jotaf
Journal of Tekirdag Agricultural Faculty
Tekirdağ Ziraat Fakültesi Dergisi

Mayıs/May 2024, 21(3)
Başvuru/Received: 24/07/23
Kabul/Accepted: 03/09/23
DOI: 10.33462/jotaf.1332016

http://dergipark.gov.tr/jotaf
http://jotaf.nku.edu.tr/

ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

The Effect of Wild Mushroom Collection in The Mountains of Strandja on The Economic Development of The People Living in The Region

Istranca Dağları'ndaki Doğal Mantar Toplamanın Bölgede Yaşayan İnsanların Ekonomik Gelişimine Etkisi

Emine YILMAZ[1*]

Abstract

There is a need for innovative approaches that can accommodate the rural population and manage to keep the rural population in the settlement. At this point, it is important to carry out actions that will adequately meet the living conditions of rural areas and to increase the income levels of rural people. The protection of forests and the maintenance of biological diversity are important in terms of non-wood forest products collected from the forests by the villagers living in that region, and it is very important for the sustainability and economic future of life in the region. In this study, a questionnaire was collected from 130 households living in the region to determine the importance of mushrooms, which grew naturally in the mountains of Strandja and were used for consumption, in terms of family economy and development. The empirical analysis was based on a face-to-face survey of 130 respondents living in villages close to the Strandja Mountains and collecting mushrooms in 2019. The answers given to the questions, which determined the opinions of the participants about the mushrooms growing in nature, were taken with a 5-point Likert scale and factor analysis was performed. Villagers collecting mushrooms could not get the income they wanted from the products they obtained. It was determined that the income of mushroom collectors from mushrooms contributed to their daily needs, but did not make a significant contribution to increasing their welfare level. For this, villagers needed to establish cooperatives and create their own sales points. Since the mushroom collectors used the mushrooms in their diets, the villagers should be trained in mushroom drying and canning to ensure mushroom consumption throughout the year. In the research, it was observed that the local people were aware of the contribution of mushrooms to the economy and that a large part of their food consumption consisted of mushrooms grown in nature and therefore it was important in rural development.

Key words: Rural development, Wild mushroom, Mushroom collect, Forest villages, Strandja Mountain

[1*]**Sorumlu Yazar/Corresponding Author:** Emine Yılmaz, Tekirdag Namık Kemal University Faculty of Agriculture Department of Agricultural Economics. Tekirdag, Türkiye. E-mail: emineyilmaz@nku.edu.tr OrcID: 0000-0002-3434-8932
Atıf: Yılmaz, E. (2024). Istranca Dağları'ndaki doğal mantar toplamanın bölgede yaşayan insanların ekonomik gelişimine etkisi. *Tekirdağ Ziraat Fakültesi Dergisi,* 21(3): 666-682.
Citation: Yılmaz, E. (2024). The effect of wild mushroom collection in the mountains of Strandja on the economic development of the people living in the region. *Journal of Tekirdag Agricultural Faculty*, 21(3): 666-682.

Öz

Kırsal da kırsal nüfusu barındırabilecek ve kırsal nüfusu yerleşimde tutmayı başarabilecek yenilikçi yaklaşımlara gereksinim vardır. Bu noktada kırsal alanların yaşam koşullarının yeteri düzeyde karşılanacağı eylemlerin gerçekleştirilmesi ve kırsal kesimde yaşayanların gelir seviyelerini arttırmaya yönelik çalışmalar önem kazanmaktadır. Ormanların korunması ve biyolojik çeşitliliğin sürdürülmesi, o bölgede yaşayan köylüler tarafından ormanlardan toplanan odun dışı orman ürünleri açısından önem arz etmekte olup, bölgedeki yaşamın sürdürülebilirliği ve ekonomik geleceği açısından oldukça önemlidir. Bu çalışmalar özellikle dağ ve orman köylerinde yaşayanlar için çok daha önemlidir. Bu çalışmada, Istranca Dağları'nda doğal olarak yetişen ve tüketim amacıyla kullanılan mantarların, bölgede yaşayan ailelerin ekonomisi ve kalkınması açısından önemini belirlemek amacıyla gerçekleştirilmiştir. Araştırma, 2019 yılında Istranca Dağları'na yakın köylerde yaşayan ve mantar toplayan 130 katılımcıyla yüz yüze yapılan bir anket üzerinden gerçekleştirilmiştir. Katılımcıların doğada yetişen mantarlar hakkındaki görüşlerini belirleyen sorulara verdikleri cevaplar 5'li Likert ölçeği ile alınmış ve faktör analizi yapılmıştır. Mantar toplayıcılarının mantardan elde ettikleri gelirin günlük ihtiyaçlarına katkı sağladığı ancak refah düzeylerini artırmada önemli bir katkı sağlamadığı belirlenmiştir. Topladıkları mantarların gelirlerini arttırması için köylülerin pazarlama noktasında problemleri oluğu ve bu problemin çözümüne karşılık pazarlamanın daha etkili olabilmesi için köylülerin kooperatifler kurması ve kendi satış noktalarını oluşturması gerekmektedir. Mantar toplayıcıları, topladıkları mantarları kendi beslenmelerinde de kullanmaktadırlar. Köylülerin topladıkları mantarları yıl boyunca tüketimini sağlamak ve bu ürünlerden tüm yıl boyunca gelir elde etmelerini sağlayabilmek için köylülere mantar kurutma ve konserve yapma gibi eğitimler verilmelidir. Araştırmada yöre halkının mantarın ekonomiye katkısının farkında olduğu ve özellikle toplama mevsiminde gıda tüketimlerinin büyük bir kısmının doğada yetişen mantarlardan oluştuğu ve bu nedenle bölgede yaşayanlar açısından kırsal kalkınmada önemli olduğu belirlenmiştir.

Anahtar kelimeler: Kırsal kalkınma, Doğal mantar, Mantar toplama, Orman köyleri, Istranca Dağı

1. Introduction

In rural areas, it is aimed to reduce development differences by increasing the income level and life quality of rural areas on the one hand, and to protect environmental and cultural values, on the other hand, based on the sustainable use of natural resources (DPT, 2006). In addition, there are problems in the implementation of sustainable forestry rules in forest villages where the adverse effects of land and climatic conditions affect the quality of life and where the dependence on natural resources and especially forests is high. Therefore, rural development in forest villages is more important than other rural areas.

In Turkey, forestry activities are conducted to preserve and increase the forested land and to improve the conditions of villagers living around forests. The Republic of Turkey Ministry of Agriculture and Forestry develops projects with social and economic goals to improve the quality of life of forest villagers, to ensure onsite development, and to reduce the pressure on forests (Bulut et al., 2021)

Forests produce non-wood products as well as wood-based products. Forest products such as blackberries, mushrooms, aromatic, medicinal and decorative plant materials, hazelnuts, sap and resins are non-wood products in forests. In a global context, especially for low-income households, non-wood forest products can represent 10-60% of household income, which is an important source of livelihood, provide food security by balancing the seasonality of other food sources, and play an important cultural and spiritual role (Lovric et al., 2020; Lovric et al., 2021).

There are groups of people who are engaged in collecting products that grow naturally in almost all parts of the world. Furthermore, recently there have been several indications that these products have acquired new popularity either as part of foodie culture, newly discovered traditional/cultural roots, search for healthier diets, etc. (Stryamets et al., 2015; Wirsum, 2017; Wirsum et al., 2018).

In recent years, interest in the commercial harvest of wild mushrooms has increased all over the world and the consumption of edible mushrooms provides significant economic contributions to the inhabitants of the region (Cai et al., 2011). The income obtained from agricultural products contributes significantly to the national economy in Turkey. Edible and medicinal mushrooms are categorized also as agricultural products, and it is thought that they can lead the family economy and regional development with the studies and regulations to be made (Ali et al., 2007). In addition to cultivated mushroom cultivation, interest in wild mushrooms has increased all over the world in recent years. Due to its flora and climatic conditions, Turkey is very rich in natural mushrooms that grow in different environments (Allı and Şen, 2016). For this reason, mushroom species that are eaten in many parts of Turkey are collected during the growing season and used as food.

It is reported that edible wild mushrooms collected from nature, especially in European countries, are much more demanded than cultivated mushrooms (Kalac, 2009). The increasing demand for edible wild mushrooms and the potential for trade put them among the valuable non-wood forest products alternative (Boa, 2004; Egli et al., 2006). One of the biggest reasons why mushrooms collected from nature are in demand is their high nutritional properties. Mushrooms contain 5-10 times more vitamin B3 than some vegetables (Anşin et al., 2000). They are low in fat and carbohydrate amounts and rich in protein amount. It is stated in some sources that 70% of the protein found in mushrooms can be easily digested by the body (Anşin et al., 2000; Babar et al., 2005; Türkoğlu and Gezer, 2006).

Wild-grown mushrooms have been a popular delicacy in many countries, particularly in central and east Europe (Keleş and Gençcelep, 2020). In Turkey, consumption of wild-grown mushrooms is also increasing particularly in the Marmara region (Gürbüz, 2019). Today; collecting mushrooms from nature has become a recreational and money-saving activity. It does not require much labor and is low cost, especially for some families in rural areas; it has become a source of livelihood for such reasons (Chang and Miles, 2004). Turkey has approximately 40 kinds of edible mushroom species are collected from nature from which 25 species commercially and exported (Okan et al., 2013).

In addition to being food, wild mushrooms are also an important source of livelihood for the villagers. Most of the mushrooms exported are collected from the forests by the villagers and they make important contributions to the country's economy (Khan et al., 2012; Pekşen and Akdeniz, 2012).

It is assumed that non-wood forest products have the potential to play a more important role in rural development by providing socio-economic benefits to a number of actors along the entire value chain, from the forest harvester to the retailer who sells these products (Huber et al., 2019). For forest villages, mushroom collecting that grows in nature is gaining importance as a primary way of utilizing non-wood forest products due to its potential for utilization in domestic and foreign markets, being a direct source of income, and supporting rural development by increasing the welfare of rural areas. While the services provided by forests differ in such a wide range, their effects on the living conditions of rural forest villagers in socio-economic terms are among the important issues that should be evaluated in terms of poverty management and poverty alleviation and rural development.

The aim of this study is to evaluate the collection and consumption of natural mushrooms that grow naturally in this region, which includes Tekirdağ Province Saray District, and are collected by the local people. In this article, answers to the following questions were sought in particular; (1) Determining the sociodemographic structure of the families living in the region and what kind of families participate in mushroom picking activities? (2) To determine how many mushrooms these households have collected? and (3) how much income they get from these collected mushrooms and how much they use for their own consumption and how they spend their income from harvesting mushrooms?

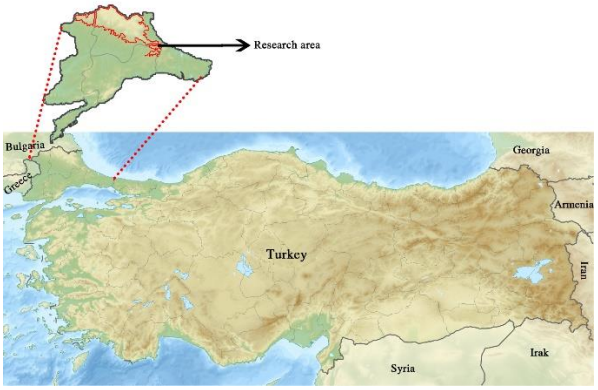

Figure 1. Location of the research area on the map

2.Material and Methods

With its green vegetation, dense forests, endemic plant species and fertile soils, mushrooms are an important source of income in Ayvacık, Safaalan, Bahçeköy, and especially in Güngörmez Village, in the Saray district of Tekirdağ, where agriculture and forestry activities are intensely carried out. Porcini is from the Boletaceae family (*Boletus edulis species*) and is one of the most common edible mushroom species in the world. The natural mushroom, which grows in the forests of the Saray every year with the spring rains and known as "bear mushroom", "bolete mushroom" or "porcini mushroom" by the locals, is collected and sold by the citizens. Bolete mushroom that grows in nature is a very important source of livelihood for in this region, but it is also important for rural development. The mushrooms collected by the village residents are sold on stalls in the village square and are also exported mainly to European countries such as Italy, France and Spain.

This region is named after a floodless water source surrounded by lush and tall trees. It was established in the foothills of the Strandja Mountains and is 7 km away from Saray. The height of the village is 220 meters. The means of livelihood is farming, animal husbandry, forestry products and factory labor (Anonymous, 2021).

In this research, primary data was obtained through a face-to-face survey conducted to mushroom collectors and live in the villages near the Strandja mountain foothills and the Igneada floodless forests, mainly within the borders of the Saray district of Tekirdag province (*Figure 1*). In determining the sample volume, the limited main mass formula was used for the ratios. In the formula, 90% confidence interval, 5% margin of error and p = q = 0.5 in order to reach the maximum sample volume (Equation 1).

$$n = \frac{N.p.q}{(N-1)\sigma_p^2 + p.q} \qquad \text{(Eq. 1)}$$

n = sample volume,

N = population size (600 households)

p = estimate ratio (0.5)

σ_p^2 = ratio variance (value with 10% margin of error at 99% confidence interval to reach maximum sample volume).

The original data of the study consisted of the findings of a face-to-face survey with 130 households selected by random sampling method from in this region. In order to test the suitability of the prepared questionnaire for its purpose, a preliminary survey was conducted with 30 people living in the region, and some parts of the questionnaire were corrected and finalized. In the first part of the survey, there were questions that determined the demographic (age, gender, marital status, education level, occupation) characteristics of the people who participated in the survey. In the first part, there were multiple-choice and open-ended questions (Equation 1). In the second part, there were questions about the contribution of the income of the participants from mushroom picking to their economic situation. Factor and logit analysis were applied to the obtained data.

2.1. Factor analysis

Factor analysis is a type of statistical analysis with many variables that provides a more meaningful and summary of the data based on the relationships between variables (Kurtuluş, 2004; Tekin, 2007; Karpati and Szakal, 2009). The main purpose of this analysis is to interpret each factor individually by explaining the relationship between the original variables with a group of factors with the least loss of information. In short, factor analysis makes it possible to work with less data by preserving the original information as much as possible. Most of the time, it is not possible to measure people's behavior on a subject with a single question. Many factors that affect this behavior are closely related. The purpose of factor analysis is to reduce the loss of information as much as possible, bringing these close factors together and allowing to work with fewer factors (Ness, 2000; Topçu, 2006; Uzundumlu, 2011).

In the study, the following hypotheses were tested to reveal the wild mushroom picking status of individuals. Testing of hypotheses was carried out by using factor groups obtained from factor analysis as explanatory variables in the logit model.

H0: Health-conscious individuals do not pick natural mushrooms. H1: Health-conscious individuals go out to collect natural mushrooms,

H0: Individuals do not go out to collect mushrooms in order to create an additional source of income. H1: Individuals go out to collect mushrooms in order to create an additional source of income.

2.2. Logit Analysis

Bivalent selection models assume selection between two alternatives depending on the characters of the individuals. Once knowing about the behavior of individuals and the choices they will make, an equation can be predicted to predict their non-exemplary choices. Since it is possible to make many assumptions about the probability structures of individuals regarding choices, alternative model specifications emerge (İşyar, 1994). In the study, logit analysis, one of the multivariate statistical analysis methods, was used to reveal the criteria that affect the preferences of individuals to go to natural mushroom picking or not.

The logit model, which was created as an alternative to the probit model to solve the problems encountered in the linear probability model, is more attractive in practice and is used more widely. Although it is the same as the probit model in terms of its formation process, it differs from it in terms of the cumulative distribution function on which it is based (Özer, 2004).

The probability of an individual going to pick mushrooms;

$$P_i = E(Y = 1|X) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_2 + \cdots + \beta_k X_k)}} \quad \text{(Eq. 2)}$$

or

$$P_i = \frac{1}{1 + e^{-Z}} \quad \text{(Eq. 3)}$$

it is indicated by. Here,

$$Z_i = \beta_1 + \beta_2 X_2 + \cdots + \beta_k X_k \quad \text{(Eq. 4)}$$

and (3) is known as the equation (cumulative) logistic distribution function. It is known that while Zi varies from -∞ to +∞, Pi takes values between 0 and 1 and its relation with Zi is not linear (Equation 2-4).

If the probability of going to mushroom picking is Pi, then the probability of not going (1-Pi) is;

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad \text{(Eq. 5)}$$

Therefore, the following can be written,

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad \text{(Eq. 6)}$$

In this case Pi / (1-Pi) is the bet rate of going to mushroom picking (Equation 5-6). If the natural logarithm of this equation is taken, the following result is obtained;

$$L_i = ln\left(\frac{P_i}{1 - P_i}\right) = Z_i \quad \text{(Eq. 7)}$$

$$= \beta_1 + \beta_2 X_2 + \cdots . + \beta_k X_k$$

The logarithm of the bet odds, L, is linear not only with respect to X but also with respect to the main mass coefficients. L is called logit and the logit model comes from equation (7) (Gujarati, 1999).

The variables used in the model are given in the following equation and the values they take are given in *Table 1*.

Table 1. Definition of the variables

Dependent variable		
Go to pick mushrooms	**1**	**Who goes to pick mushrooms?**
	0	**Who does not go to pick mushrooms?**
Independent variables		
Income group	1	1001-2000
	2	2001-3000
	3	3001-4000
	4	4001 +
Education	1	Non-education
	2	Primary school
	3	Secondary School
	4	High school
	5	University
Factor 1		
Factor 2		
Factor 3		
Factor 4		

3. Results

A survey was conducted to determine the social and economic structure of families living in this region of Tekirdağ Saray District. The socio-demographic characteristics of the survey participants were given in *Table 2*. The majority of the respondents (27.7%) were between the ages of 46-55. This was followed by the age range of 26-35 with 23.8%. 57.7% of the participants were women and 42.3% were men. 63.8% of these people were married and 26.9% were single. Similar results were obtained from Pellecier-Gonzalez et al. (2002).

Table 2. Socio-economic status of families (%)

	Number	%		Number	%
Gender			**Income (monthly)**		
Woman	75	57.7	166-333$	17	13.1
Men	55	42.3	334-500$	46	35.3
Ages			501-666$	27	20.8
16-25	12	9.2	667$ +	40	30.8
26-35	31	23.8	Total	130	100
36-45	17	13.1	**Family type**		
46-55	36	27.7	Mother, father and children	120	92.3
56-65	21	16.2	Mother, father and children and grandparents	10	7.7
66≥	13	10.0	Others	-	-
Total	130	100	Total	130	100
Education Groups			**Marital status**		
Primary school	56	43.1	Married	83	63.8
Secondary school	14	10.8	Single	35	26.9
High school	23	17.7	Widow	8	6.2
Bachelor	22	16.9	Divorced	4	3.1
Master science and PhD	15	11.5			
Total	130	100	Total	130	100

It was determined that 43.1% of the participants were primary school graduates. Looking at the incomes of the families, it was determined that 35.3% of the respondents had an income between 333-500$ and 30.8% had an income of 667$ or more. 86.9% of the respondents stated that they had an income higher than the minimum wage 355$. 92.3% of the families participating in the survey consisted of the basic family structure (mother, father and children). It was determined that the crowded family structure was less in the region where the survey was conducted (7.7%).

Table 3. Participants going to mushroom picking (%)

Going to pick mushrooms	Number	Rate (%)
Yes	92	68.3
No	38	31.7
Total	130	100.0
Single	18	19.6
With my wife	24	26.1
With my wife and children	16	17.4
With Relatives	18	19.6
With Neighbors	5	5.4
Other	11	12.0
Total	92	100.0

68.3% of the respondents went to collect mushrooms in nature, 31.7% did not. Participants mostly went to pick mushrooms because it was a traditional family activity and it was profitable. It was observed that the participants mostly went to mushroom picking with their spouse (26.1%). When asked why mushroom collectors were going with their spouse, they stated that “the more people the more mushrooms” they collected (*Table 3*). Yılmaz et al. (2017) conducted a study in Feke district of Adana province, the cedar mushroom collector households subjected

to the survey stated that they went to the cedar mushroom collection together with "other household members and friends". It was seen that our results were consistent with the Yılmaz et al. (2017). Questions about the "mushroom picking time" were also posed to the natural mushroom collectors who participated in the survey. Accordingly, they stated that natural mushroom picking was an activity that took place in the "spring-autumn" season, "every week" of the month and "every day" of the week.

Table 4. Time participants spend in nature to find mushrooms (%)

Time Spent	Number	Rate (%)
3 Hours and less	22	23.9
Between 3-5 Hours	32	34.8
Between 5-7 Hours	30	32.6
7-9 Hours	8	8.7
Total	92	100.0

Within the scope of the research, the participants were asked about the time they spent in nature to collect mushrooms daily, and the data obtained were given in *Table 4*. According to the data obtained, the fluctuation in the amount of mushrooms also affected the time spent to collect mushrooms in nature. The main reason for this was that sometimes the rain fall in the season, and sometimes the rain did not fall on time and sufficiently. This time period was 5-10 hours in the period when mushrooms were abundant, but it was limited to 3-5 hours in periods when mushrooms were less. It was seen that our results were consistent with the results of the previous study (Cai et al., 2011). The amount of mushrooms collected in nature also varied in proportion to the time period. 34.8% of the mushroom collectors who participated in the survey stated that they spent 3-5 hours to find mushrooms in the nature, and 8.7% stated that they spent 7-9 hours.

Table 5. Mushroom amount of participants collected daily from nature (%)

The amount of mushrooms collected	Number	Rate (%)
Less than 5 kg	26	28.3
6-10 kg	29	31.5
11-20 kg	17	18.5
21-30 kg	16	17.4
31-40 kg	2	2.2
40 kg +	2	2.2
Total	92	100.0

Table 6. Income of participants from daily mushroom picking ($)

Income	Number	Rate (%)
Less than 8.33 $	25	27.2
8.34-16.66 $	29	31.4
16.67-50$	25	27.2
50.01-83.3$	11	12.0
83.31-133.3$	2	2,2
Total	**92**	**100.0**

In the periods when mushrooms were abundant, 11-20 kg and more mushrooms could be collected in 3-5 hours in the nature, while 4-5 kilograms of mushrooms could be found in nature by traveling for 3-5 hours in the periods when the mushrooms were less. When the amount of mushroom picking was examined, it was mostly collected between 6-10 kilograms (*Table 5*). Considering the income from daily mushroom picking, 31.4% of the participants stated that they earned between 8.5-16.5$ (*Table 6*).

26.9% of the income obtained from the mushroom collected was used for food expenditures (*Figure 2*), 19.2% for education expenditures and 13.1% for clothing expenditures. Increasing the income level of the local people through mushroom cultivation would be an effective factor in development for the region, especially considering that these mushrooms could be obtained with very low costs.

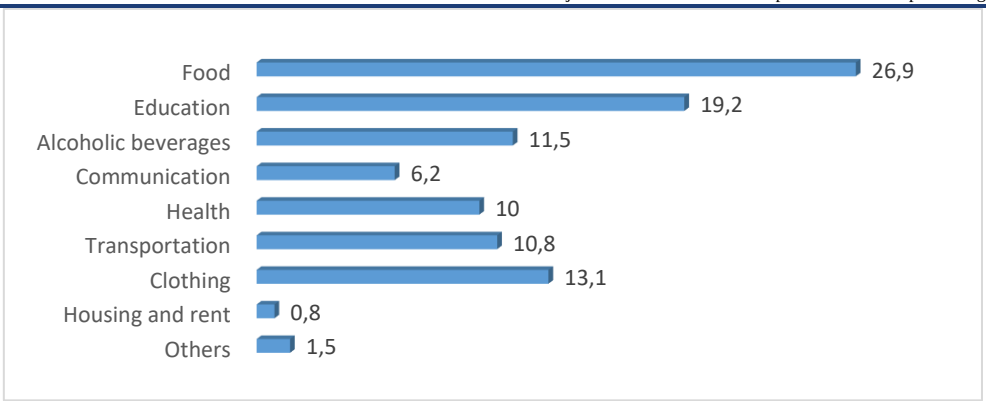

Figure 2. In which expenditures the income is used (%)

While 96.9% of the participants stated that they found the mushrooms grown in nature to be healthier because they did not contain heavy metals and chemicals, 3.1% stated that they did not find it healthy. When we looked at their consumption, 92.3% of the participants consumed mushrooms that grew in nature, and 7.7% did not. All those who went to collect mushrooms found the mushrooms grown in nature healthy, 97.8% of them consumed this mushroom and 2.2% of them did not consume.

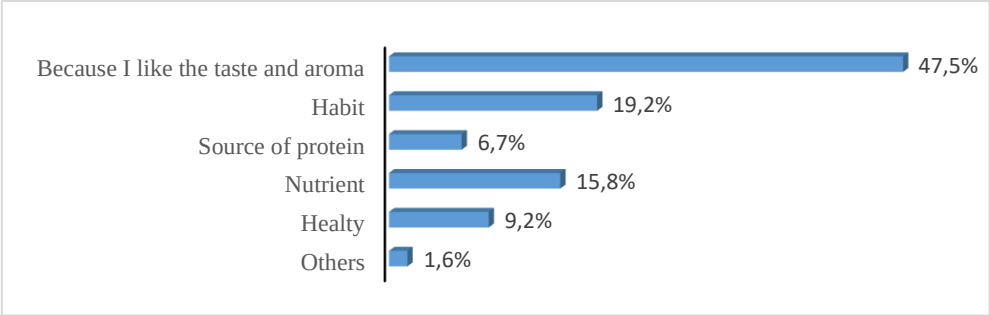

Figure 3. Nature-grown mushroom consumption status

When the mushroom consumption status was examined, consumption due to its taste was the first place with a ratio of 47.5% (*Figure 3*). This was followed by habit at 19.2% and those who consumed it because it was nutritious was 15.8%. Similar results were obtained from Adanacıoğlu et al. (2017). When the participants who did not consume mushrooms were asked why they did not consume mushrooms, 40% of the consumers stated that they did not find the mushrooms grown naturally in nature healthy and did not consume them because they were afraid of poisoning, while 20% did not like the taste of mushrooms. When asked how natural mushrooms were consumed, 27.9% of them were served with meat, while 24.6% were sautéed, 23.0% fried, 9.8% soup, 9.0% pastry, 2.5% pickles and 3.2% on the grill or in the oven.

Table 7. Reasons for less mushroom growing in nature compared to previous years

The reasons why mushrooms are scarce in nature	Number	Rate (%)
Lengthening of summer and shortening of autumn due to global warming	26	20
Delay of rain season due to global warming again	40	30.8
Thinning the forests	28	21.5
Unconscious collection	36	27.7
Total	130	100

The respondents thought that the publicity of mushrooms grown in nature was not sufficient. They stated that the publicity of natural mushrooms could be made via internet 50.8%, television 38.5%, newspaper 6.9%, fairs and festivals.

When the data obtained as a result of the research were examined, when asked why the mushrooms growing in nature were less common than in previous years, 30.8% of the participants stated that it was due to the delay of the rainy season due to global warming (*Table 7*). Most of the participants stated that they knew that the fungus

existed in rain and temperature conditions with the experience of the past years. For the solution of these problems, questions were asked to the participants and when the solution ways were examined, it was agreed that the destruction of nature should be prevented with a rate of 53.3% (*Table 8*).

Table 8. What should be done to solve the reasons of less mushrooms in nature (%)

What to do to solve the problem	Number	Rate (%)
The public should be made aware	45	35.0
Nature destruction should be prevented	69	53.3
Tightening of inspections against illegal logging	16	11.7
Total	130	100.0

Considering that the damage caused by human beings to nature was increasing day by day, it was reported that the fear that we might not see this mushroom species in nature again after a decade was the common thought of natural mushroom collectors. They stated that some measures should be taken in order to prevent the destruction of nature.

The answers to the questions determining the opinions of the participants about the mushrooms growing in nature were taken with a 5-point Likert scale. Since the scaled criteria were numerous, it was not possible to use each of them as explanatory variables. Therefore, variables should be presented in summary form. Summarizing the variables in the study was done by factor analysis with the help of PASW 18.0 software.

The Kaiser-Meyer-Olkin measure was used to determine whether the variables to be used were suitable for factor analysis. As seen in Table 9, the KMO test result was calculated as 0.703. In addition, Barlett's Test of Sphericity value and significance tests whether the variables showed correlation with each other and showed whether it was appropriate to perform factor analysis with the data used. As can be seen from *Table 9*, it was shown that the data used in two values were suitable for factor analysis. It was stated in the literature that factor loads ranging from 0.30 to 0.40 could be taken as the lower cut-off point in forming the factor pattern (Büyüköztürk, 2007).

The suitability of the data set for factor analysis was tested with the Kaiser-Meyer-Olkin (KMO) and Barlett tests. KMO values> 0.90: excellent, 0.80: very good, 0.70; good, 0.60; medium, 0.50; weak and <0.50; interpreted as rejection (Table 9).

Table 9. KMO and Bartlett's test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,703
Bartlett's Test of Sphericity	Approx. Chi-Square	623,890
	df	78
	Sig.	,000

In the initial solution of the factor analysis, the eigenvalues, variance and cumulative variance values used in deciding the number of factors were calculated and given in *Table 10*. The number of factors with eigenvalues greater than 1 is 4. All of these 4 factors explained 65,611% of the total variance.

Factor 1 consisted of 4 items and the factor load values of the items under this dimension vary between 0.588 and 0.864, Factor 2 consists of 4 items, factor load values are 0.638 and 0.830, Factor 3 consists of 3 items, factor load values are 0.540 and 0.895. It was determined that Factor 4 consists of 2 items and factor loadings are 0,431 and 0,926 (*Table 11*).

Table 10. Factor analysis initial solution statistical results

Factor	Eigen Value	Variance	Cumulative Variance
1	4,238	32,603	32,603
2	1,871	14,394	46,997
3	1,271	9,780	56,777
4	1,148	8,833	65,611

Table 11. Factor Analysis Results

Factors and Variables that Form Factors	Factor Loads			
	F1	F2	F3	F4
Factor 1 Nutritional value				
Mushrooms have anti-aging properties	,864			
Mushrooms that grow in nature are healthier than others	,723			
Mushrooms are a source of protein	,701			
I don't think mushrooms are healthy	,-588			
Factor 2 Health awareness				
I don't consume mushrooms because I'm afraid of poisoning		,830		
Mushroom flavor matters		,746		
Mushrooms should be consumed for health		,668		
Over-consumption of mushrooms can cause poisoning		,638		
Factor 3 Conscious consumption				
Public awareness should be raised about the consumption of natural mushrooms			,895	
Consuming mushrooms protects against cancer			,595	
Consuming mushrooms strengthens our immune system			,540	
Factor 4 Additional income and product processing				
Facilities processing natural mushrooms should be established				,926
Mushroom collecting provides an extra income for rural residents				,431

Factor 1 is named as "nutritional value" and it explains 32.603% of the variance. Factor 2 has been named "Health Awareness". It explains 14.394% of the variance. Factor 3 has been named "Conscious Consumption". It explains 9,780% of the variance. Factor 4 has been named "Additional income and product processing". It explains 8,833% of the variance.

Logit Analysis

In the study, the logit model was used to examine the variables affecting whether the household in this region goes to collect mushrooms or not. In this method, each estimation probability is compared according to the split point C (Hosmer and Lemeshow 1989). If the estimated probability value exceeds C, the investigated variable will be equal to 1, otherwise it will be equal to zero. Usually, 0.50 is used for the discrimination point (Karaman and Yılmaz, 2007). As seen in *Table 12*, the rate of correct estimates of the logit model is 90.8%. 92.4% of the individuals who went to mushroom picking and 86.8% of the individuals who did not go to pick mushrooms were classified correctly.

Such criteria can be used to test the validity of the model since the criteria similar to the sum of error squares based on the difference of likelihood ratio values of the model that includes all variables and the estimated model show χ^2 distribution. The likelihood ratio test is similar to the general F test for significance of coefficients in multiple linear regression. The likelihood value of the model consisting of L_0 constant terms was calculated as χ^2 111.54, where L_1 is the likelihood value of the model, and it was found to be statistically significant (111.54> 25,0.01 = 16.81) at the 0.01 significance level. The Cox & Snell R^2 coefficient was calculated as 0.57 and the Nagelkerke R^2 coefficient as 0.82, among the criteria of goodness of fit (*Table 13*).

Table 12. Correct prediction table of the Logit Model

Observed	Estimated		
Whether to go pick mushrooms or not	1	0	Correct prediction
1	85	7	92.4
0	5	33	86.8
Total correct prediction rate			90.8

C= 0.50

Hosmer and Lemeshow H test, which gives goodness of direct fit, shows χ^2 distribution with t-2 degrees of freedom (Hosmer and Lemeshow, 1989).

Tested hypotheses; H_0: Model is compatible, H_1: The model is incompatible.

Since the observed value of the H test statistic is H = 5.37 < χ^2 8, 0.01 = 20.09, the H_0 hypothesis showing the goodness of fit of the model cannot be rejected and the model is considered significant at the 0.01 significance level.

Table 13. Goodness of fit criteria

L_0 (-2 log probability)	157.08
L_1 (-2 log probability)	45.54
LR statistics	111.54
Cox & Snell R^2	0.57
Nagelkerke R^2	0.82

The significance of the independent variables in the model can be determined by using the Wald test. When the significance levels of the variables were examined according to the Wald test, Factor2, Factor3, Factor 4 and "educational status" independent variables were found to be statistically significant (*Table 14*).

Odds ratios are used in the interpretation of the estimators of the Logit model. Odds ratio; It expresses how many times the dependent variable will affect the realization probability of the dependent variable when the relevant independent variable takes 1 or 0 while the other variables are constant. If the coefficients of the estimators take negative values, the Odds ratios of these coefficients should be corrected as OO = 1 / OO (Özdamar, 2004). In the model, Odds ratios for monthly income, education level and Factor 1 variables were corrected. While the other factors are constant, an individual who cares about judgments in the Factor 1 group will be 1.39 times less likely to go to mushroom picking than other individuals. For the other factor groups, an individual's probability of going to mushroom picking is 5.91 times higher than other individuals for the Factor 2 group, 10.68 times higher than the other individuals for the Factor 3 group, and 17.79 times higher than the other individuals for the Factor 4 group. While the results of Factor 2 and Factor 3 variables support the hypothesis of "H1: Individuals with health awareness go out to collect natural mushrooms", the result of Factor 4 variable supports the hypothesis "H1: Individuals go out to collect mushrooms to create an additional income source". Since the coefficients of monthly income and education level variables are also negatively signed, the Odds rates were arranged and commented. Accordingly, when the grouped monthly income rises by 1 slice, the probability of going to mushroom picking will be 1.61 times less. Similarly, when an individual's education level rises to the next level, the probability of going to mushroom picking decreases by 25 times. Activities to make improvements in agriculture, in parallel with the problems, were first to have consistency in agricultural policies, followed by planning production and reducing costs (Keskin, 2021).

Table 14. Logit Model Results

Variable	Coefficient	Std. Error	Wald	Expressiveness	Odds ratio
Factor 1 (nutritional value)	-,334	,890	,141	,707	,716
Factor 2 (health awareness)	1,777	,621	8,191	,004	5,913
Factor 3 (conscious consumption)	2,369	,942	6,318	,012	10,687
Factor 4 (additional income)	2,879	,835	11,877	,001	17,793
Education status	-3,230	,799	16,349	,000	,040
Monthly income status	-,480	,548	,768	,381	,619
Constant term	13,376	3,919	11,650	,001	644432,032

In the logit model, when the constant coefficient is zero (0), the slope coefficients measure the change in the logit (L) for a unit change in the independent variable, while the log-probability ratio of individuals' preferences to go to mushroom picking. When you want to estimate the probability of going to mushroom picking, not the odds, predictors need to be determined in advance (Gujarati, 1999). Equation (8) can be solved by giving values according to a scenario for the independent variables in the model. For example, the probability of an individual who has a monthly income between 500-666 $, a high school graduate, and attaches importance to Factor 3 and Factor 4, can be calculated with the help of the following equation.

$$P = \frac{1}{1+e^{-Z}} \qquad \text{(Eq. 8)}$$

$$Z = 13.376 - 0.480 * 3 - 3.230 * 3 + 2.369 * 1 + 2.879 * 1 = -3{,}002$$

$$P = \frac{1}{1 + e^{3.002}} = 0.047 = \%4.7$$

The probability of the mentioned individual going to mushroom picking is 4.7%. Examples can be increased for individuals who attach importance to different factor groups and have different income and education levels.

4. Discussion

In the last two decades, interest in commercial harvesting of wild edible mushrooms has increased significantly in many regions (Cai et al., 2017). When the literature is examined, very few studies can be found on the socio-economic characteristics of mushroom collectors, their practices, and the returns of the activity. It is important to carry out this research in a region very close to the Igneada Floodplain forests in the northwest of Turkey to determine how many people and what kind of people participate in the commercial mushroom harvesting, to measure the time allocated to the activity and the collected amounts, and to evaluate the economic importance of this income source.

It is seen that 43.1% of mushroom collectors are primary school graduates and are in the middle age group. In this sense, young people do not adopt the mushroom as a business. It is determined that most families participate in this activity together and spend more than 3 hours collecting mushrooms. It is seen that 59.8% of participants collect 10 kg or less mushrooms and this group is in low-income level. When the time spent to collect mushrooms in the forest increases, the amount of mushrooms collected also increases. Since the collection of common mushroom varieties in the region is open to everyone, it is clear that it provides an opportunity for the people living in that region to both nutrition and earning an additional income. In a study conducted on the subject of the research, it was reported that mushroom collectors both increased income from the mushrooms they collected and used them as an alternative to meat in their diet (Gürbüz, 2019). The results obtained by Gürbüz (2019) are similar to our results.

The forest ecosystem directly affects the development of rural areas. For developing countries, including Turkey, the development of rural areas and the continuity of production in these areas are positively reflected in the gross national product. Based on this situation, the forest ecosystem in or near it should be fully utilized for the development of rural areas. In addition to the ecological, social and cultural functions of forest products and services, wild foods such as fruit, leaves, mushrooms and walnuts obtained from forests in many regions of the world provide important supplementary food especially to the poor rural population. In recent years, the contribution of forests, trees and agroforestry activities to food security and nutrition has been better understood.

The wild mushroom, which is grown in natural conditions and cannot be cultivated, is in high demand in the food sector due to its nutritional value (Bulam et al., 2018). Especially the restaurants in the region offer the dishes made from mushrooms to the consumers. Wild mushroom, which is one of the mushroom varieties closest to meat in terms of taste, provides great benefits for health with the protein, vitamins, and minerals it contains. The logit analysis, applied to the results of the research shows the importance of the mushrooms grown in their natural environment in terms of nutrition. In addition, the fact that this region is far from the industrial area reduces the potential contamination of the mushrooms that grow spontaneously and increases its importance in terms of nutrition.

When the studies on the effects of mushroom collection on rural economies in mountainous regions are examined, it is seen that they earn an important income both from organizing tours for mushroom picking and by selling the mushrooms collected in these tours to hotels and restaurants in the region (Martinez-Pena et al., 2007; Martinez-Aragon et al., 2011). This study is the first approach to estimate mushroom productivity and corresponding economic value at the regional level based on mushroom field surveillance, and our results are similar to Martinez-Pena et al. (2007) and Martinez Aragon et al. (2011) is lower than the stated values.

Turkey's geography of climate, soil, and vegetation diversity provides a natural environment for the growth of many species of mushroom. Wild mushrooms growing in Turkey are exported to more than 80 countries. Turkey is one of the mushroom exporting countries. In every region of our country, there are various wild mushrooms collected and consumed by local people. However, although there are few mushrooms that the local people collect locally, there are quite a lot of wild mushrooms that are unknown and edible locally. There is a need for information

and awareness-raising activities on issues such as the collection of wild mushrooms from their natural habitat and gaining economic value. When spring comes, natural mushroom collectors start to collect mushrooms grown in nature to generate additional income. During this period, natural mushrooms become an important resource for making money. Although natural mushroom collectors cannot be "rich" with their mushroom collecting activity and remain low-income, natural mushroom collectors provide a significant additional income to the household economy of the collectors in this region. In other words, natural mushroom collection for households is not the only, but an additional source of income.

Mushrooms are among the growing food consumption in Turkey every year. Mushrooms, which are among alternative natural products, are consumed by humans due to their different flavors and aromas, as well as their medicinal effects such as antioxidant, antimicrobial, antitumor and immune system regulator (Yılmaz et al., 2017; Sevindik, 2018). Mushrooms are included in food culture as a meal alone or for aroma purposes. However, mushrooms cannot be consumed continuously due to their properties such as having high amount of water as 90-95%, having a short shelf life, being seasonal and local. Therefore, mushrooms are preserved after different processes such as drying, freezing, and pickling (Eren et al., 2017). Thus, mushrooms can be consumed when they are scarce or absent or in regions where they are not available. Considering the consumption habits, only fresh mushroom consumption is possible in the region. However, in addition to this form of consumption, mushrooms can also be offered to consumers as dried or frozen. By providing the local people with the necessary training on the evaluation of mushrooms, it may be possible to use the collected mushrooms in a better way and to spread them over a longer period of time.

Mushroom collectors, who are university graduates (16.9%) and have postgraduate education (11.5%), define this activity as entertainment and spending time with the group rather than making an economic contribution. Those in this group said that they had a good time while collecting mushrooms and that walking in nature was good for their health. They also stated that they mostly used the mushrooms they collected for their food. Mushroom collectors for commercial gain have both more and more time spent collecting in the area they travel. Mushrooms collected by this group are sold entirely for cash.

There are very few businesses processing mushrooms in this area. In these establishments, only cold storage is carried out. These businesses should both increase in number and apply advanced processing techniques. The production and marketing of naturally grown and economically important non-wood forest products (mushroom thyme, sage, frankincense oil, laurel, etc.), especially through cooperatives, will provide income and employment opportunities for forest villagers.

5. Conclusions

The knowledge and skills of those who collect mushrooms from forests are very important. Because knowing the mushroom types will prevent the buyers and those who consume the mushrooms from consuming poisonous mushrooms. The protection of forests and the maintenance of biological diversity are important in terms of non-wood forest products collected from the forests by the villagers living in that region, and it is very important for the sustainability and economic future of life in the region. Villagers collecting mushrooms cannot obtain the income they want from the products they have obtained. For this, villagers need to establish cooperatives and create their own sales points. Since the villagers collecting mushrooms use the mushrooms they collect in their diet, training should be given to the villagers on mushroom drying and canning to ensure mushroom consumption throughout the year. According to the results of the research, it has been determined that the income obtained by the mushroom collectors from the mushrooms they collect contributes to their daily needs, but does not make a significant contribution to the increase in their welfare level. Organizing festivals and organizations (such as mushroom hunting and tour) during the harvesting times in order to support the villagers who collect mushrooms from the forest can contribute to the economic development of the villagers.

This study is important in terms of the economic evaluation of mushrooms grown in the natural environment of forest villagers. Mushrooms that grow naturally can contribute economically to the people living in the region in terms of socio-economical rural development, additional income, creating environmental awareness, preventing the destruction of forest areas, protecting natural resources, and establishing mushroom sales markets. Designing more effective promotion and marketing strategies can be beneficial to the socioeconomic development of mushroom collectors.

Ethical Statement

There is no need to obtain permission from the ethics committee for this study.

Conflicts of Interest

The author declares that they have no conflict of interest.

Authorship Contribution Statement

Concept; Design; Data Collection or Processing; Statistical Analyses; Literature Search; Writing, Review and Editing: Yılmaz, E.

References

Adanacioglu, N., Tan, A., Karabak, S. Guzelsoy, N. Ayas, F. Aykas, L., and Taylan, T. (2017). Economically important wild mush-room saffron milk cap (*Lactarius Delicious* L.) Gray] of Aegean Region, Turkey. *Anadolu Journal of AARI*, 27(2):91 – 96.

Ali, M. A., Mehmood, M. I., Nawaz, R., Hanif M. A., and Wasim, R. (2007). Influence of substrate pasteurization methods on the yield of oyster mushroom (*Pleurotus species*). *Pakistan Journal of Agriculture Sciences*, 44(2): 300-303.

Allı, H., Şen, İ. (2016). Edibility and economical importance of Turkish mushrooms. *Agriculture & Food*, 4:415-423. https://www.scientific-publications.net/en/article/1001057/

Anonymous (2021). The demographic structure of Güngörmez village. https://www.endeksa.com/tr/analiz/tekirdag/saray/gungormez/demografi#nufus (Accessed Date: 25.08.2022).

Anşin, R., Eminağaoğlu, Ö. and Göktürk, T. (2000). Edible Mushrooms in Artvin Province. *Turkey VI. Edible Mushroom Congress*, September 20-22, 122-129, Bergama, İzmir, Türkiye.

Babar, M. H., Afzal, M., Bashir, M. H. and Ali, M. A., (2005). Chemical control of mushroom mite (tarsonimidae) at different time intervals and concentrations of dicofol, abamectin and hexythiazox. *Pakistan Journal of Agriculture Sciences*, 42(3-4): 2005.

Boa, E. (2004). Wild Edible Fungi, A global overview of their use and importance to people, Food and Agriculture Organization of the United Nations, Rome. www.fao.org/3/a-y5489e.pdf

Bulam, S., Ustun. S. N. and Pekşen, A. (2018). The most popular edible wild mushrooms in Vezirköprü District of Samsun Province. *Turkish Journal of Agriculture - Food Science and Technology*, 6(2): 189-194.

Bulut, N. D., Bozlar, T. and Daşdemir, İ. (2021). The economic analysis of blueberry (*Vaccinium corymbosum* L.) cultivation in Eastern Black Sea Region of Turkey. *Pakistan Journal of Agriculture Sciences*58: 1437-1444.

Büyüköztürk, Ş. (2007). Data Analysis Handbook for Social Sciences. Ankara: Pegem A Publishing.

Cai, M., Pettenella, D. and Vidale, E. (2011). Income generation from wild mushrooms in marginal rural areas. *Forest Policy and Economics*, 13: 221-226.

Cai. Y., Gong, Y., Liu, W., Hu, Y., Chen, L., Yan, L., Zhou, Y. and Bian, Y. (2017). Comparative secretomic analysis of lignocellulose degradation by Lentinula edodes grown on microcrystalline cellulose, lignosulfonate and glucose. *Journal of Proteomics*, 163:92–101.

Chang, S. T. and Miles, P. G. (2004). Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, CRC Press, pp. 15- 18, Florida, ABD.

DPT (2006). Ninth Five-Year Development Plan Turkiye, Ankara.

Egli, S., Peter, M., Buser, C., Stahel,W. and Ayer, F. (2006). Mushroom picking does not impair future harvests – results of a long-term study in Switzerland. *Biological Conservation*, 129(2): 271-276.

Eren, E., Süren, T. and Kızıleli, M. (2017). A conceptual evaluation of wild edible mushrooms in Turkey from a gastronomic perspective. *Academic Journal of Tourism*, 02: 77-89.

Gujarati, D. N. (1999). Basic Econometrics (Translation. Ü. Şenesen and G.G. Şenesen), Literature Publishing, İstanbul.

Gürbüz, İ. B. (2019). Nongreen revolution: a case study of wild-grown edible mushroom. *Environmental Science and Pollution Research*, 26:7954–7959.

Hosmer, D. W., and Lemeshow, S. (1989). Applied Logistic Regression, John Willey & Sons.

Huber, P., Hujala, T., Kurttila, M., Wolfslehner, B. and Vacik, H. (2019). Application of multi criteria analysis methods for a participatory assessment of non-wood forest products in two European case studies. *Forest Policy and Economics*, 103: 103–111.

İşyar, Y. (1994). Econometric Models. Uludag University Press, Bursa, pages 258.

Kalac, P., (2009). Chemical composition and nutritional value of European species of wild growing mushrooms: A review. *Food Chemistry*, 69: 273–281.

Karaman, S., and Yılmaz, I. (2007). Analysis of factors affecting use of bumble bees for the pollination in glasshouse tomatoes growing. *Journal Tekirdag Agriculture Faculty*, 4(1): 99-7. (in Turkish)

Karpati, L. and Szakal, Z. (2009). Marketing characteristics of Tokaj Wine specialties based on factor and cluster analyses. Pages; 93-102 Applied Studies in Agribusiness and Commerce, Agroinform Publishing House, Budapest.

Keleş, A., and Gençcelep, H. (2020). Determination of elemental composition of some wild growing edible mushrooms. *The Journal of Fungus*, 11(2): 129-137.

Keskin, G. (2021). A research of determinants of structural transformation in agriculture in Turkey. *Pakistan Journal of Agriculture Sciences*, 58: 1107-1114.

Khan, S. M., Nawaz, A., Ali, M. A., Ahmad, T., Khan, N. A., and Rehman, A. U. (2012). Response of oyster mushroom on different agricultural wastes of Southern Punjab. *Pakistan Journal of Agriculture Sciences*, 49(2): 127-130.

Kurtuluş, K. (2004). Marketing Studies (Extended 7th Edition). Literature Publications, Publication Number: 114, pages:397-418, İstanbul.

Lovric, M., Re, D. R., Vidale, E., Prokofieva, I., Wong, J., Pettenella, D., Verkerk, P. J. and Robert Mavsar, R. (2020). Non-wood forest products in Europe – A quantitative overview. *Forest Policy and Economics*, 116 (2020):102175.

Lovric, M., Re, D. R., Vidale, E., Prokofieva, I., Wong, J., Pettenella, D., Verkerk, P. J. and Robert Mavsar, R. (2021). Collection and consumption of non-wood forest products in Europe. *Forestry*, 2021: 1–14. https://doi.org.10.1093/forestry/cpab018

Martínez de Aragón, J., Riera, P., Giergicznyc, M. and Colinas, C. (2011). Value of wild mushroom picking as an environmental service. *Forest Policy and Economics*, 13: 419-424.

Martínez-Peña, F., Gómez Conejo, R., and Ortega-Martínez, P. (2007). MICODATA - Geographical information system on the production, use and management of mycological resources in Castilla y León. Available online: http://www.micodata.es (Accessed Date: 14/02/2021).

Ness, M. (2000). Multivariate Techniques in Marketing Research. Curso de Especializacion Postuniversitaria en Marketing Agroalimentario, CHIEAM, Spain.

Okan, O. T, Yıldız, S., Yılmaz, A., Barutçiyan, J. and Deniz, I., (2013). Wild Edible Mushrooms Having an Important Potential in East Black Sea Region. *International Caucasian Forestry Symposium*, 24-26 October, Artvin, Türkiye.

Özdamar, K. (2004). Statistical Data Analysis with Package Programs 2. Eskişehir: Kaan Publications.

Özer, H. (2004). Econometric Models with Qualitative Variables: Theory and an Application, Nobel Yayın Dağıtım, Ankara.

Pekşen, A. and Akdeniz, H., (2012). Nature mushrooms as an organic product. *Duzce University Journal of Forestry*, 8(1): 34-40.

Pellicer-González, E., Martínez-Carrera, D., Sánchez, M., Aliphat, M., and Estrada-Torres, A. (2002). Rural Management and Market-Ing of Wild Edible Mushrooms In Mexico. *IV International Conference on Mushroom Biology and Mushroom Products*, 433-443 pp., Cuernavaca, Mexico. ISBN 968-878-105-3.

Sevindik, M. (2018). Heavy metals content and the role of Lepiota cristata as antioxidant in oxidative stress. *Journal of Bacteriol Mycology*, 6(4): 237–239.

Stryamets, N., Elbakidze, M., Ceuterick, M., Angelstam, P., and Axelsson, R. (2015). From economic survival to recreation: contemporary uses of wild food and medicine in rural Sweden, Ukraine and NW Russia. *Journal of Ethnobiology and Ethnomedicine*, 11:53.

Tekin, V. N. (2007). SPSS Applied Scientific Marketing Research. Seçkin Publishing, Ankara.

Topçu, Y. (2006). *Brand competition and consumer behaviors in dairy products: the case of Erzurum Province*. (Ph.D. Thesis). Atatürk University, Institute of Science and Technology, Department of Agricultural Economics, Erzurum.

Türkoğlu, A. and Gezer, K. (2006). Macrofungi of Buldan Region. *Buldan Symposium*, November 23-24, pages; 377-388. Buldan, Türkiye.

Uzundumlu, S. A. (2011). *Investigation of processed and unprocessed drinking milk consumption behaviors in Erzurum Province*. (Ph.D. Thesis) Atatürk University, Institute of Science and Technology, Department of Agricultural Economics, Erzurum.

Wiersum, K. F. (2017). New interest in wild forest products in Europe as an expression of biocultural dynamics. *Human Ecolgy*, 45: 787–794.

Wiersum, K. F., Wong, J. L.G., and Vacik, H. (2018). Perspectives on non-wood forest product development in Europe. *International Forestry Review* 20(2): 250-262.

Yılmaz, A., Yıldız, S., Kılıç, C., and Can, Z. (2017). Protein contents and antioxidant properties of *Pleurotus ostreatus* cultivated on tea and espresso wastes. *International Journal of Secondary Metabolite*, 4(3;1): 177-18.