

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

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Czech University of Life Sciences Prague

**Faculty of Tropical  
AgriSciences**

**Preferences, prevalence and use of non-timber forest products in  
Bohemia**

Bachelor Thesis

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## **Declaration**

I hereby declare that this work entitled “Preferences, prevalence and use of non-timber forest products in Bohemia” is my own work and all the sources have been cited and acknowledged by means of complete references.

In Prague, 15<sup>th</sup> of April 2016

.....

Adam Janata

## **Acknowledgement**

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## **Abstract**

Due to the changes in the perception of forests and forest products that happened in recent years, the general interest in non-timber forest products arose around the whole world. The products such as mushrooms, forest fruits, honey or nuts started to be perceived as a possible alternative to the timber oriented commercial forest management strategies. Given the fact that NTFPs can play several various roles for the local communities, depending on the region and economic potential of its population, we decided to document the role of forests for the population of Bohemia and to document what were the most used and purchased non-timber forest products there. A consumer survey (n=123) was carried out in eight major urban centres in the region of the Ore Mountains, a rural area that is characteristic for its low economic potential and industrial character, and in Prague, the capital of the Czech Republic as well as the wealthiest region in the country. Food products were the most used ones and consumers from both study sites regarded quality and certification as the most important criteria for purchasing such products. For majority of the respondents, visiting forests represented only a way to relax and NTFPs were not considered as products to be later commercialized. Family showed up to be very important factor for distribution of NTFPs as well as the main knowledge source, and private sellers, especially in case of honey, turned up to be the main distributors of NTFPs.

**Keywords:** population survey, consumer preferences, forest services, forest products, urban areas, rural areas, Czech Republic

## Abstrakt

Vzhledem ke změnám ve vnímání lesa a lesních produktů, ke kterým došlo v průběhu posledních let, vzrostl po celém světě všeobecný zájem o nedřevní lesní produkty. Produkty, jako například houby, lesní ovoce, med či ořechy začaly být vnímány jako možná alternativa ke komerčním strategiím využití lesa, zaměřeným především na těžbu dřeva. Vzhledem k tomu, že nedřevní lesní produkty mohou hrát mnoho různých rolí pro místní komunity, lišících se v závislosti na regionu a ekonomickému potenciálu v něm žijící populace, rozhodli jsme se zdokumentovat úlohu, kterou lesy pro obyvatele Čech představují, a zjistit, které nedřevní lesní produkty jimi byly nejvíce používány a kupovány. Byl proveden spotřebitelský průzkum (n=123) v osmi největších městech napříč oblastí Podkrušnohoří a v Praze, hlavním městě České republiky, které je zároveň nejbohatším regionem v celé zemi. Nejpoužívanějšími se ukázaly být produkty určené ke konzumaci a spotřebitelé z obou oblastí považovali kvalitu a certifikaci jako nejdůležitější kritéria ke koupi takových produktů. Pro většinu respondentů představovala návštěva lesa především odpočinkovou aktivitu a nedřevní lesní produkty nebyly považovány za produkty určené k pozdějšímu zpeněžení. Rodina se ukázala být velice důležitým faktorem v distribuci nedřevních lesních produktů, stejně jako nejdůležitějším zdrojem informací a soukromí prodeji, zejména v případě medu, jako hlavní distributoři nedřevních lesních produktů.

Klíčová slova: populační průzkum, preference spotřebitelů, lesní služby, lesní produkty, městské oblasti, venkov, Česká republika

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# 1 Introduction

Forests have always played an important role for mankind throughout the world. It has always provided the raw material resources that are necessary for survival and further development (Williams, 2002; FAO, 2012). At the end of Pleistocene epoch, after the last glacial period (approximately 10,000 years ago), the human population slowly started to transform from hunters and gatherers into the agrarian society. Together with this change came the need for land clearing and demand for raw materials, which had directly affected forest resources (Williams, 2002). People started to burn the forest down in order to gain land that would feed the growing populations, the so called slash-and-burn agriculture. Usually, when this form of agriculture is used, the burned land later returns to its former state and the forest regrows as the farmer moves to a different area, but when this becomes so intense that the regrowth is not possible, this process is called deforestation (Tinker et al., 1996).

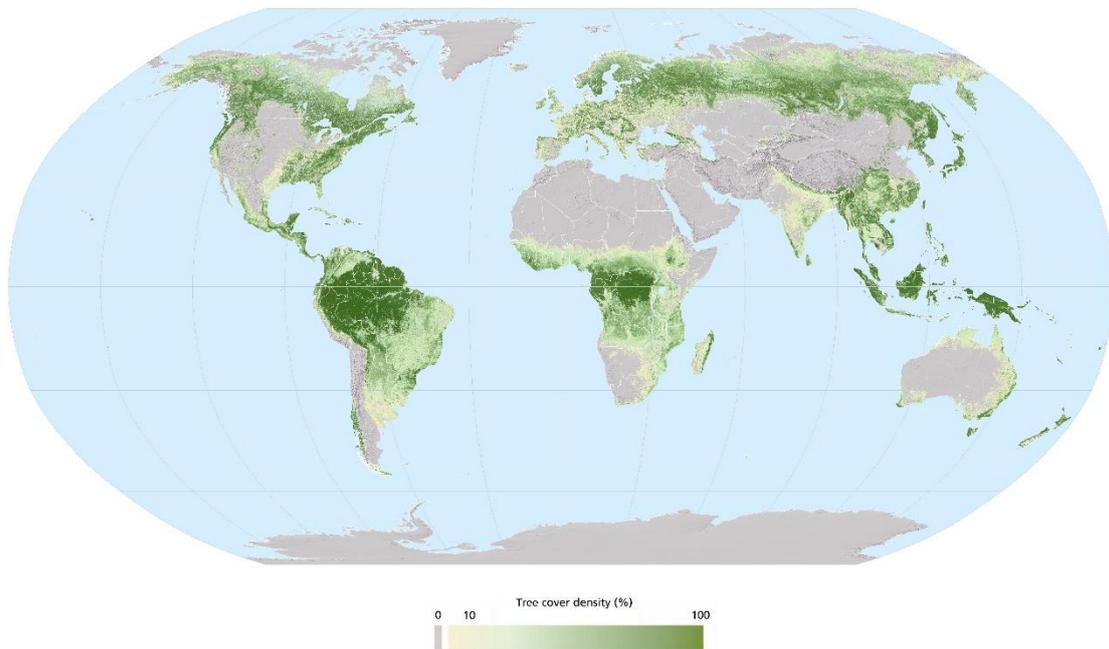


Figure 1 Current distribution of world's forests

Source: FAO, 2010

Together with the land clearing, people started to use wood for cooking, as a construction material, for heating and later as a fuel for the industrial activities. It was about then when man started to alter the shape of Earth to what it looks like now (Williams, 2002; FAO, 2012). This phenomenon had more or less the same course in all regions around the world. As the society of each region evolved and the population rose, the demand for materials kept rising, leading to conflicts, depletion of materials and sometimes, even to desertification (FAO, 2012). Over the past 25 years, the extension of global forests kept declining in area, however the rate of the deforestation slowed down (see Table 1). Generally, there has never been a greater focus at the state of global forests than ever before (FAO, 2015).

**Table 1** Global deforestation over the last 25 years

<b>Year</b>	<b>Forest (000 ha)</b>	<b>Annual change (000 ha)</b>	<b>Annualized* Change</b>
<b>1990</b>	4,128,269		
<b>2000</b>	4,055,602	-7,267	-0.18
<b>2005</b>	4,032,743	-4,572	-0.11
<b>2010</b>	4,015,673	-3,414	-0.08
<b>2015</b>	3,999,134	-3,308	-0.08

\*Calculated as the compound annual growth rate

Source: FAO, 2015

Forest can be multifunctional, depending on which purpose we give it. The protective functions of forest resources have long been set aside, but lately, the raising awareness about the protective functions and environmental services the forest can offer emerged in many countries (FAO, 2010). The protective functions of world's forests range from protection of soils to coastal protection, avalanche control and to the air pollution filter function. Among them, the soil and water protective function is probably the most important. Forests play an important role in the water cycle by increasing infiltration, reducing the runoff velocity and therefore surface erosion, by filtering water pollutants, reducing the impact of floods or improving the precipitation by capturing the cloud moisture (FAO, 2010).

As for the productive functions, traditionally the assessment of forest resources focused on timber production, but this focus has changed and now, the forest products include timber and fuelwood, food (berries, edible plants, mushrooms, bushmeat), fodder and other non-wood forest products (NWFPs) (FAO, 2010). Investment in NWFP production and enhancing the capacities of people engaged in NWFP collection could strengthen the life situation of forest-dependent people, improve the nutrition and overall food security and help conserve the resource base (FAO, 2012). Classification of forest products can be found in Figure 2.

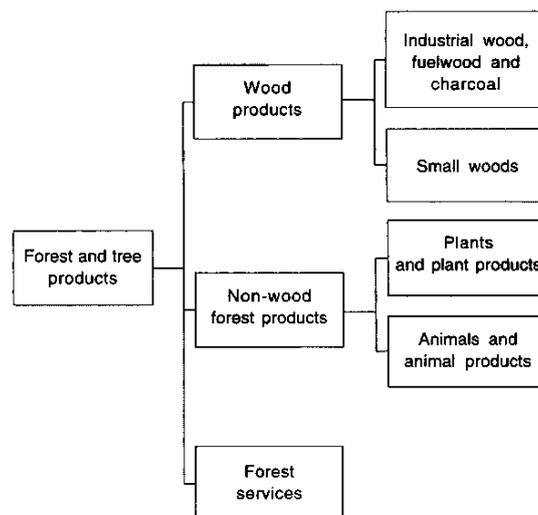


Figure 2 Preliminary classification of forest and tree products

Source: FAO (1999)

Generally, it can be said that the non-wood forest products are important to three groups of people (FAO, 1995):

- Rural populations who have traditionally used non-wood forest products for livelihood, social and cultural purposes
- Urban populations who purchase them
- Traders who supply the non-wood forest product to the urban populations

Even though the inclusion of fuelwood and small woods distinguishes non-timber forest products from non-wood forest products (FAO, 1999), we will continue this thesis without differentiating the two of them.

## 2 Literature review

### 2.1 Non-timber forest products: an overview

Historically, non-timber forest products (NTFPs) were perceived as products of only local and therefore minor importance (Delang, 2006), but by the end of the millennium, the general interest in NTFPs started rising after Peters et al. (1989) published their paper showing that the economic potential of NTFPs can be much higher than of timber. Since then, NTFPs started to be seen as equally important forest resource as timber or even more important and their economical and biodiversity conservation potential started to be further examined. Although the definition of the term non-timber forest products varies in scientific literature, they are generally understood as all the products and materials other than timber collected and extracted from forests in order to be commercialized or directly used by humans, such as fruits, resins, berries, mushrooms, medicinal plants, essential oils, bamboos, rattans or other construction materials and game (Belcher et al., 2005; Shone and Caviglia-Harris, 2006; Delang, 2006; Jones and Lynch, 2007; Kilchling et al., 2009). The inconsistency leads for example to the discussion whether fuelwood and carving wood should be considered a NTFP or not. Regardless of this debate, many studies underline the fact that among other forest resources that are used by humans, NTFPs play a very important and often even existential role for the rural communities across the globe (Shackleton et al., 2002; Marshall and Newton, 2003; Belcher et al., 2005; Kim et al., 2008; Kar and Jacobson, 2012). Due to the proximity to the forests, rural communities often depend on the NTFP collection and use in order to improve their household subsistence and cash income, and NTFPs can sometimes also serve as a safety net in times of low agricultural production (Belcher et al., 2005; Kim et al., 2008; Xayvongsa et al., 2009; FAO, 2012; Schaafsma et al., 2014).

This is particularly evident for the rural communities living in the most remote areas with limited access to fertile land and for the poorest ones, who often directly depend on the NTFP collection (Xayvongsa et al., 2009; Illukpitiya and Yanagida, 2010; Mahapatra and Shackleton, 2011).

## 2.2 NTFPs: developing vs developed countries

So far, the available scientific literature dealing with the issue of non-timber forest product collection and use has been oriented particularly on developing countries (Salick et al., 1995; Ros-Tonen, 2000; Shanley et al., 2002; Senaratne et al., 2003; Trauernicht and Ticktin, 2005; Pyhälä et al., 2006; Guariguata et al., 2008; Jensen, 2009; Pando-Moreno et al., 2008; Xayvongsa et al., 2009; Vodouhe et al., 2009; Mahapatra and Shackleton, 2011; Rist et al., 2012; Schaafsma et al., 2014; Adnan and Hölscher, 2012; Ashton, 2014; Cruz-Garcia et al., 2015; Moktan et al., 2016). While each study deals with its own problems and goals, there is something that connects the majority of them, the idea that NTFPs can help ensure the sustainable forest management and by being promoted, help protect the existing forest stands, their biodiversity and that way provide for the rural people dependent on the forest and theoretically lift the poverty. On the other hand, some of these studies also examine the effect that this aimed NTFP collection has on the original ecosystems.

Nevertheless, the studies on NTFP collection, use and/or consumer preferences were carried out in developed countries as well. In north America for example, many studies focused on the Canadian boreal forests. Kim et al. (2012) examined the cultural uses of NTFPs and their significance to the indigenous people of Sts'ailes in the region of British Columbia, Boxal et al. (2003) and Murray et al. (2005) focused on NTFP collection and use in the subarctic areas of Northwest Territories. The topic of NTFPs in the United States of America has been studied particularly in the area of the Pacific Northwest, by Peck and Christy (2006), who studied the commercial moss harvest in Oregon, Cocksedge and Titus (2006), who examined similar issue of commercial harvest of salal (*Gaultheria shallon*), another product used for floral greenery, and by Jones and Lynch (2007), who focused on NTFPs and their impact on biodiversity, as well as in the east of the USA, for example in the area of the Chesapeake Bay, where Robles-Diaz-De-Leon and Kangas (1999) evaluated the potential gross income that could be generated from the local NTFPs.

Kilchling et al. (2009) examined the demand for NTFPs in the urban zones of Switzerland, documenting high appreciation of the NTFPs by the urban consumers and

high demand for products such as honey, berries, mushrooms and nuts, as well as medicinal and wellness products. In the same time, this study also revealed a gap in the market, when the number of actual buyers showed up to be much lower than the number of people stating they would be interested in buying such products. Another important factor that was revealed were the rising preferences for natural products with quality or regional certification. Similar study, regarding the product certification, was carried out by [Kärnä et al. \(2003\)](#), which examined the influence of forest certification in marketing of forest products in Europe. [Janse and Ottisch \(2005\)](#) examined the factors influencing the role of non-wood forest products and services in the context of Netherlands, a country with very small forest cover, and Norway, one of the most forested countries in Europe. [Croitoru \(2007\)](#) performed a thorough evaluation of the importance and economical value of NTFPs in the Mediterranean region, covering all the countries in the north, east and south of the Mediterranean Sea, demonstrating that NTFPs accounted for around a quarter of the overall economic value of the Mediterranean forests.

Great focus has been also put on the topic of wild edible fungi, particularly in Spain and Finland, where mushroom collection represented a way to generate an additional, often substantial, income for local rural population ([de Román and Boa, 2006](#); [Martínez de Aragón et al., 2007](#); [Cai et al., 2011](#); [Martínez de Aragón et al., 2011](#); [Voces et al., 2012](#)). [Calama et al. \(2010\)](#) performed a review of the existing management models and methods for the main non-wood forest products in Europe, such as cork, pine nuts, berries, mushrooms and resins. [Keča et al. \(2013\)](#) studied the value chains for non-wood forest products in Serbia, analysing the importance of stakeholders or individuals who take part in the NWFP commercialization, such as collectors, processors, enterprises and importers.

### **2.3 NTFPs in the Czech Republic**

There is general lack of scientific literature documenting the collection and use of NTFPs in the Czech Republic. The most recent study focused on the use and marketing potential of the main NTFPs such as berries and mushrooms in the Czech Republic over the last 20 years ([Šišák et al., 2016](#)) and the study by [Kovalčík \(2014\)](#) examined the value of the

same products, berries and mushrooms in Slovakia, which used to form one state with the Czech Republic until the beginning of 1993. In the past years, other studies by Šišák (2006) and Šišák (2011) also documented the socioeconomic importance of non-wood forest products and the public opinion on forest activities. For the general public, the access to forests and forest products is granted by the Forest Act No. 289 from 1995, Article 19 (Ministry of Agriculture, 1995), which grants free entry at one's own risk and permits free collection of any forest product for personal purposes. In the same time, the visitor should act and behave in order to bring no damage to the forest.

### **3 Aims of the Thesis**

The aim of the survey is to document the role of forest and forest products in life of the population in Bohemia.

Specific objectives are to document:

- what kind of non-timber forest products are collected by people living in Bohemia;
- what are the preferences of Bohemian consumers towards quality, availability and prices of forest products;
- what is relationship of Bohemian people towards forest in general.

## 4 Material and Methods

### 4.1 Study sites description

In order to cover different socioeconomic characteristics of the Czech Republic, our study focused on two regions, the Ore Mountains and Prague. Table 2 shows the main characteristics of both study sites. Ore Mountains consist of two administrative units, Karlovy Vary and Ústí nad Labem regions (dark grey), while Prague (light grey) forms one administrative unit (see Figure 3).

The region of Ore Mountains is typical for its industrial character, high unemployment rate and low wages relative to the whole Czech Republic. Prague is the capital of the Czech Republic and one of the most developed regions in the whole European Union considering the per capita income.

**Table 2** General characteristics of the study sites

Study site	Total area	Forest cover	Total population	Per capita GDP	Average wage	Unemployment rate
	km <sup>2</sup>	%	thousands	PP\$	USD	%
Ore mountains	8,649	35.45	1,121	62,0	943.75	8,27
Karlovy Vary	3,314	43.51	298		905.85	6.83
Ústí nad Labem	5,335	30.44	823		957.47	8.79
Prague	496	10.48	1,265	173,1	1363.67	4.19

Source: CSU, 2015

The entire region of the Ore Mountains has had a complicated history due to the German-Czech coexistence since the Medieval times. It was a place where two cultures met and influenced each other on a daily basis. After the end of World War II, the overall atmosphere across the Czechoslovakia towards Germans was not good and it resulted in official forced expulsion of Germans from the Czech lands by the Beneš decrees. To this day, the forced expulsion is a delicate topic and has not been fully resolved. Another important characteristic of the region is its industrial character.

Alongside the whole mountain range lie rich mineral deposits. There are two main brown coal mining sites, the Sokolov basin in Karlovy Vary region and the North Bohemian Basin in Ústí nad Labem region (Kavina, 2009). The Czech Republic also belonged to one of the world's major producers of uranium with 102,245 tonnes of the ore extracted between 1946 and 1992 (Čechák and Klusoň, 2006). However, the main focus still lies with the brown coal (Kavina, 2009). The majority of extracted coal is being burned in thermal power plants. According to ČEZ, state owned energetic company, there are currently six coal fired thermal power plants spread across the region (Tisová, Ledvice, Počerady, Prunéřov, Trmice and Tušimice). They were all built in the period from 1950s till 1970s (ČEZ, 2016) and there is clear link between the energetic boom and the dramatic deterioration of the environment (Kopáček, 2005) that lasted until the 1990s when the political and economic changes came.

The emissions of air pollutants, such as sulphur, chlorine, nitrogen or arsenic caused contamination of air, water resources and soil. The most visible effect though were the acid rains, caused mainly by the sulphur emissions. On the example of Lysina catchment in the west part of Karlovy Vary region, the aerial photographs taken in the years 1953, 1969 and 1991 showed 70% decrease of the mature, over 100 years old spruce forest extension leaving only younger, more recently planted trees (Hruška, 2002).

Prague is the capital of the Czech Republic as well as the biggest city in the country. The amount of people living there equals approximately one tenth of the whole Czech population and the GDP per capita is more than two times higher than in the North West of Bohemia. This makes it unique region with living conditions that cannot be found anywhere else in the Czech Republic. The city forms its own region, which is located in the very centre of Bohemia and is completely surrounded by the Central Bohemian region.

## **4.2 Data collection**

Inspired by previous studies (de Román and Boa, 2006; Kilchling et al., 2009; Šišák et al., 2016), we decided to collect our data at frequented locations near shopping centres

and markets from passing-by people. Every potential respondent was approached individually and asked for willingness to participate in our survey. Personal interview consisting of 16 questions, both open and close ended, was used as the main technique for data collection. Figure 3 demonstrates the distribution of the sites selected for data collection. The largest urban centres spread across most of the mountain range were chosen in the area of the Ore Mountains.

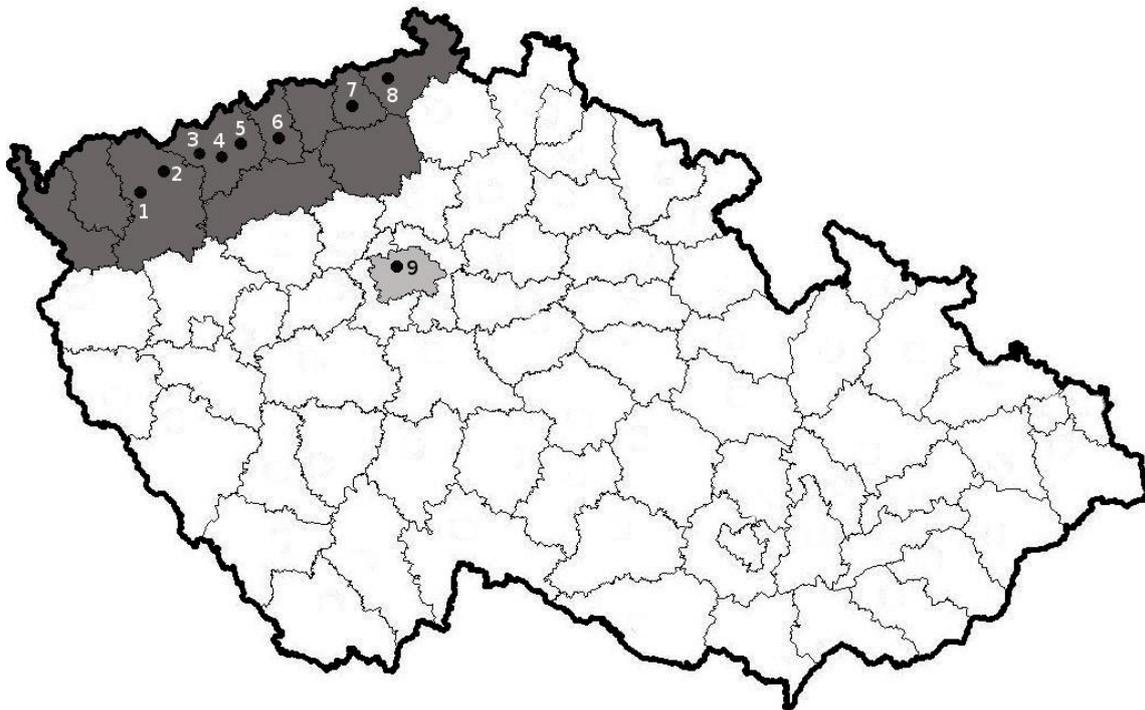


Figure 3 Distribution of the data collection sites in the Ore Mountains region: Karlovy Vary (1), Ostrov nad Ohří (2), Klášterec nad Ohří (3), Kadaň (4), Chomutov (5), Most (6), Ústí nad Labem (7) and Děčín (8), and in Prague (9)

Similar approach was applied in Prague, where the respondents were addressed particularly at so-called “farmer’s markets”, an open air public markets that take place at the main squares of the cities and usually offer products of local origin or even homemade products, on various locations throughout Prague (i.e. Jiřího z Poděbrad, Tylovo náměstí and Vítězné náměstí) and around the specialised shop Country Life near the Staroměstské náměstí that focuses on products of healthy lifestyle, or products with various kinds of certifications such as bio, fair trade, local products or products from small productions that should offer better quality than the products fabricated at large scale. All the data was collected in the period from September 2015 to December 2015.

### 4.3 Questionnaire

The questionnaire consisted of 16 questions, both open and close ended. When creating the questionnaire inspired by [Kilchling et al. \(2009\)](#) and [Šišák et al. \(2016\)](#), we made a set of questions and then tested it on 16 subjects to refine the questions and possible answers into the final version, which you can find below (see Table 3).

**Table 3** The questionnaire used for the survey

Question	Possible options
<b>Which of the following products do you use, and if so, do you buy/collect/receive</b>	a) Forest fruits b) Medicinal herbs c) Mushrooms d) Nuts e) Ornamentals f) Roots g) Seeds
<b>If you usually buy any of the products listed above, where</b>	a) Farmer's market b) Private seller c) Specialised shop d) Supermarket
<b>Which of the following criteria do you look for when buying a NTFP</b>	a) Certified origin b) Price c) Quality d) Regional origin e) Taste
<b>Where do you learn about NTFPs</b>	a) Family and friends b) Farmer's markets c) Internet d) Literature e) Magazines f) Specialised shops
<b>How often do you usually visit forest</b>	a) Not at all b) Very rarely (once a year) c) Rarely (twice a year) d) Regularly (once a month) e) Frequently (several times a month)
<b>How far is your residence from the forest you usually visits</b>	a) Close (within a short walk distance) b) Up to 5 km c) Up to 15 km d) Up to 30 km e) More than 30 km
<b>What is the main purpose of your forest visit</b>	a) Collection of NTFPs b) Recreation c) Work
<b>What was the latest NTFP you bought or collected</b>	Open answer
<b>Do you personally believe that consumption or use of NTFPs has any effect on you</b>	a) Positive effect b) Negative effect c) No effect d) Indifferent
<b>Where did you grow up</b>	a) Village b) Town c) City
<b>Where do you live now</b>	a) Village b) Town c) City
<b>How old are you</b>	Open answer
<b>What is your highest level of education</b>	Open answer
<b>What is your current occupation</b>	Open answer
<b>How many people live in your household</b>	Open answer
<b>Would you be willing to disclose the approximate monthly income of your household</b>	Open answer

## 5 Results

### 5.1 Characteristics of the respondents

Total number of 123 respondents from the two study sites participated in the survey, 80 of them being from the Ore Mountains and 43 from Prague. The response rate reached 62.0% and 87.8% respectively.

**Table 4** Demographic and socio-economic characteristics of the respondents

Characteristics	Unit of measure	Ore Mountains	Prague	t-test
Average age	years	48.8	42.0	0.012
Average household size	n	2.26	2.86	0.001
Average monthly household income	USD	1,384	2,453	0.000

Source: based on CSU, 2015

Generally, the typical respondent in our survey could be characterised as a female, of 46.4 years of age, having the secondary level of education in the Ore Mountains and university level in Prague, living in a household with 2.47 other people and having monthly income of 42,974 CZK (1,757 USD) (see Table 4). The distribution of education level among the two study groups showed up to be in contrast. In Ore Mountains, the majority of respondents stated various types of secondary education (67.6%), followed by university degree (22.5%). In Prague, the situation was quite the opposite, when majority (62.8%) of the respondents stated university degree to be the highest educational level reached, followed by secondary education (32.5%).

### 5.2 The latest NTFP purchased or collected

Mushrooms (39.8%) were cited as the most frequented recently obtained product, followed by forest fruits (17.1%), honey (16.3%), ornamentals (14.6%) and nuts (13.8%). The products such as forest fruits, honey and nuts were cited more frequently in Prague, whereas mushrooms were cited more frequently in the Ore Mountains (see Figure 4).

The products such as medicinal herbs, roots and seeds showed up to be out of interest of the respondents at the time of the study.

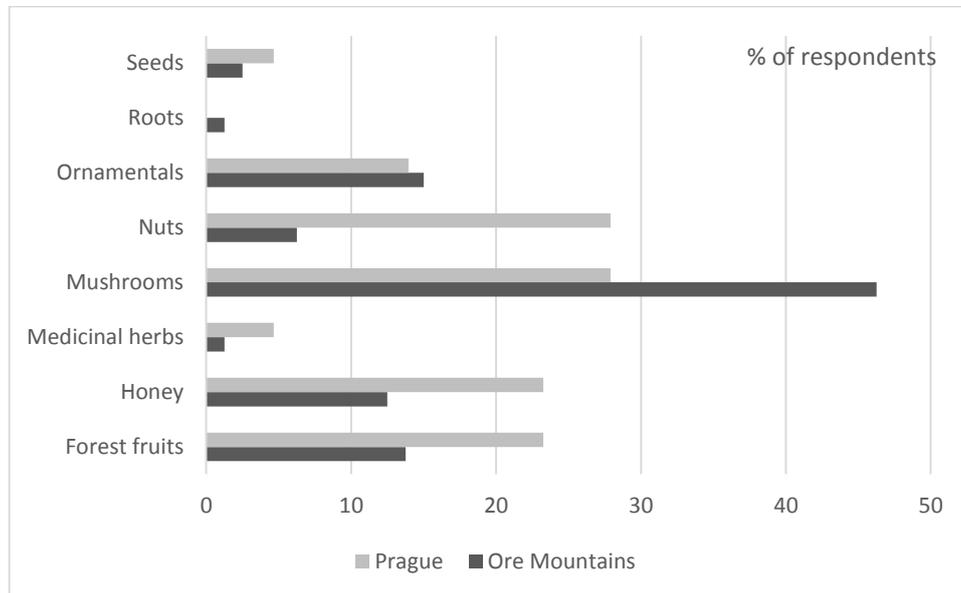


Figure 4 The latest product that was purchased or collected by the respondents

### 5.3 Personal feeling of the respondents on the effects of NTFPs

The belief that NTFPs had a positive effect was cited by the majority of respondents both in the Ore Mountains and Prague (75.0% and 90.7% respectively), followed by no effect (20.0% and 9.3% respectively). There was a difference in the perception of NTFPs by the both study groups, however small it might have been. Only 3.3% of the respondents cited they did not have any opinion on this issue whatsoever.

### 5.4 Use of NTFPs

Forest fruits, honey, mushrooms, medicinal herbs and nuts were the most frequently cited NTFPs (see Figure 5). Additionally, no difference between both study sites was observed in using forest fruits, mushrooms, roots and seeds. On the other hand, respondents from Prague tend to use more honey, nuts and medicinal herbs. Only the ornamentals showed higher popularity in the Ore Mountains.

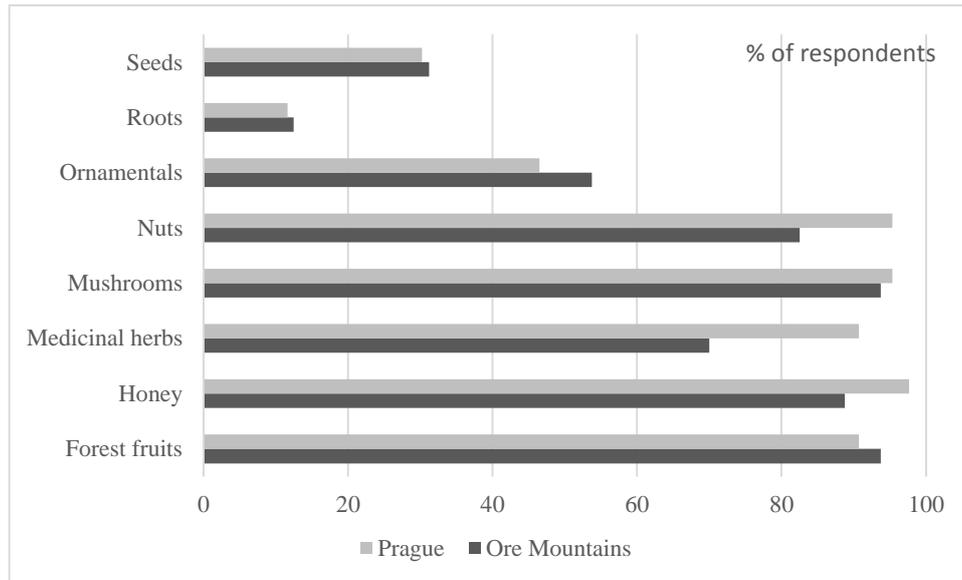


Figure 5 Forest products reported by the respondents as the most used ones

### 5.5 Acquiring of the NTFPs

Honey (75.6%), medicinal herbs (52.9%), forest fruits (45.5%) and nuts (37.4%) were the most frequently purchased products. Differences appeared in the demand for mushrooms, nuts and medicinal herbs, which were more demanded in Prague, and honey, more purchased in the Ore Mountains (see Figure 6). The products such as ornamentals, roots and seeds showed up to be of a very little interest to the respondents, reaching 2.4%, 4.1% and 6.5% respectively.

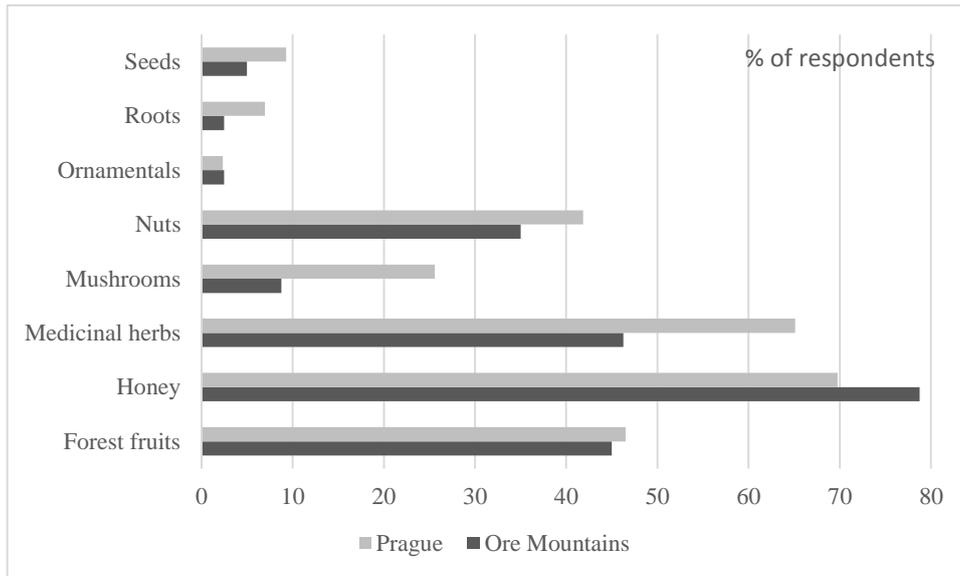


Figure 6 Forest products reported by the respondents as the most purchased

Mushrooms (80.5%), forest fruits (65.0%) and ornamentals (49.6%) were the most frequently collected products. While mushrooms showed up to be equally popular for both study groups, differences appeared for the ornamentals, which were more collected in the Ore Mountains, and for forest fruits, which were more collected in Prague (see Figure 7).

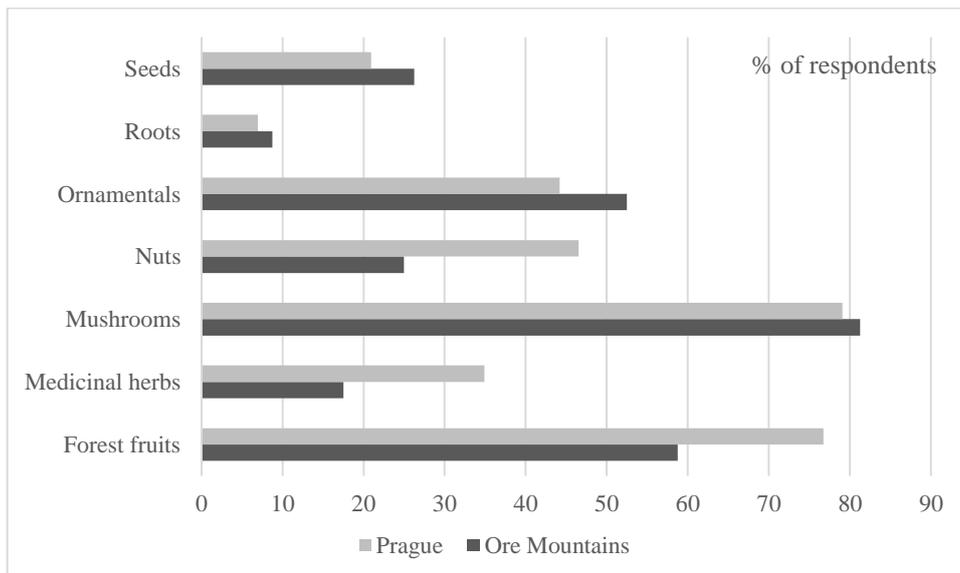


Figure 7 Forest products reported by the respondents as the most collected

The products such as nuts (32.5%), seeds (24.4%) and medicinal herbs (23.6%) were also

collected quite often, with the difference that nuts and medicinal herbs were collected twice as much in Prague and seeds were slightly more collected in the Ore Mountains. As for the third option of acquiring the product, respondents also stated they had received the product in the form of a gift (see Figure 8).

Nuts (33.3%) and honey (17.9%) were the most often received products, with the difference that both nuts and honey were received more in Prague than in the Ore Mountains. Forest fruits were also quite more often received by the Prague respondents, but altogether, this product was cited only by 4.8% of all the respondents.

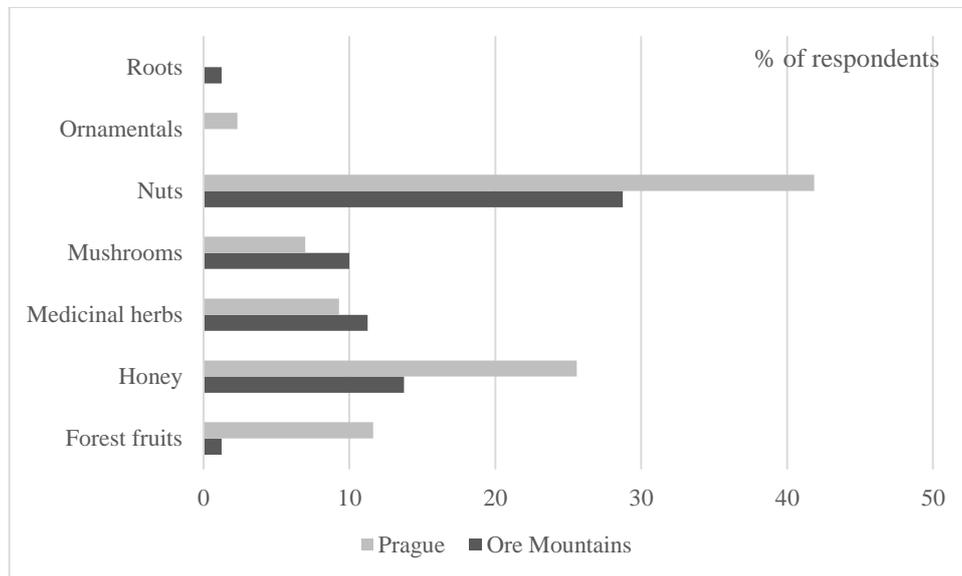


Figure 8 Forest products reported by the respondents to have been received as a gift

## 5.6 Consumers' preferences regarding NTFPs

In the Ore mountains, private seller was selected as the main source to buy the products from (68.8%), followed by supermarket (35.0%). On the contrary, in Prague, farmer's market (62.8%), specialised shop (58.1%) and private seller (55.8%) were all selected with nearly the same rate (see Figure 9).

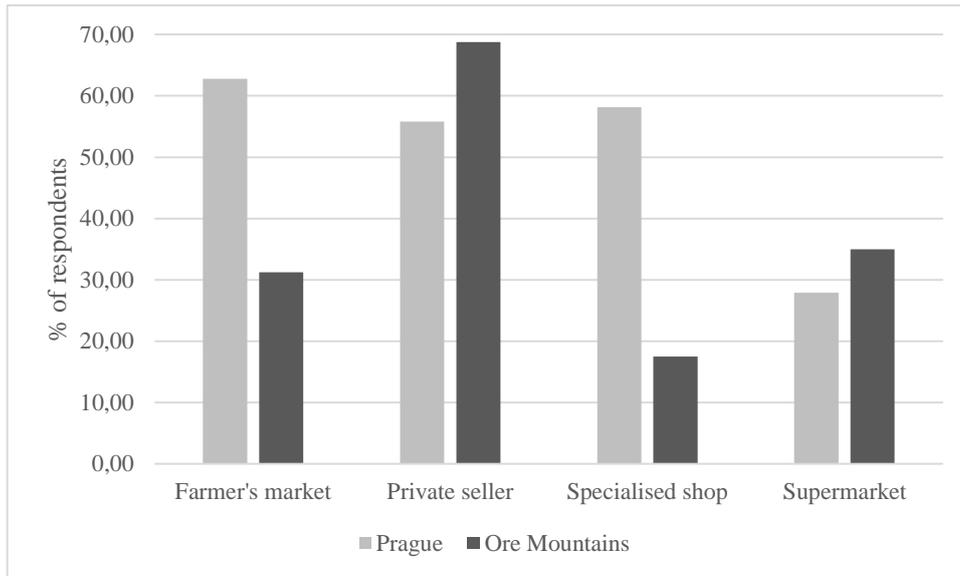


Figure 9 Places the products were being purchased at

Quality was identified as the most important criteria for purchasing particular forest product (71.5%) with nearly no difference between the Ore Mountains and Prague, followed by taste (51.2%), certified origin (48.8%), regional origin (41.5%) and price (35.0%) as the least important. Differences appeared between the two study groups, when certified and regional origin were reported to be more important in Prague and taste and price slightly more important in the Ore Mountains (see Figure 10).

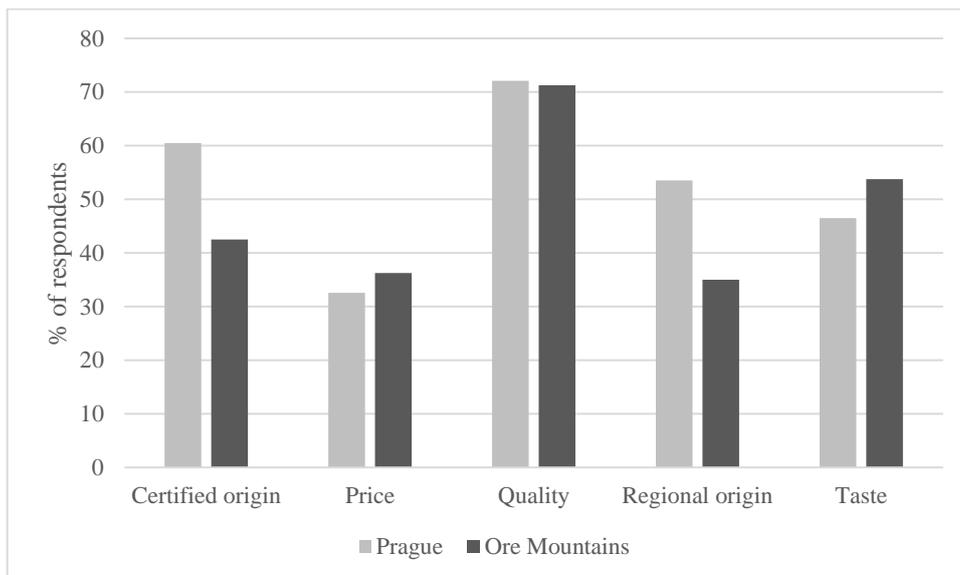


Figure 10 Criteria influencing the customers' choice when purchasing NTFPs

Family and friends was selected as the most common source of information (73.2%), followed by the internet (62.6%), literature (26.8%), magazines (25.2%), farmer's market (22.8%) and specialised shop (14.6%) (see Figure 11).

The options family and friends, internet and magazines were selected more or less equally by both study groups, but differences were found for farmer's market, literature and specialised shop, that tend to be more sought by the respondents from Prague.

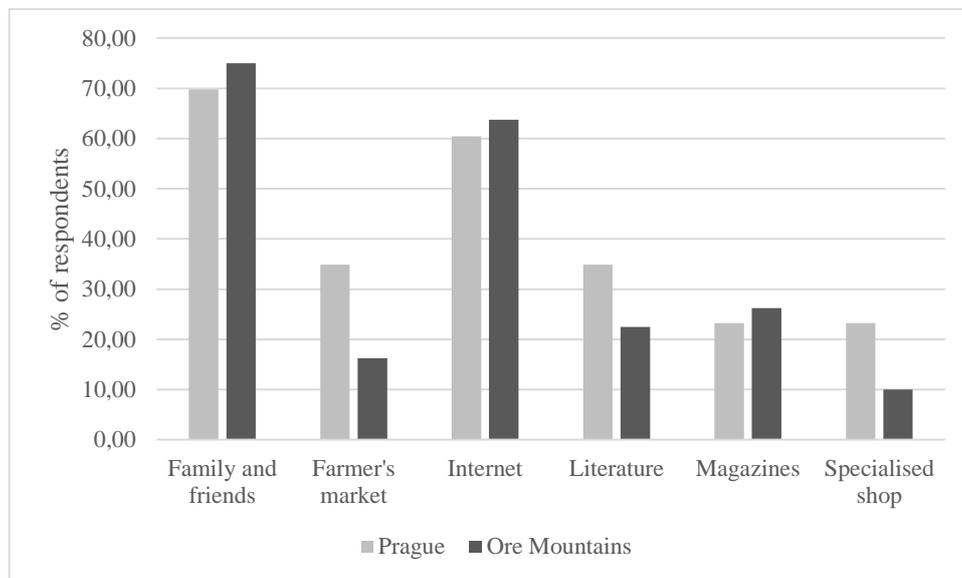


Figure 11 Sources of the respondents' knowledge about NTFPs

## 5.7 Forest visits

The majority of the respondents cited they had been visiting forest frequently (54.5%). The following options regularly (21.1%), rarely (17.1%), very rarely (4.9%) and not at all (2.4%) decreased gradually as the frequency of forest visit became more occasional (see Figure 12). The only notable differences can be seen in the options regularly, that was cited more in Prague and frequently, cited more in the Ore Mountains. For majority of the respondents, recreation (86.2%) was cited as the main reason for visiting forest, followed by collection (11.4%). No one cited the reason for visiting forest to be work related. No differences were found between the two study groups.

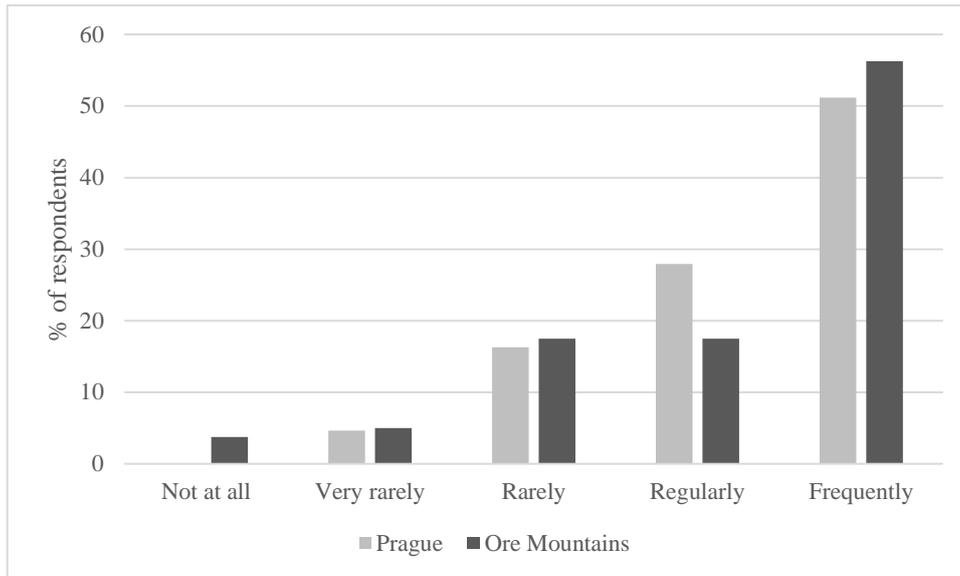


Figure 12 Frequency of forest visits reported by the respondents

Most of the respondents cited they lived close to the forest (30.1%), followed by the options up to 5 km (29.3%), more than 30 km (17.9%), up to 15 km (12.2%) and up to 30 km (8.1%) (see Figure 13). Clear differences were found for the options close and up to 5 km, which were more selected in the Ore Mountains, and more than 30 km, which was selected mostly in Prague. However, surprisingly high number of the Prague respondents also cited they lived close to the forest or up to 5 km to it.

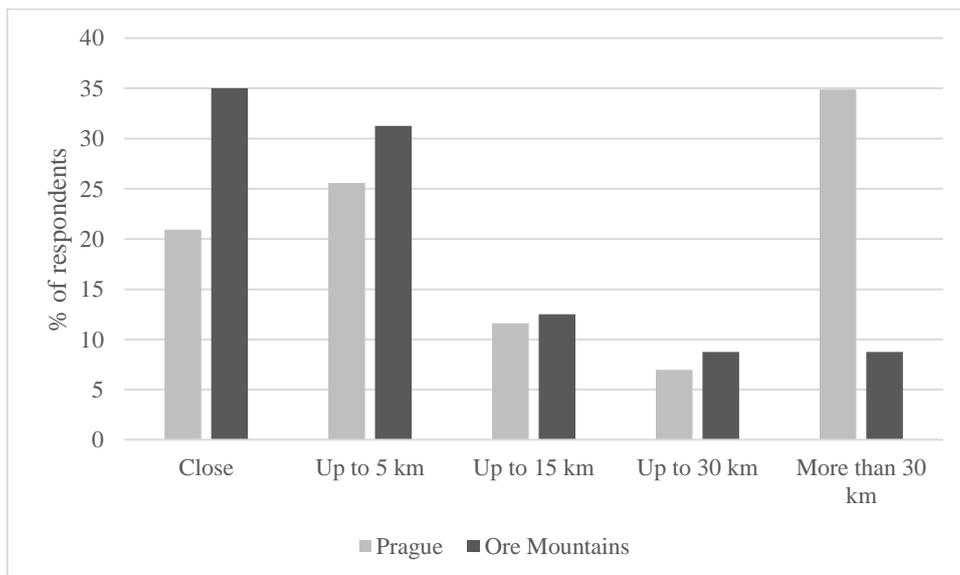


Figure 13 Distance the respondents had to travel to reach the usually visited forest

## 6 Discussion

Our work documented high interest in both collection and purchasing of NTFPs, especially mushrooms and forest berries by the population in Bohemia, which confirms previously published studies (Šišák, 2006; Šišák et al., 2016). Our respondents also expressed their interest in collection and purchase of other NTFPs such as medicinal herbs, nuts and honey, similarly to the situation in Switzerland (Kilchling et al., 2009). These products, together with forest fruits, showed marketing potential, which was documented by the fact that more than half of the respondents cited that they usually seek and purchase such products. According to our respondents, criteria such as quality and certification play the most important role when purchasing NTFPs. Czech people, especially those living in Prague, want to know the origin of the products they consume and therefore the regional or quality certification could enhance the added value of the marketed NTFPs. This fact corresponds with the tendencies in north-western Europe as it was studied by Kärnä et al. (2003). Similar to Swiss urban consumers, who were willing to pay an extra price for high quality non-timber forest products (Kilchling et al., 2009), Czech consumers shared the same will, which was expressed by the fact that only one third of the respondents cited price as an important factor when buying a NTFP, but more than 70% of them regarded quality as the most important factor. Additionally, half of the respondents believed that high quality of the available NTFPs, both collected and purchased, offers also better taste qualities and therefore they preferred this kind of natural products rather than the usually available mass products. Based on our results, many respondents obtained the products such as nuts or honey in form of a gift, often from their relatives, which has not been documented in any study before. This presents a new perspective on the topic of NTFPs as products that are shared among relatives and friends without any economic interest, suggesting another level of social importance of NTFPs.

The consumer preferences regarding the distribution sites of NTFPs showed great importance of private sellers. For nearly 70% of the Ore Mountains respondents, private seller was the main source they bought NTFPs from, and they expressed rather distrust

towards the rest of options such as farmer's market, specialised shop and supermarket. On the other hand, Prague respondents value the private seller the same way, and additionally seek NTFPs at farmer's markets and specialised shops. A special case among all the products was honey, cited as the number one product to be purchased from private seller. Nearly all the respondents who stated to be buying honey immediately added they knew the beekeeper in person and that they had established this relationship with one particular honey producer and held on to it for a long time. This offers a possible research opportunity for future studies to examine how important the private small scale honey producers are for Czech society.

Mushrooms are the typical example of a non-timber forest product that represents historically specific product very commonly collected in the forests of Bohemia. However, in contradiction to studies from Spain and Finland (Cervera and Colinas, 1997; de Román and Boa, 2006; Cai et al., 2011; Voces et al., 2012; Tehvanainen et al., 2016), they seem not to have any kind of economic potential for Czech people in terms of commercialization of collected mushrooms at local markets. None of the respondents participating in our survey cited their forest visits to be related to income generation and considered visiting forest a leisure activity or a way to relax. All the respondents, who cited to be using mushrooms, did it for their own consumption. This shows certain similarity between the aboriginal population of Sts'ailes people living in British Columbia and Czech population, given the cultural and social aspect the NTFPs represent for both populations, rather than being products to be commercialised, as it was studied by Kim et al. (2012). Certain link also appeared in case of Gwich'in people living in the Mackenzie river delta region in Canada, who, even though that some of them would be willing to sell the collected NTFPs (in this case berries), did not perceive these products as something that should be collected with the clear intention of selling it in first place (Murray et al., 2005). This situation is opposite to the studies from other European countries where local populations take more opportunistic strategy towards forest products, especially mushroom collection, and see in this activity an additional source of income, particularly because of high unemployment rate, such as in Finland (Cai et al., 2011).

For majority of the respondents, both from the Ore Mountains and Prague, the main source of information about NTFPs were their relatives and friends. This could indicate how deeply have the NTFPs been set into Czech culture over the centuries, and that the oral tradition of passing the knowledge on new generations still prevails as the most important source of knowledge regarding the NTFPs. Second most important source of information for our respondents was the internet, complemented by the information obtained at the farmer's markets and specialised shops in case of Prague respondents.

This study has its limitations however. Data were collected particularly during the period of September – December, which could have influenced our results in the way that majority of mushroom species, that are being collected, bear fruits during autumn. In a certain manner, our respondents could have been also influenced by number of national holidays, which are celebrated during autumn, such as St. Wenceslas Day on 28<sup>th</sup> of September, Day of the Foundation of the independent Czechoslovak State on 28<sup>th</sup> of October and Struggle for Freedom and Democracy Day on 17<sup>th</sup> of November, and upcoming Christmas time. Additionally, autumn is considered a time of seasonal illnesses, particularly respiratory issues, as well. This could have influenced the preferences and attitudes of the respondents regarding forest medicine or higher sensitivity towards quality of the final products.

Another factor influencing the results could have been the fact that many of those living in Prague originally grew up in rural areas of the Czech Republic and are newcomers to the capital. More than two thirds of Prague respondents stated town or village as the place they grew up in, but 90.7% of them chose Prague as the place they are living in now. This fact that great part of the people living in the capital has not originated there, could have reduced the differences between the respondents from the Ore Mountains and those from Prague in the final results. The Prague respondents might have misunderstood the term of forest, as a place where NTFPs could be collected, as well, because more than 45% of them cited to be living close or up to 5 km to a forest they usually visit. Places like Divoká Šárka or Kunratický les were often cited, but these places, even though they represent areas with forest cover, cannot be considered forests the same way as in the Ore Mountains, particularly due to the fact that they represent two of the few natural sites

close to Prague that can be reached easily, and therefore are visited by great amount of people each day. Last, but not least, final results could have been influenced by the fact that the majority of our respondents were females, who were in general more willing to cooperate in our survey compared to male population.

## 7 Conclusion

This thesis has proven that forests and forest products are highly regarded among the inhabitants of Bohemia. Certain products such as mushrooms, forest fruits, honey, medicinal herbs or nuts were used by majority of the population participating in the survey and several products also showed marketing potential that could be used for possible subsequent commercialization of NTFPs. The population of Bohemia shared several characteristics with the inhabitants of other parts of Europe, especially the consumer preferences, however, they did not perceive forest in the same way as for example the populations of Finland or Spain, that took more opportunistic position towards forest products. Forest activities, including the collection of NTFPs, were regarded as a leisure activity without any commercial subtext for population of Bohemia, similarly to some parts of Canada. Very important factor for Czech people in the context of NTFPs turned up to be family, which substituted the commercial market quite often, and was the main source of information about NTFPs. An important role of small scale honey producers was discovered through our survey, as well as the role of private sellers, who provided the distribution of marketed NTFPs for majority of the respondents. The survey also indicated the connection that certain part of the urban respondents participating in our survey had with the rural areas of the Czech Republic they were born in. In general, forests and forest products confirmed to be of great importance for people living in Bohemia and this attitude towards forests gave us a better insight on the possible forest use managements.

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