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RESEARCH ARTICLE

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DETERMINATION OF FACTORS AFFECTING THE CONSUMPTION BEHAVIOR OF ORNAMENTAL PLANT CONSUMERS: ŞANLIURFA SAMPLING OF TURKEY

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ABSTRACT

Ornamental plants are a sector that meets the spiritual and visual needs of people, improves the physical properties of the space they are used in, and contributes significantly to the economy and employment with the added value it creates. Şanlıurfa has an important potential for ornamental plants due to its geothermal resource and seasonal characteristics. The purpose of this study is to determine the factors that affect the consumption behavior of ornamental plant consumers in Şanlıurfa. The material of this research consists of data obtained from face-to-face surveys with consumers selected by a simple random sampling method in Şanlıurfa, and the surveys were conducted in 2020. Multinomial probit, negative binomial regression, and Tobit models were used in the analyzes. According to the results, the gender, marital status, income, employment status, and education level of the participants were determined as effective factors at different statistical significance levels. It was determined that age is not an effective factor. When the income level rises by one level, the ornamental plant expenditure increases by 19.93 TL annually, and when the education level rises by one level, it increases by 17 TL. The spread of ornamental plant cultivation should be encouraged in Şanlıurfa. This study is the first kind on this subject in Şanlıurfa.



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I. INTRODUCTION

Plants, especially ornamental plants, have been used as a source of nutrition, food, healing, social and religious ritual, aesthetic, functional, economical, industrial, landscape, decor, morale and motivation, together with the history of humanity until now [1]–[21]. Ornamental plants, which are a sub-branch of crop production in agricultural activities, differ from other agricultural product varieties with their soothing, relaxing, happy, and peaceful results that meet the spiritual and visual needs of people instead of food needs [15]. The term ornamental plants used in agricultural production is an inclusive term and they are collected in four subgroups as cut flowers, potted plants, outdoor and indoor ornamental plants, and natural flower bulbs, and cut flowers have the largest share among ornamental plants in Turkey [16]. Ornamental plants and floriculture is a non-essential necessity item, has become a commercial sector and an important for

employment, which is constantly increasing in importance due to its contribution to human psychology, satisfying people's aspirations for the environment, nature, and natural environment in places where industrialization and urbanization are intense [2], [3], [5], [17], [22]. In addition to its positive effects on people due to its aesthetic properties, ornamental plants have become a globally growing sector that softens and improves the physical properties of the place, contributes significantly to the economy and employment with the added value it creates [3]–[5], [8], [12], [17], [19], [21].

Şanlıurfa is the most important province in terms of agricultural production potential, which is included in the Southeastern Anatolia Project (GAP). [23]–[25]. Şanlıurfa has an important potential in terms of ornamental plant cultivation due to its geothermal resources and seasonal characteristics, and also has endemic and geophyte varieties peculiar to the region [4], [19],

[21]. Although Turkey has an important potential in terms of ornamental plants and floriculture, scientific studies in this field are not common enough [1], [3]. The purpose of this study is to determine the factors that affect the consumption behavior of ornamental plant consumers in řanlıurfa, Turkey.

II. MATERIALS AND METHODS

The main material of this research is the data obtained from face-to-face surveys with ornamental plant consumers in řanlıurfa, and consumers were determined by a simple random sampling method based on voluntary participation. The population of řanlıurfa was 2.12 million people according to the results of the address-based population registration system in 2020 [26]. The sampling volume of the research was determined as 384 according to the table of population sizes and sample volumes according to tolerable sampling error [27], [28] with 95% confidence limit and 5% margin of error. To stay on the safe side, 390 surveys based on voluntary participation in the field were conducted in 2020. The data obtained from the surveys were transferred to Excel, analyzed in SPSS, and interpreted. The average and distribution range of numerical data such as age or income of the participants was determined by performing frequency analyzes based on the research questions. The main analyzes were made by regression analysis. Regression analysis is a statistical method used to determine the relationship between two or more variables. It is used to predict models based on dependent or explained variables, and cumulative normal distribution is used in probit analysis [29], [30]. Multinomial probit analysis was performed to determine the characteristics that distinguish consumers in purchasing ornamental plants and flowers. The number of flowers consumers received and gave during the year was analyzed by negative binomial counting data regression. In the analysis of the consumption of ornamental plants and flowers, the Tobit model, which is widely used to explain models with limited dependent variables, was used. The model is a linear regression model with non-negative dependent variables and is based on variables that do not take negative values such as price, wage, and expenditure [30], [31].

III. RESULTS AND DISCUSSIONS

70% of the consumers participating in the research were female and 30% were male. The low number of males in the number of participants is because the research subject was not very interesting by male participants due to the norm culture of the research field. Participants were between the ages of 18 and 70, with an average age of 28.4 years. 53% of the participants are single, 40% are married and 7% are widows or divorced. 41% of the participants are university graduates, 34% are high school graduates and 25% are secondary school and below. 35% of the participants are salaried employees, 7% are self-employed, others are non-working, housewives, retired, and students. The monthly income of 37% of the participants was between 1501 and 5000 Turkish Lira (TL), 17% of them have an income of 5001 TL or more, and the remaining income was 1500 TL and below (The average of 1 USD was 7.01 TL in 2020). The monthly average income of the participants was determined as 3415 TL. Participants' annual average purchase expenses of ornamental plants and flowers are calculated as approximately 126 TL, with a minimum of 10 TL and a maximum of 3500 TL. This calculated average value corresponds to 3 per thousand of the monthly income of the consumers and within the solvency. 55% of the participants

buy ornamental plants and flowers only on special occasions and 22% for celebrations.

The most purchased varieties are indoor ornamental plants, bouquets, and arrangements. Most purchases are on mother's day, and the appearance and meaning of the variety purchased are the most important reasons for selection. In a study conducted in Turkey, it was determined that the most flowers were taken on Valentine's Day and then on mother's day [3]. The most purchased place is flower shops, followed by online purchases. Consumers buy flowers on special occasions (Mother's Day, Father's Day, Valentine's Day, New Year, etc.), regularly, seasonally, and for other reasons (such as birthdays, celebrations, promotions, and motivations). While most flowers are bought on special occasions, the rate of those who receive flowers regularly is 9%. The purchasing frequency of consumers is given in Table 1.

Table 1: Consumers' purchase frequency and distribution of ornamental plants and flowers.

Purchase period	Frequency	%
Only on special occasions	213	54,6
Regularly	35	9,0
Seasonally	48	12,3
Other reasons	94	24,1
Total	390	100,0

Source: Authors, (2021).

Multinomial probit analysis was performed to determine the socio-economic characteristics that distinguish consumers from these aspects. In the analysis, the dependent variable is the frequency of purchasing ornamental plants and flowers and the reference category is other reasons, and the analysis results are given in Table 2.

Table 2: Multinomial probit analysis results.

Variables		Coefficient	Standard error	t	p
Only on special occasions	Age	0.006217	0.011618	0.54	0.593
	Married	0.24683	0.22422	1.1	0.271
	Female	0.100582	0.226898	0.44	0.658
	Unemployed	-0.44574**	0.217892	-2.05	0.041**
	Income	-0.21645***	0.081045	-2.67	0.008***
	Constant	0.936262**	0.397963	2.35	0.019**
Regularly	Age	0.013395	0.015053	0.89	0.374
	Married	0.052466	0.293036	0.18	0.858
	Female	-0.14616	0.288534	-0.51	0.612
	Unemployed	-0.6105**	0.306604	-1.99	0.046**
	Income	-0.00767	0.10235	-0.07	0.940
	Constant	-0.75833	0.514241	-1.47	0.140
Seasonally	Age	0.015073	0.013095	1.15	0.250
	Married	0.205916	0.265599	0.78	0.438
	Female	0.011336	0.281147	0.04	0.968
	Unemployed	0.098927	0.26596	0.37	0.710
	Income	-0.03515	0.097138	-0.36	0.717
	Constant	-0.95262	0.48298	-1.97	0.049

Wald chi-square (15) = 23.59; Log-likelihood = -434.84773; p= 0.0724. Shows the statistical level of importance by ** 5%, ***1%.

Source: Authors, (2021).

In terms of the multinomial probit model estimation results in Table 2, according to those who bought flowers for other reasons:

- Employees are more likely to buy flowers "only on special occasions".
- The higher the income, the more likely it is to buy flowers "only on special occasions".
- Employees are more likely to purchase flowers "regularly".

The results of marginal effects of the multinomial probit model estimation are given in Table 3.

Table 3: Marginal effects of multinomial probit model estimation.

Variables	Only on special occasions	Regularly	Seasonally	Other reasons
Age	0.000	0.001	0.002	-0.002
Married	0.054	-0.014	0.010	-0.050
Female	0.039	-0.025	-0.004	-0.010
Unemployed	-0.104*	-0.050	0.068*	0.086*
Income	-0.063***	0.014	0.013	0.035**

Shows the statistical level of importance by *10%, **5%.

Source: Authors, (2021).

According to the marginal effects in Table 3:

- Employees are 10.4% more likely to buy flowers only on special occasions than non-employees.
- Unemployed are 6.8% more likely to purchase flowers seasonally than employees.
- Those who do not work are 8.6% more likely to buy flowers for other reasons than employees.
- When income increases by one unit, the probability of buying flowers only on special occasions decrease by 6.3%.
- When income increases by one unit, the probability of buying flowers for only other reasons increases by 3.5%.

The number of flowers that consumers receive throughout the year has been analyzed by negative binomial counting data regression, and the results are shown in Table 4. Alpha testing confirms that negative binomial regression should be used instead of using Poisson regression. It is observed that the number of flowers received by the participant is higher in females than in males, less in unemployed than in employees, and more in married than unmarried. Age, education level, and income level do not affect the number of flowers that the consumer receives.

Table 4: Negative binomial regression estimation results (Dependent variable: Number of flowers received).

Variables	Coefficient	Standard error	t	p	Marginal effect
Age	-0.01096	0.006963	-1.57	0.115	-0.0390685
Education Level	-0.04410	0.054033	-0.82	0.414	-0.1571822
Income	0.043754	0.053289	0.82	0.412	0.1559676
Female	0.398642	0.137064	2.91	0.004***	1.321226
Unemployed	-0.639790	0.131522	-4.86	0.000***	-2.117342
Married	0.315144	0.129026	2.44	0.015**	1.164704
_constant	1.488746	0.331726	4.49	0.000***	
/lnalpha	0.048980	0.091881			
alpha	1.050199	0.096494			

LR test of alpha=0; chibar2 (01) = 1133.40; Prob>= chibar2 = 0.000

Shows the statistically level of importance by ** 5%, ***1%.

Source: Authors, (2021).

According to the marginal effect values in Table 4:

- Females receive 0.39 more flowers than males.
- An employee receives 0.64 fewer flowers than a non-employee.
- Married people receive 0.39 more flowers than unmarried ones.

The number of flowers given by consumers throughout the year has also been analyzed by negative binomial counting data

regression, and the results are given in Table 5. The alpha test concluded that negative binomial regression should be used. The number of flowers given is less in females than in males, more in those who are married than in those who are not married, and in those who are not working, less than in those who work. The number of flowers given does not differ in terms of age, education level, and income level.

Table 5: Negative binomial regression estimation results (Dependent variable: Number of flowers received).

Variables	Coefficient	Standard error	t	p	Marginal effect
Age	-0.008540	0.007475	-1.14	0.253	-0.0085429
Education Level	0.009947	0.056078	0.18	0.859	0.0099469
Income	0.082996	0.052858	1.57	0.116	0.0829955
Female	-0.163360	0.134669	-1.21	0.225	-0.1633629
Unemployed	-0.633110	0.136186	-4.65	0.000***	-0.6331074
Married	0.293222	0.134053	2.19	0.029**	0.2932222
_constant	1.626030	0.345427	4.71	0.000***	1.62603
/lnalpha	0.129022	0.086675			
alpha	1.137715	0.098611			

LR test of alpha=0; chibar2(01) = 1485.12; Prob>= chibar2 = 0.000

Shows the statistically level of importance by ** 5%, ***1%.

Source: Authors, (2021).

According to the marginal effect values in Table 5:

- Females give 0.16 fewer flowers than males.
- The employee gives 0.63 fewer flowers than the unemployed.
- Married people give 0.29 more flowers than unmarried ones.

The Tobit model was used to determine the consumer characteristics that determine the annual flower expenditure, and the results are given in Table 6. Consumers with zero flower spending prevent the linear regression to meet the "neutrality of estimators" condition. For this reason, the Tobit model, which is suitable for situations where the dependent variable can also take the value of 0, is used.

Table 6. Tobit model estimation results (Dependent variable: Flower expenditure).

Variables	Coefficient	Standard error	t	p	Marginal effect
Constant	-74.9356	79.6677	-0.9406	0.3469	
Age	1.13181	1.59777	0.70840	0.4787	0.73997
Income	30.4797***	11.4958	2.65100	0.0080***	19.927
Married	21.1025	31.1717	0.6770	0.4984	13.860
Female	-17.8489	31.1998	-0.5721	0.5673	-12.072
Unemployed	-46.6962	30.5238	-1.530	0.1261	-30.571
Education level	26.0066**	12.6644	2.0540	0.0400**	17.003
Sigma	262.343	10.0887			
Constant	-74.9356	79.6677	-0.9406	0.3469	

Shows the statistical level of importance by ** 5%, ***1%.

Source: Authors, (2021).

According to the Tobit model estimation results, as income and education level increase, flower expenditure increases. According to the marginal impact values, when the income category rises by one level, flower expenditure increases by 19.93

TL annually and 17 TL when the education category rises by one level.

IV. CONCLUSIONS

Ornamental plants have started to be among the non-compulsory but widely preferred needs that people are increasingly paying attention to due to reasons such as population growth, urbanization, and industrialization. According to the results of the research, while the ornamental plants and flowers of the consumers participating in the survey were at most 54.6% on special occasions, the rate of those who buy them regularly was 9%. According to the multinomial probit model estimation results, employees' probability of getting flowers "only on special occasions" increases ($p < 5\%$). The higher the income, the higher the probability of getting flowers "only on special occasions" ($p < 1\%$). Employees are more likely to buy flowers "regularly" ($p < 5\%$). In terms of marginal effects, employees are 10.4% more likely to buy flowers only on special occasions than non-employees. Non-working people are 6.8% more likely to purchase flowers seasonally than employees, and 8.6% more likely to purchase flowers for other reasons. When income increases by one unit, the probability of purchasing flowers only on special occasions decrease by 6.3%, while the probability of purchasing flowers increases by 3.5% for other reasons. It is seen that the number of receive flowers is higher in women than in men ($p < 5\%$), less in non-working than in employees ($p < 1\%$), and more in married than in unmarried ($p < 5\%$). Age, education level, and income level do not affect the number of flowers received ($p > 10\%$). According to the marginal effect values, women received 0.39 more flowers than men, 0.64 fewer than non-employed, and 0.39 more flowers than unmarried women. The number of flowers given is less in women than in men, more in those who are married than in those who are not married, and in those who are not working, less than in those who work. The number of flowers given does not differ in terms of age, education level, and income level ($p > 10\%$). According to the marginal effect values, females give 0.16 more flowers than males, employees 0.63 less than unemployed and married ones give 0.29 more flowers than unmarried ones. According to the model estimation results of ornamental plant and flower expenditures, as income and education level increase, flower expenditure increases. According to the marginal impact values, when the income level rises by one level, flower expenditure increases by 19.93 TL annually and 17 TL when the education level rises by one level.

Şanlıurfa has an important potential for growing ornamental plants due to its endemic and geophyte varieties and seasonal characteristics. The widespread use of ornamental plant cultivation in Şanlıurfa should be encouraged due to the foresight that the prices will decrease with the widespread production and therefore the consumption amount will increase among consumers. This study is the first study on this subject in Şanlıurfa. This study was derived from the master's thesis entitled "Determination of Ornamental Plants Potential: The Case of Şanlıurfa Province" completed by the second author under the supervision of the corresponding author.

V. AUTHOR'S CONTRIBUTION

Conceptualization: Mustafa Hakkı Aydođdu and Necla Yıldızođulları.

Methodology: Mustafa Hakkı Aydođdu.

Investigation: Mustafa Hakkı Aydođdu and Necla Yıldızođulları.

Discussion of results: Mustafa Hakkı Aydođdu and Necla Yıldızođulları.

Writing – Original Draft: Mustafa Hakkı Aydođdu and Necla Yıldızođulları.

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