiguous not only due to the difficulties of qualifying a certain plant to a group of vegetables or fruit but also due to the different names used in various regions of Poland. To be precise, despite the popular botanical definition of fruit, defined as a product of flower and inflorescence in a state of (potential) seed maturity, according to Scientific Publishers PWN, in this study, fruit has been defined as a human-edible part of a plant, most often fleshy and sweet or sweet and sour, which may or may not contain seeds [45]. When preparing the questionnaire, the authors considered these issues so that the answers provided were as clear and unambiguous as possible.

The survey questionnaire consisted of 78 questions divided into 3 thematic parts. The first part was general. The respondents were asked about the places one could buy fruit (possible answers: ‘marketplace’, ‘greengrocer’s’, ‘supermarket’, ‘local store’, ‘I grow it myself’, ‘health food store’, ‘not applicable’, ‘I refuse to answer’); whether the respondent buys fruit from certified organic farming producers (possible answers: ‘always’, ‘almost always’, ‘often’, ‘rarely’, ‘almost never’, ‘never’, ‘I do not know’); and for what reasons they do so (possible answers: ‘they are better than traditional’, ‘they are healthier than traditional’, ‘I can afford it’, ‘this is popular’, ‘I want to eat healthy’, ‘not applicable’) or not (possible answers: ‘they are too expensive’, ‘they are no better than traditional ones’, ‘they are not healthier than traditional ones’, ‘it does not matter to me’, ‘I am not sure what the eco-friendliness is’, ‘not available in my place of residence’, ‘I do not see any difference in comparison to traditional fruit’, ‘not applicable’). If none of the proposed answers were adequate, the respondent could choose the ‘other’ option and provide his/her own answer.

In the second part of the questionnaire, detailed questions were asked about the frequency of fruit consumption (possible answers: ‘more than 3 times a day’, ‘3 times a day’, ‘twice a day’, ‘once a day’, ‘6 times a week’, ‘5 times a week’, ‘4 times a week’, ‘3 times a week’, ‘twice a week’, ‘once a week’, ‘I do not eat at all’). Questions were also asked about the portions of the one-time consumption of each type of fruit. The proposed answers specified either the weight of the portion (possible answers: ‘200 g’, ‘300 g’, ‘400 g’, ‘500 g’, ‘750 g’, ‘1 kg’, ‘1.5 kg’, ‘2 kg’) or more descriptive units (possible answers: ‘1/2 glass’, ‘1 glass’, ‘1–2 slices’, ‘3–4 slices’, ‘a few slices’, ‘1–2 particles’, ‘3–4 particles’, ‘1/4 piece’, ‘1/3 piece’, ‘1/2 piece’, ‘2/3 piece’, ‘3/4 piece’, ‘1 piece’, ‘2 pieces’, ‘3 pieces’, ‘4 pieces’, ‘5 pieces’, ‘1 handful’, ‘2 handfuls’, ‘small bunch’, ‘large bunch’). Also, in this section, if none of the proposed answers were appropriate, the respondent could choose another option and provide his/her own answer.

Part three of the survey included the respondents’ personal information. The participants were asked about:

- Gender;
- Age;
- Educational level;
- Marital status;
- Region and area of residence;
- Number of people in the household;
- Indicative net income.

Details regarding the possible answers to particular questions of the socio-demographic part of the survey are presented along with the results in Table 2.

Table 2. Demographic background of respondents.

	Demographic Factor	Frequency (n = 74)	Percentage (%)
Gender	Male	19	26
	Female	55	74
	Prefer not to answer	0	0
Age	18–20 years	3	2
	21–30 years	16	22
	31–40 years	26	35
	41–50 years	11	15
	51–60 years	5	7
	61–70 years	7	9
	Over 70 years	5	7
	Refusal to answer	1	1
Educational level	Secondary education	5	7
	Secondary vocational	3	4
	Post-secondary	7	10
	Higher vocational	3	4
	Bachelor degree	4	5
	Master degree	49	67
	Refusal to answer	3	2
Marital status	Single	24	32
	Married /in relation	41	55
	Separation/after divorce	2	3
	Widowed	4	5
	Refusal to answer	3	2
Region of Poland (voivodeship/province)	Dolnośląskie	12	16
	Kujawsko-pomorskie	1	1
	Łódzkie	2	3
	Małopolskie	25	34
	Mazowieckie	4	5
	Opolskie	17	23
	Podkarpackie	2	3
	Pomorskie	1	1
	Śląskie	4	5
	Warmińsko-Mazurskie	1	1
	Wielkopolskie	3	4
	Zachodniopomorskie	1	1
	Refusal to answer	1	1

Table 2. *Cont.*

	Demographic Factor	Frequency (n = 74)	Percentage (%)
Area of residence, number of inhabitants	Countryside agricultural area	8	11
	City, up to 20,000	1	1
	City, 21,000–100,000	8	11
	City, 101,000–250,000	14	19
	City, 251,000–500,000	5	7
	City, 501,000–750,000	7	9
	City, 751,000–1,000,000	19	26
	City, over 1,000,000	9	12
	Refusal to answer	3	4
Number of people in the household	1	12	9
	2	30	41
	3	13	18
	4	11	15
	5	5	7
	6	1	1
	7	1	1
	Refusal to answer	1	1
Indicative net income in PLN [in USD]	Up to PLN 1000 [USD 251.5]	4	5
	PLN 1001–3000 [USD 251.7–754.5]	33	45
	PLN 3001–5000 [USD 754.8–1257.6]	12	16
	PLN 5001–7000 [USD 1257.8–1760.6]	11	15
	PLN 7001–9000 [USD 1760.8–2263.6]	1	1
	Over PLN 9000 [USD 2263.6]	2	3
	Refusal to answer	11	15

Only fully completed questionnaires were processed for further investigation. A graphical representation of the obtained questionnaires divided by region of residence and place of purchased fruits is shown in Figure 1.

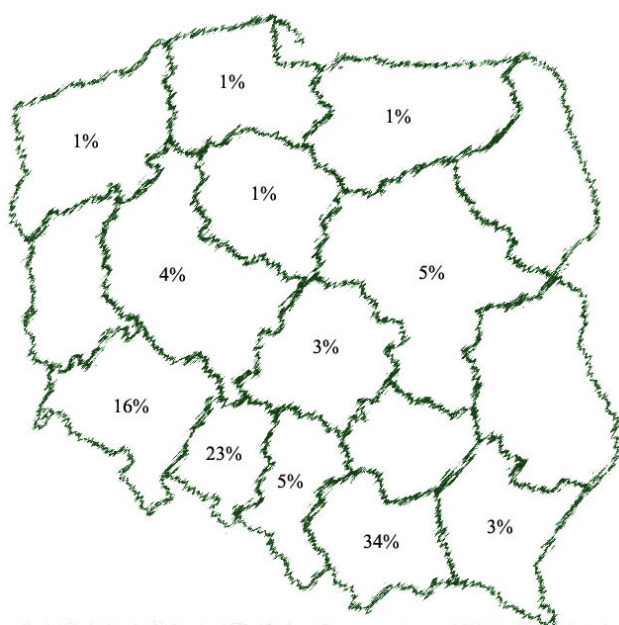


Figure 1. Percentage of the respondents according to their place of residence and area of purchased fruit; values are rounded, 1%—refusal to answer.

Therefore, only questionnaires that provided answers to all questions in all three parts of the survey (“other” or “refuse to answer” were also rated as an answer) were considered valid. Since our survey was detailed and respondents might have considered it tedious, from the total number of 108 surveys, in further investigations, we considered 74 complete (all questions were answered) questionnaires. The questionnaires were completed by adults who come from and live in Poland. Respondents also declared consuming fruits and acting as the main person supplying their households with food products. The following hypotheses, H0 and H1 (alternative to H0), were adopted:

H0. *Reasons for buying and not buying organic fruit, as well as the frequency of fruit buying from certified organic farming producers, does not depend on sociodemographic characteristics.*

H1. *Reasons for buying and not buying organic fruit, as well as the frequency of fruit buying from certified organic farming producers, depends on socio-demographic characteristics.*

The chi-2 test was used to obtain p -values. Calculated p -values > 0.05 confirmed the validity of the null hypothesis (H0); meanwhile, p -values < 0.05 confirmed the validity of the alternative hypothesis (H1).

3. Results

3.1. Research Group Characteristics

A total of 74 complete questionnaires were qualified for further analysis; they were filled in by people who make decisions about the consumed food products. Nearly three-quarters of the respondents (74%) were women. The respondents were between the ages of 17 and 71 years. In terms of age, the most numerous groups of respondents were between 31 and 40 years old (35%), followed by those aged between 21 and 30 years (22%), and those between 41 and 50 years old (15%). More than three-quarters of the respondents had a higher level of education (76%) and 67% had completed master’s studies. Over half of the respondents were married (55% of responses) and 42% were single. All respondents came from Poland; however, the largest number of participants came from the following provinces: Małopolskie (33.8%), Opolskie (23%), and Dolnośląskie (16.2%). The respondents lived in densely populated areas: cities with a number of inhabitants ranging from 751,000 up to 100,000 (26%), cities with 101,000 up to 250,000 inhabitants (19%), cities with over 1 million inhabitants (12%), and towns with 21,000 up to 100,000 inhabitants (11%). The respondents most often declared that their households consisted of one to four people (two people in the household: 41%, three people: 18%, one person: 16%, and four people: 15%). The net income declared by the respondents, per person in a household, ranged between PLN 1000 (USD 271.2) and PLN 7000 (USD 1899): PLN 1001–3000 (USD 271.5–813.7) 45%, PLN 3001–5000 (USD 814–1356) 16%, and PLN 5001–7000 (USD 1355.6–1897.5) 15%.

3.2. Fruits Supply Sources Characterisation

The results of the research showed that the respondents usually bought fruit in a supermarket (66%), at a greengrocer’s (62%), at a marketplace (50%), and at a local store (45%). The majority of men chose a supermarket (68%), a local store (63%), a greengrocer’s (47%), or a marketplace (32%). Most often, women bought fruit at a greengrocer’s (67%), in a supermarket (65%), at a marketplace (56%), and in a local store (38%). The majority of single people (unmarried and bachelors) chose a supermarket (71%), a greengrocer’s, and a local store (58% each). On the other hand, those in a relationship (i.e., married people and people staying in cohabitation) most often purchased fruit at a greengrocer’s and in a supermarket (71% each). More than one in five respondents grew fruit on their own and every one in ten bought fruits in health food stores. The participants rarely (39%) bought fruit from certified organic farming producers, i.e., that use organic agricultural production methods and are controlled by the certification body [38] (p. 397). Detailed results are presented in Figures 2 and 3.

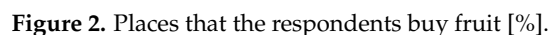


Table 3. The frequency of fruit-buying from certified organic farming producers in relation to gender; ?—not declared.

Table 4. The frequency of fruit-buying from certified organic farming producers in relation to age; ?—not declared.

	Observed									Expected									
Age	13-16	17-19	20-30	31-40	41-50	51-60	61-70	>71	?	13-16	17-19	20-30	31-40	41-50	51-60	61-70	>71	?	p-Value
Almost always	0	0	0	0	0	0	0	1	0	0.0	0.0	0.2	0.4	0.1	0.1	0.1	0.1	0.0	
Often	0	0	0	1	2	0	3	0	1	0.1	0.2	1.5	2.5	1.0	0.5	0.7	0.5	0.1	
Rarely	0	1	5	13	5	1	4	0	0	0.4	0.8	6.3	10.2	4.3	2.0	2.7	2.0	0.4	
Almost never	1	0	4	5	0	2	0	2	0	0.2	0.4	3.0	4.9	2.1	0.9	1.3	0.9	0.2	
Never	0	0	4	4	3	2	0	1	0	0.2	0.4	3.0	4.9	2.1	0.9	1.3	0.9	0.2	
?	0	1	3	3	1	0	0	1	0	0.1	0.2	1.9	3.2	1.3	0.6	0.9	0.6	0.1	0.0245 H1

Table 5. The frequency of fruit-buying from certified organic farming producers in relation to educational level; ?—not declared.

Education Level *	?	Observed						?	Expected						<i>p</i> -Value
		1	2	3	4	5	6		1	2	3	4	5	6	
Almost always	0	0	0	0	0	0	1	0.04	0.07	0.04	0.09	0.04	0.05	0.66	0.0413 H1
Often	0	2	0	1	1	0	3	0.28	0.47	0.28	0.66	0.28	0.38	4.64	
Rarely	0	1	1	3	2	2	18	1.09	1.82	1.09	2.55	1.09	1.46	17.88	
Almost never	0	0	0	0	0	0	13	0.53	0.88	0.53	1.23	0.53	0.70	8.61	
Never	0	0	0	2	0	1	11	0.57	0.95	0.57	1.32	0.57	0.76	9.27	
?	3	2	2	1	0	1	3	0.49	0.81	0.49	1.14	0.49	0.65	7.95	
Decision															

* 1—Secondary education, 2—Secondary vocational, 3—Post-secondary, 4—Higher vocational, 5—Bachelor's degree, 6—Master's degree.

Table 6. The frequency of fruit-buying from certified organic farming producers in relation to marital status; ?—not declared.

Observed												Expected				
Marital Status	Single	Married/in Relation	Separation/after Divorce	Widowed	?	Single	Married/in Relation	Separation/after Divorce	Widowed	?	<i>p</i> -Value					
Almost always	0	0	0	1	0	0.3	0.6	0.0	0.1	0.0	0.0347 H1					
Often	2	4	0	1	0	2.3	3.9	0.2	0.4	0.3						
Rarely	7	19	0	1	3	9.7	16.6	0.8	1.6	1.2						
Almost never	5	8	0	0	0	4.2	7.2	0.4	0.7	0.5						
Never	5	7	1	1	0	4.5	7.8	0.4	0.8	0.6						
?	5	3	1	0	0	2.9	5.0	0.2	0.5	0.4						
Decision																

Table 7. The frequency of fruit-buying from certified organic farming producers in relation to region of residence; ?—not declared.

	Observed														Expected														
Region of Residence *	1	2	3	4	5	6	7	8	9	10	11	12	?	1	2	3	4	5	6	7	8	9	10	11	12	?	p-Value		
Almost always	0	0	0	1	0	0	0	0	0	0	0	0	0	0.16	0.01	0.03	0.34	0.05	0.23	0.03	0.01	0.05	0.01	0.04	0.01	0.01	0.7864 H0		
Often	0	0	0	2	1	3	0	0	0	0	0	0	1	1.14	0.09	0.19	2.36	0.38	1.61	0.19	0.09	0.38	0.09	0.28	0.09	0.09			
Rarely	6	0	2	10	2	4	1	0	1	1	2	0	0	4.70	0.39	0.78	9.80	1.57	6.66	0.78	0.39	1.57	0.39	1.18	0.39	0.39			
Almost never	2	1	0	2	0	5	1	0	1	0	1	1	0	2.27	0.19	0.38	4.73	0.76	3.22	0.38	0.19	0.76	0.19	0.57	0.19	0.19			
Never	3	0	0	5	0	4	0	0	2	0	0	0	0	2.27	0.19	0.38	4.73	0.76	3.22	0.38	0.19	0.76	0.19	0.57	0.19	0.19			
?	1	0	0	5	1	1	0	1	0	0	0	0	0	1.46	0.12	0.24	3.04	0.49	2.07	0.24	0.12	0.49	0.12	0.36	0.12	0.12			
Decision																													

* 1—Dolnośląskie, 2—Kujawsko-pomorskie, 3—Łódzkie, 4—Małopolskie, 5—Mazowieckie, 6—Opolskie, 7—Podkarpackie, 8—Pomorskie, 9—Śląskie, 10—Warmińsko-Mazurskie, 11—Wielkopolskie, 12—Zachodniopomorskie.

Table 8. The frequency of fruit-buying from certified organic farming producers in relation to area of residence; ?—not declared.

Area of Residence *	Observed									Expected									<i>p</i> -Value
	1	2	3	4	5	6	7	8	?	1	2	3	4	5	6	7	8	?	
Almost always	0	0	0	0	0	0	1	0	0	0.11	0.01	0.11	0.19	0.07	0.09	0.26	0.12	0.04	0.6446 H0
Often	0	0	2	2	0	0	3	0	0	0.76	0.09	0.76	1.32	0.47	0.66	1.80	0.85	0.28	
Rarely	5	1	3	4	1	1	7	5	2	3.14	0.39	3.14	5.49	1.96	2.74	7.45	3.53	1.18	
Almost never	2	0	1	4	3	0	3	1	0	1.51	0.19	1.51	2.65	0.95	1.32	3.59	1.70	0.57	
Never	1	0	2	3	1	3	2	2	0	1.51	0.19	1.51	2.65	0.95	1.32	3.59	1.70	0.57	
?	0	0	0	1	0	3	3	1	1	0.97	0.12	0.97	1.70	0.61	0.85	2.31	1.09	0.36	
Decision																			

* 1—Countryside agricultural, 2—City, up to 20,000, 3—City, 21,000–100,000, 4—City, 101,000–250,000, 5—City, 251,000–500,000, 6—City, 501,000–750,000, 7—City, 751,000–1,000,000, 8—City, over 1,000,000.

Table 9. The frequency of fruit-buying from certified organic farming producers in relation to the number of people in the household; ?—not declared.

	Observed									Expected								
Number of People in the Household	1	2	3	4	5	6	7	?	1	2	3	4	5	6	7	?	p- Value	
Almost always	1	0	0	0	0	0	0	0	0.18	0.43	0.22	0.20	0.14	0.09	0.11	0.01	0.5250 H0	
Often	3	2	1	1	0	0	0	0	1.23	3.03	1.51	1.42	0.95	0.66	0.76	0.09		
Rarely	2	10	5	7	3	0	1	1	5.09	12.54	6.27	5.88	3.92	2.74	3.14	0.39		
Almost never	2	7	3	1	0	1	0	0	2.46	6.05	3.03	2.84	1.89	1.32	1.51	0.19		
Never	2	8	3	0	1	0	0	0	2.46	6.05	3.03	2.84	1.89	1.32	1.51	0.19		
?	2	3	1	2	1	0	0	0	1.58	3.89	1.95	1.82	1.22	0.85	0.97	0.12		
Decision																		

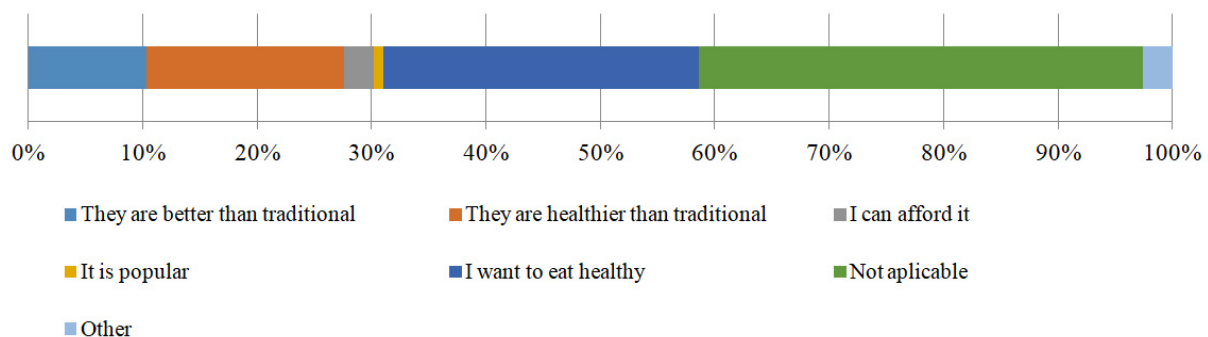
Table 10. The frequency of fruit-buying from certified organic farming producers in relation to net income; ?—not declared.

Observed								Expected								p-Value
Net Income *	1	2	3	4	5	6	?	1	2	3	4	5	6	?		
Almost always	0	1	0	0	0	0	0	0.05	0.45	0.16	0.15	0.01	0.03	0.15	0.6269 H0	
Often	0	2	1	3	0	1	0	0.38	3.12	1.14	1.04	0.09	0.19	1.04		
Rarely	2	12	4	4	0	1	6	1.57	12.93	4.70	4.31	0.39	0.78	4.31		
Almost never	0	7	3	3	0	0	1	0.76	6.24	2.27	2.08	0.19	0.38	2.08		
Never	2	6	3	1	0	0	2	0.76	6.24	2.27	2.08	0.19	0.38	2.08		
?	0	5	1	0	1	0	2	0.49	4.01	1.46	1.34	0.12	0.24	1.34		
Decision																

* 1—Up to PLN 1000 [USD 251.5], 2—PLN 1001–3000 [USD 251.7–754.5], 3—PLN 3001–5000 [USD 754.8–1257.6], 4—PLN 5001–7000 [USD 1257.8–1760.6], 5—PLN 7001–9000 [USD 1760.8–2263.6], 6—Over PLN 9000 [USD 2263.6].

For the features of gender, region and area of residence, number of people in the household, and net income, the *p*-value was always greater than 0.05, supporting the null hypothesis describing that none of these characteristics had an effect on the frequency of fruit-buying from certified organic farming producers. The other characteristics of age, education level, and marital status have a *p*-value that is lower than 0.05, which confirms the H1 hypothesis. They influence the decisions of purchasing fruit from organic farms.

People who bought organic fruit justified their choice by the willingness to eat (32% of responses), the belief that organic fruits are healthier than traditional ones (20%), and the belief that they are better than traditional ones (13%) (Figure 4). Women referred to the willingness to eat healthy (38%) and argued that ‘eco’ products are healthier than traditional ones (24%). Men pointed to the higher quality of organic food in comparison to traditional food (21%) and the willingness to eat healthily (16%).

**Figure 4.** Reasons for buying organic fruit [%], according to the respondents.

Respondents who did not buy organic fruit pointed to the inability to purchase organic fruit in their place of residence (31%), the high price (26%), a lack of certainty as to what exactly ‘green’ is (23%), not noticing the difference between organic and non-organic products (12%), and not paying attention to this issue (11%) (Figure 5) as their reasons.

Women most often described organic fruit as too expensive (31%) and argued that organic fruit is not available in their place of residence (33%). In turn, men were uncertain about what ‘eco-friendly’ means (32%) and, similarly to women, noted the inability to buy organic fruit in their place of residence (26%). When shopping for fruit, single people primarily paid attention to price (42%) and did not notice the difference between organic and non-organic products (21% of responses against 7% of the responses of those who were married/in a relationship). On the other hand, people who were in relationships, more often than single people, indicated the inability to buy organic products in their place of residence (37% and 21% of responses, respectively) and did not know what the so-called ‘green’ label meant (29% and 13%, respectively).

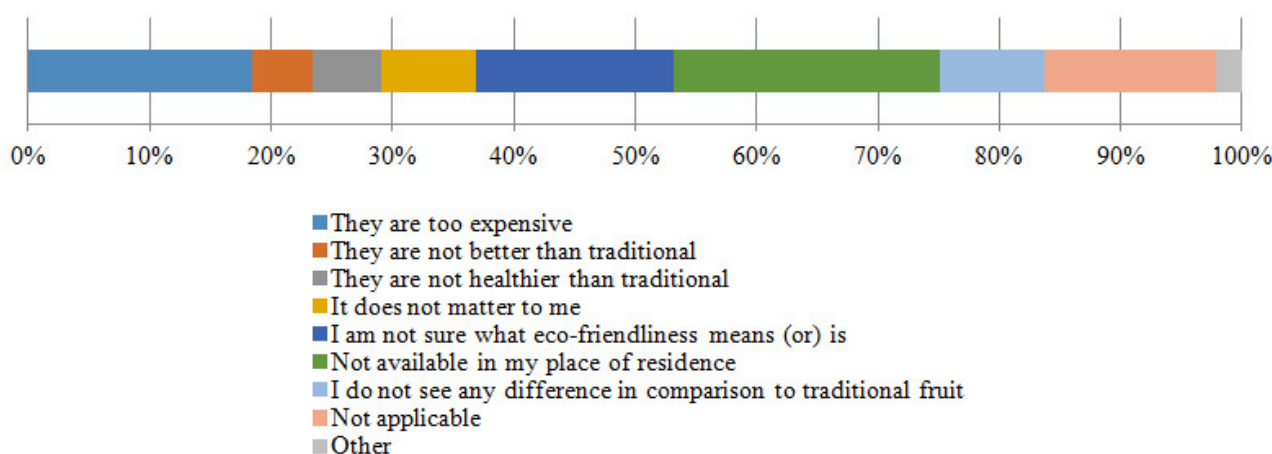


Figure 5. Reasons for not buying organic fruit [%], according to the respondents.

3.3. The Characteristics of Fruit Consumption Trends

The results of the survey showed that the fruits eaten most rarely by the respondents were hawthorns, wild rosehips, chokeberries, gooseberries, red currants, cherries, wild strawberries, and blackberries. Gooseberries, chokeberries, peaches, black currants, rosehips, hawthorns, blueberries, blackberries, wild strawberries, plums, and cherries were eaten no more than once a week. In terms of the fruits consumed every day, the respondents indicated mainly apples (26%) and strawberries (18%). Raspberries and cherries were consumed the most often, i.e., three times a week (19% each). During the season (the period of ripening and harvesting), fruits, such as gooseberries, chokeberries, black and red currants, rosehips, hawthorns, blueberries, blackberries, wild strawberries, and nuts were usually consumed in the amount of half a glass at one time. Cherries, raspberries, and strawberries were eaten in the amount of one glass. The amount of a one-time portion of grapes was defined as one small bunch. Larger fruits, such as peaches, pears, and apples, were most often eaten in the amount of one piece. In turn, apricots were eaten in two or three pieces and plums were eaten in six pieces.

In terms of exotic fruits, the least-frequently eaten were papayas, mangos, avocados, grapefruits, and pineapples. Most respondents ate bananas twice a week. Watermelon and nectarines were consumed once a week. Regularly (several times a month), participants ate lemons, oranges, and avocados. Kiwis, grapefruits, and tangerines were consumed irregularly, a dozen times a month. Pineapples, mangos, and papayas were also consumed several times a year. The respondents consumed four tangerines at one time. Kiwis and nectarines were consumed two at a time. Bananas, mangos, and oranges were consumed one at a time. Avocados, grapefruits, and papayas were consumed in half portions at each time. The participants ate three slices of a pineapple and two slices of a lemon at one time. Details are shown in Figures 6 and 7.

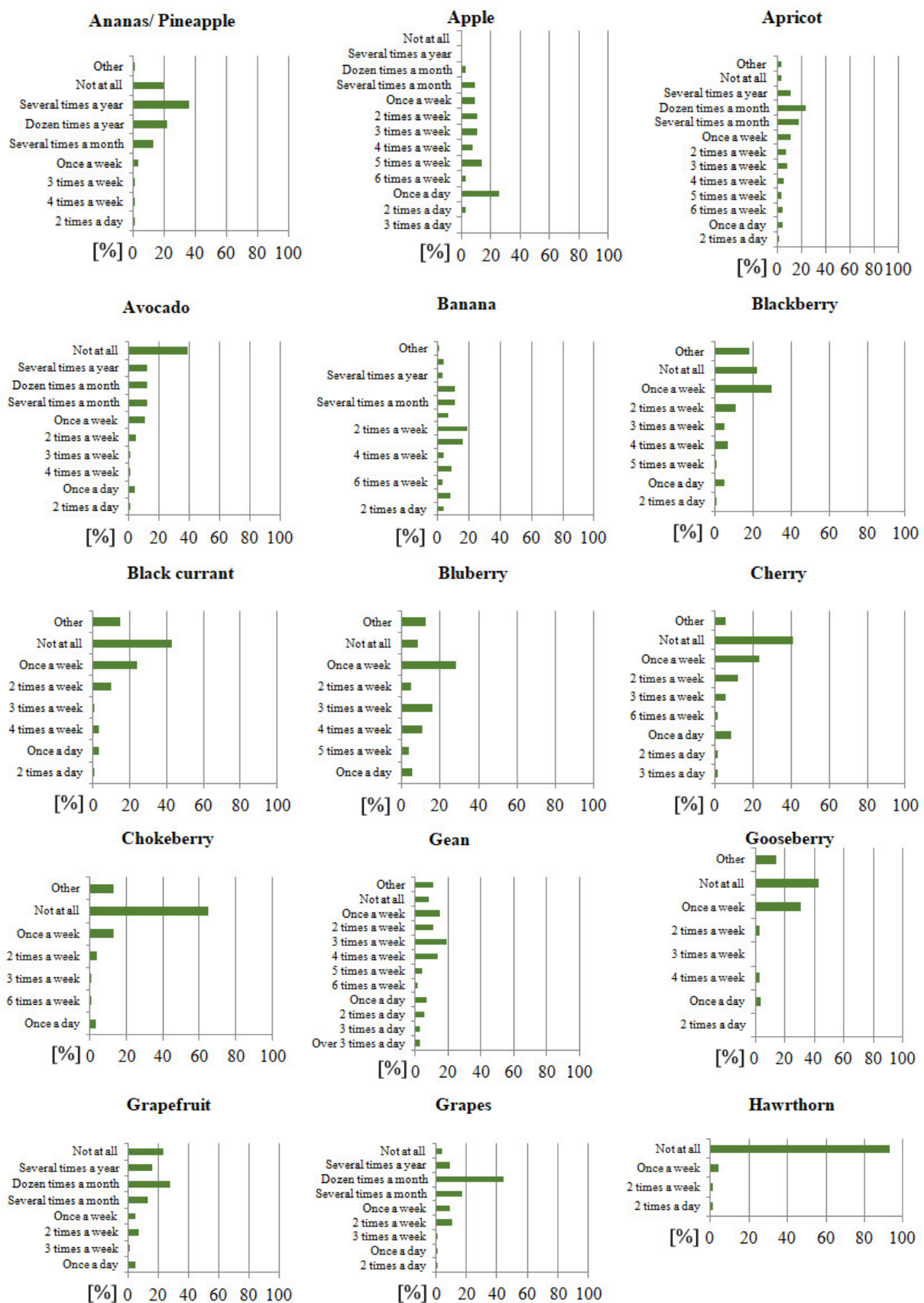


Figure 6. Cont.

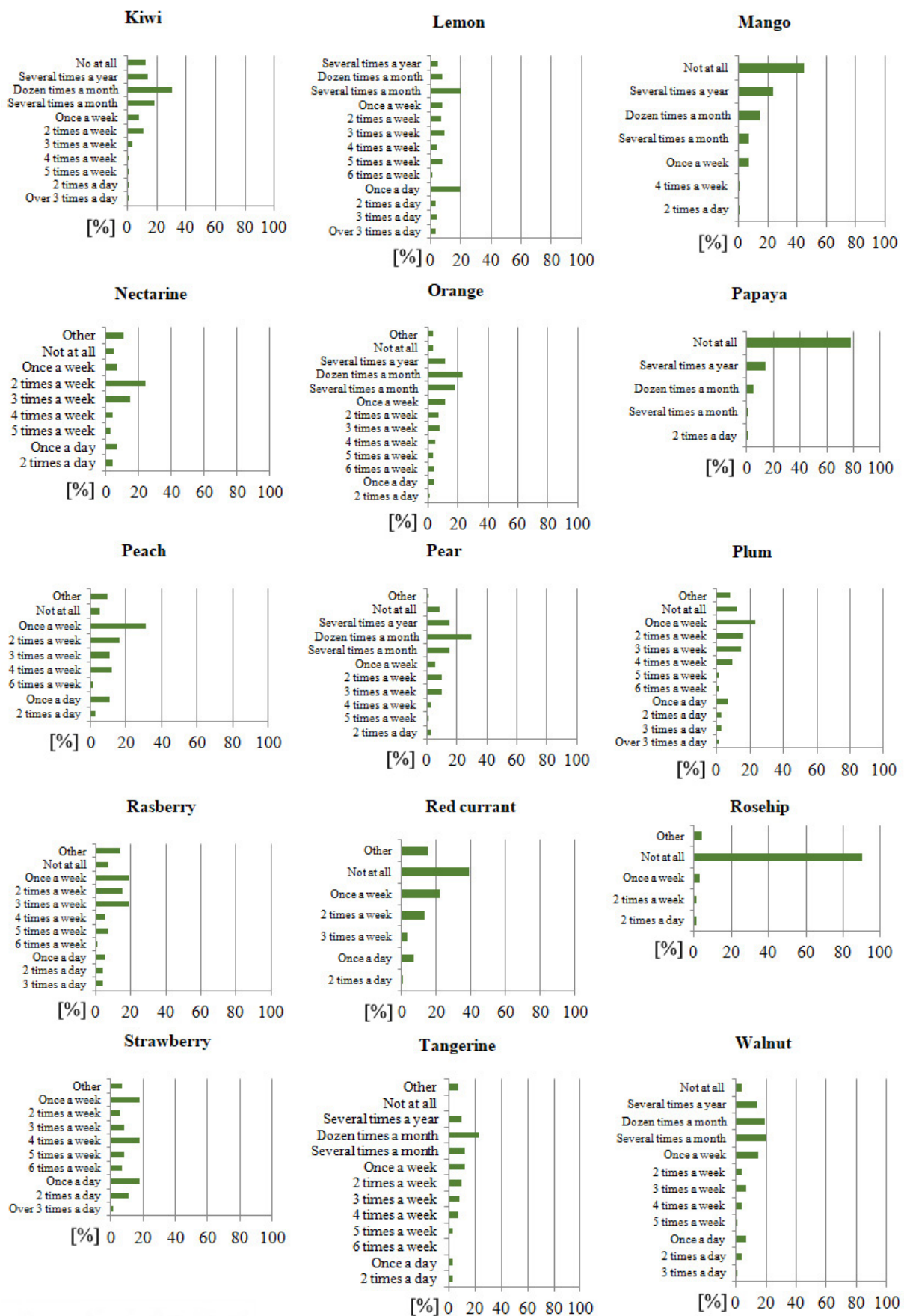


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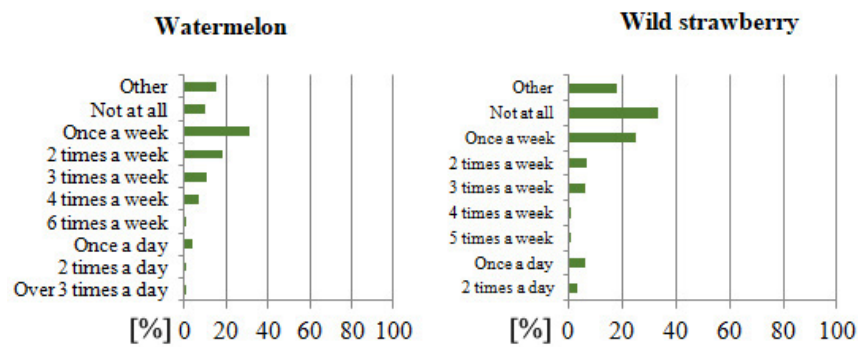


Figure 6. The frequency of fruit consumption [%] per year among respondents.

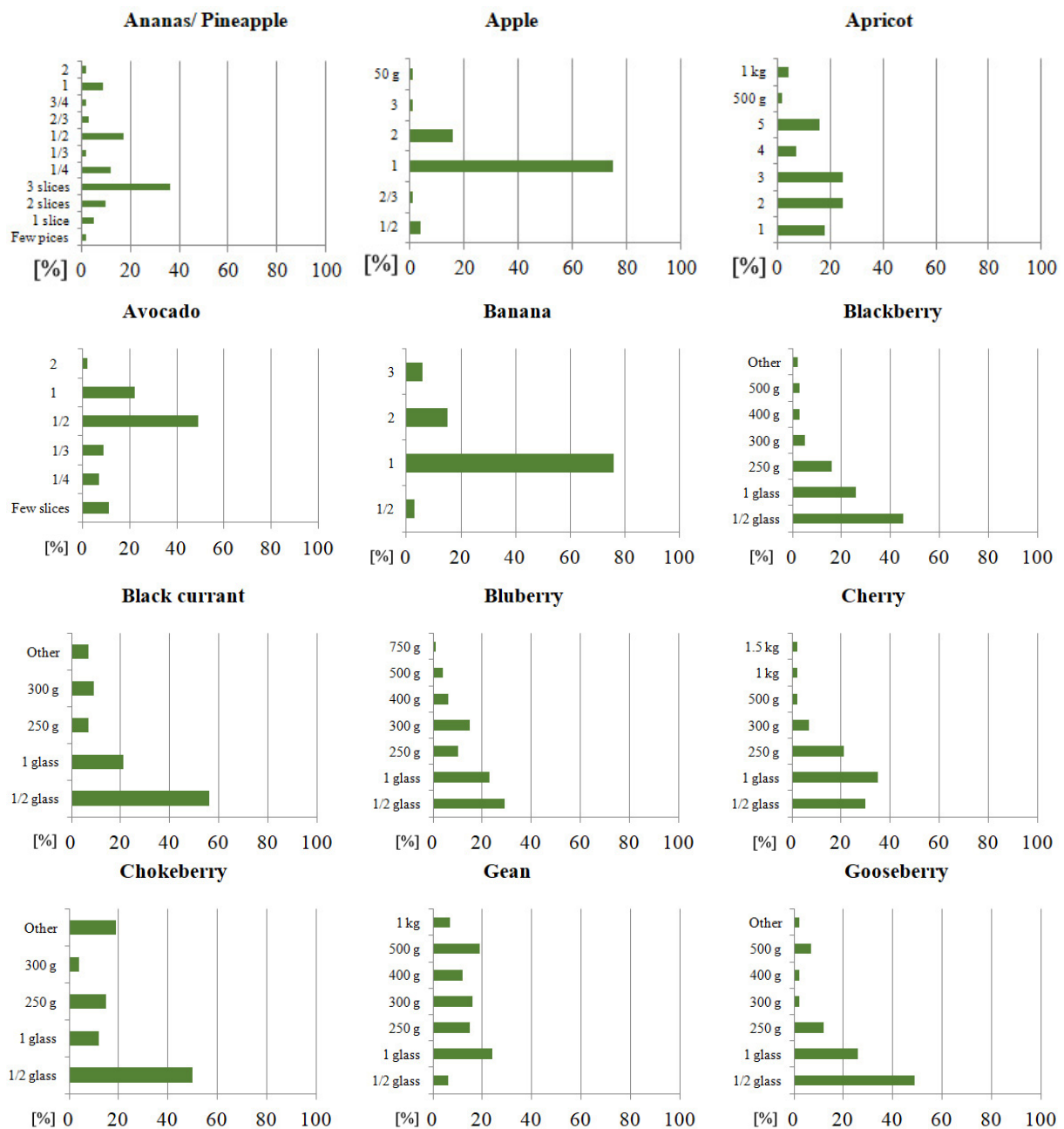


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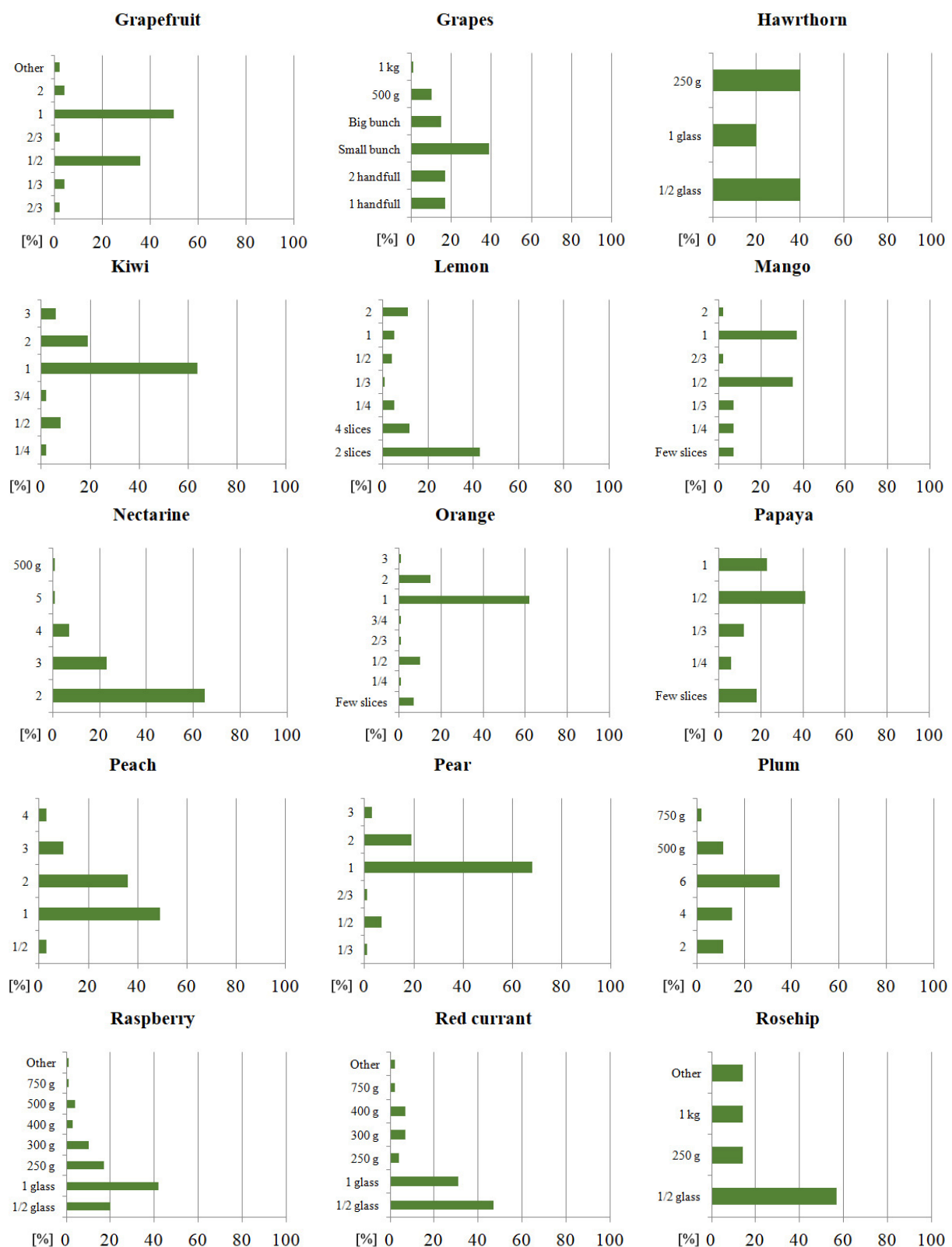


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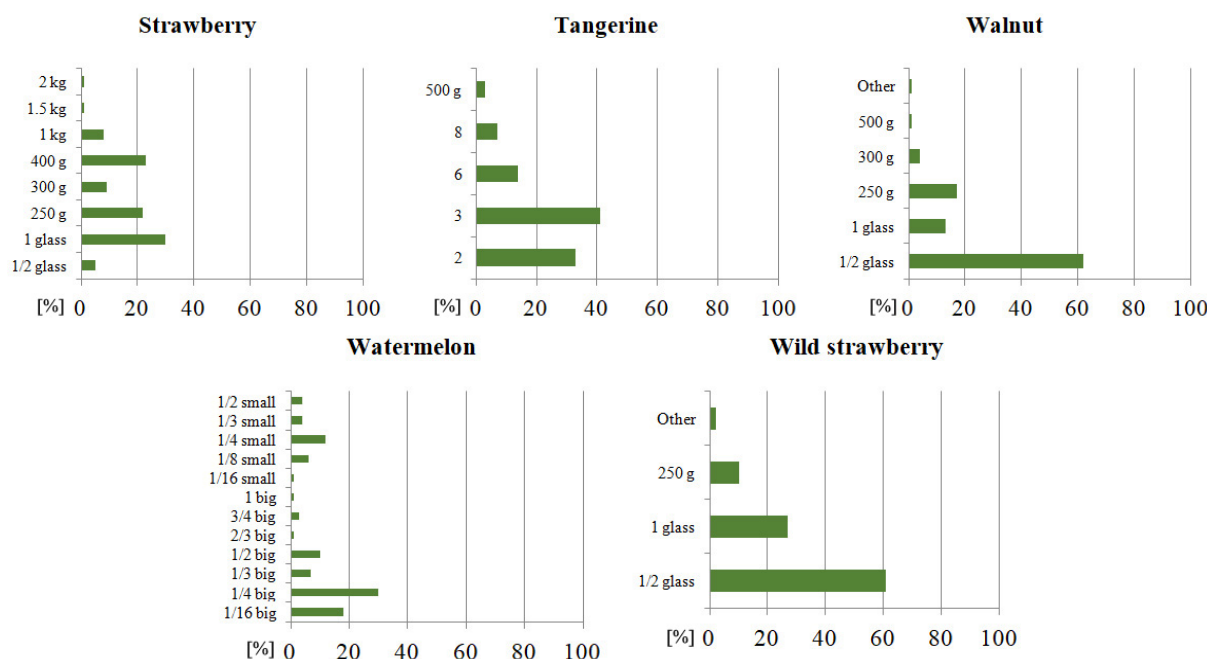


Figure 7. The amount of fruit consumed per portion size [%], according to the respondents.

4. Discussion

4.1. The Place of Purchasing Fruit

In terms of the places where fruits are bought, the preferences of the respondents varied according to their gender and marital status. In general, fruit was bought in supermarkets (by women and single people) and local shops (by men). It may be related to the amount of fruit bought in a one-time purchase, i.e., for one person/group of people, and the availability of parking infrastructure, i.e., the use of shopping trolleys on wheels, which reduces the need for physical strength when shopping, as well as the opening hours of stores. This study showed that fruit was primarily not bought at marketplaces, mainly due to their distance from the respondents' places of residence and the opening hours. It was also found that women were more active in terms of answering our survey. This stays in line, also, with the observation that women consume more fruits than men, not only in Poland [46] but also in the EU countries [47]. However, our observation could not be confirmed yet across various studies due to their lack of focus on Poland [48,49]. The aspect of the limited availability to or lack of marketplaces has been also indicated as the main obstacle in consuming a sufficient amount of fruit by other researchers [7]. Other studies have also indicated additional factors that may limit fruit consumption, such as no habit of eating fruit in the morning [9]; their high price [50]; changing traditional eating habits into a Western diet (especially among people who start preparing their own meals) [51]; the lack of availability of vegetables and fruit at home (not developing the habit of reaching for fruit in children) [5]; following parents behaviour, i.e., the lack of mothers' preference for certain fruits [52]; restrictions in the consumption of large fruits (melons, watermelons, and pomelos) and packages sold per kilogram (peaches, kiwi, nectarines, plums); the difficulty of purchasing them in the amount of 'one time' eating sizes—as single portions; the quality of the offered products; the availability of overripe fruit; and the sentiment surrounding a specific variety consumed in the past that is no longer available [42].

Fruits are usually more available in marketplaces due to their variety and the number of suppliers. However, according to the surveyed consumers, convenience is more important than the wide variety of fruit. Marketing campaigns have also been promoting the wide variety and availability of fruit from Polish suppliers and have been encouraging people to buy fruit in supermarkets and smaller chain stores.

Our study also revealed that respondents liked health food stores in Poland the least. Health food stores specialize in distributing organic food. The reasons for their low popularity include consumer preferences for organic food, which include their high price and ignorance of the labelling of organic products [49]. The argument of a higher price and insufficient consumer awareness also appeared in other researchers' studies; in addition, the low availability of organic products, their short shelf life, and their low visibility [53] were all factors.

4.2. The Aspect of the Ecological Quality of the Purchased Fruit

Convenience also arises in the context of the ecological aspect. Only one in five respondents grew fruit and every one in ten sought out healthy food stores. Consumers are mainly driven by comparably healthier choices and the high value of health for themselves and their loved ones. This is especially true for female consumers. The respondents also pointed out the importance of the quality of organic food.

Those who did not buy organic fruit claimed that there were no places to buy it nearby and paid attention to its higher price and the ambiguity of the term 'organic'. The argument for accessibility may be related to the lack of information on certified farms. The number of such places in Poland has been increasing; nevertheless, the available data have indicated their number rather than their location. For example, according to the reported data, in 2018, Poland had 14,927 certified organic farms and a total area of 363,565 hectares of land farmed organically. In 2018, the largest numbers of certified organic farms were located in the Warmińsko-Mazurskie (2719 farms), Podlaskie (2420 farms), Mazowieckie (1593 farms), Zachodniopomorskie (1553 farms), and Lubelskie (1466 farms) provinces [38], (pp. 404–405). According to the Agricultural and Food Quality Inspection [54] in 2020, there were 20,274 organic producers in Poland. The majority of them were located in Warmińsko-Mazurskie (3270), Podlaskie (2953), and Mazowieckie (2661); whereas, the lowest number of them were located in Opolskie (76) and Śląskie (203).

Organic food producers in Poland receive state financial support and support from non-governmental organisations. One source of support is the EU Rural Development Programme [55,56]. This support includes subsidies and training in organic farming. However, the owners of organic farms emphasize the need to increase subsidies, e.g., subsidy rates for 1 ha of organic production, as well as conducting training that would be more useful and valuable for them [57]. However, the share of payments from the environmental program included in the income of organic farms is not high [58].

Published research results have given the following reasons for why consumers do not prefer organic fruit: not paying attention to health benefits, this aspect has the least impact on the choice of organic food; price (higher than for traditional products); accessibility issues; previous habits, [59–61]; and "lack of faith" in organic products and limited trust in them [62]. The above is also confirmed in our research.

This reveals the essential role of knowledge and the need for further educational activities promoting environmental friendliness and the impact of food on the health condition of the body. This also includes social campaigns presenting the benefits of organic foods and distinguishing them from non-organic foods. In terms of the higher price of organic products, recent studies have shown that consumers pay more attention to the prices of organic than non-organic fruit. The change in prices may impact the propensity to eat organic fruit. Consumers who purchase organic produce are also less likely to revert to buying conventional fruit [63].

Diet and eating habits, including fruit consumption, depend on the following factors: biological (e.g., a consumer's body weight, energy requirements, feeling hungry); physical (e.g., the development of freshness-extension services [7], the appearance of fruits, fruits' divisibility into smaller portions); demographic (i.e., sex, age, education level); economic (i.e., related to the price of fruit, income per household member); psychological (conscientious fruit consumption that influences favourable health behaviour [64], the positive associations of fruit, the inner consumer's attitude [65], and personality traits indicating

a tendency to try something new, e.g., foreign fruit, new foods [66]); social (related to the immediate and extended environment of the consumer, including cultural factors [26]) and socio-economic status [67,68].

Demographic and economic factors are particularly significant when discussing fruit consumption. People with a high socio-economic status typically develop healthier eating habits, reflected in more frequent fruit consumption [30]. For example, the higher the economic status, the higher the consumption of fruit [9]; their nutrition is also healthier. The consumer's individual economic situation also affects physical access to healthy food outlets [69]. Similarly, the higher the level of education, the greater the knowledge of pro-health behaviour; therefore, more fruits are included in their diet [8,25]. Moreover, men tend to eat less fruit than women, older women consume more fruit than younger women, and people in relationships eat more fruit than single people [70].

The higher price of products from organic farming producers is caused, among other elements, by production and other costs. The former includes a greater labour input per production unit, the failure to achieve economies of scale (smaller harvest), the mandatory segregation of organic and conventional products, and the relatively inactive marketing and distribution chain resulting from the size of production. Additional elements include compensation for low financial returns resulting from rotation periods (building soil fertility); avoiding threats to farmers' health (e.g., not using pesticides); and the development of rural areas, including ensuring fair income for producers [71]. In addition to the above, the higher prices could also be due to the cost of the organic certification, together with the application, inspection, and required upgrading [72].

4.3. The Selection of Polish or Foreign Fruit

The research showed that the respondents definitely preferred Polish fruit. Their fruit diet was dominated by apples and strawberries. In Poland, apples are available throughout the year while strawberries are available seasonally. Also, Poland is the world leader in raspberry production [73]; this has an impact on the number of products offered on the market and, therefore, the strong competition between manufacturers resulting in the adopted pricing strategies. In addition, this impacted the aspect of previous behaviours and connecting raspberries and cherries with flavours characteristic of childhood, including pastries and preserves made from them. In the case of cherries, Poland is responsible for the production of a significant amount within Europe. In addition, the perception of the health benefits of cherries also matters [74,75]. The least popular among the Polish fruits were hawthorns, rosehips, chokeberries, gooseberries, red currants, cherries, wild strawberries, and blackberries. When determining the amount of small fruit consumed in a season (gooseberries, chokeberries, black currants, rosehips, hawthorns, blueberries, blackberries, wild strawberries, cherries, and even plums and peaches), the respondents most often chose the descriptive form of their quantity, i.e., glasses. Cranberries and elderberries, considered as blueberries, were not consumed [76]. With regard to the consumption of smaller fruit, the respondents indicated half a glass and a glass. In the case of the largest fruits (peaches, pears, and apples) consumed at one time, the respondents most often indicated the amount as one piece.

The little interest in fruit may be associated with their high price and unsuitable taste for consumers [77]. Regarding Poles with a less innovative approach, apart from the price, their current habits are also important. On the other hand, among consumers with a more pro-innovative attitude, the following are important in making decisions: information on the biodegradability of the packaging, general information on the packaging, and the place of origin of the fruit [46].

The most popular among the exotic fruits were, in the following order, bananas, lemons, watermelons, nectarines, oranges and tangerines, kiwis and grapefruits, pineapples, avocados, mangos, and papaya. In terms of the pomegranates available in Poland, fruits from Turkey and Spain were more predominant [78]. Despite the fact that the season for these fruits lasts from September to December, they are available for sale all year

round [79]. Surprisingly, pomegranates were not mentioned at all among our respondents, regardless of their antioxidant and anti-inflammatory properties and the beneficial effect they have on cardiovascular health [80,81].

The reasons for the lower consumption of tropical fruits in Poland may be related to their price, which includes transport costs. For example, the high cost of air transport has contributed to a small decrease in the popularity of papaya. Among the fruits imported to Europe between 2021 and 2022, a decrease in imports was recorded as follows: pineapples, from 826.6 thousand tons to 764.1 thousand tons; papaya, from 38.5 thousand tons to 34.7 thousand tons; and mango, from 408.7 thousand tons to 388.9 thousand tons [82]. The decreasing interest in papaya may also be related to the reported allergies to it and its specific smell [83]. On the other hand, avocado imports remained at a very similar level (in 2021, 582.9 thousand tons were imported and in 2022, 582.5 thousand tons were imported). In addition, global exports of mangoes, mangosteens, guavas, and avocados are expected to decline (by −5% and −6%, respectively); meanwhile, papaya and pineapple exports are expected to increase (by 1% and 1.5%, respectively) [82]. However, avocado is becoming more and more popular in Poland, which may be related to the increasing awareness of the health-promoting properties of this fruit. In the case of grapefruit, apart from the characteristic bitter taste, information related to its interactions with drugs is becoming more and more popular [84].

5. Conclusions

The conducted survey on the preferences of Polish consumers in the purchasing and consumption of both local and exotic fruit showed that local fruit was preferred by consumers, especially during the ripening season. The aspect of sustainability was less significant than the convenience of purchasing fruit. The respondents rarely bought organic fruit and rarely grew them on their own. The conducted research also revealed an imbalance in fruit consumption. This indicates the need for promoting the positive aspects of fruit consumption. Among the additional tips for promoting organic fruit consumption that can be suggested are:

- The publication of texts devoted to sustainable development issues (including organic food facts) that are only in the form of open access;
- The introduction of additional research grants for research related to the presented topic, in which the award criterion is not based mainly on the existing scientific achievements (open to more innovative approaches and new points of view on the issue);
- An increase in the emphasis on education during the first stages of education;
- The introduction of compulsory subjects at each stage of education related to a healthy lifestyle/proper nutrition;
- Further social campaigns (in which the methods of breaking the record are used—repeated information about the same recommendations within various messages), ensuring that the public will have daily contact with sustainable food recommendations;
- The conduction of practical campaigns enabling the costing of organic fruit, joint preparation of meals (learning by doing), and receipt of current feedback from consumers.

This research also shows the need for more detailed data on regional fruit consumption. This would allow for the development of a more balanced approach towards fruit distribution and a balanced supply-and-demand policy in the fruit market. The results of our research related to the preferences and habits of Polish consumers are also intended to encourage the continuation of scientific research on such an important topic. The results of this research also extend the existing research, enriching the topic of the preferences of Polish consumers with regard to fruit consumption in the context of sustainable consumption. However, there is a need for further research on this topic and a larger research sample. These results may also be useful to institutions that support developing healthy eating habits.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su151410953/s1>, Table S1: Compacted version of the questionnaire on consumption of edible plants in Poland; full version of the questionnaire in 12 Polish was published under the link <https://www.interankiety.pl/i/rpByxOLg>, accessed on 30 November 2017.

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