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Forestry and Wood Technology
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The study of recreational use of the part of Pelhřimov city forests

The diploma thesis

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Abstract

The aim of the thesis was to familiarize the public with non-timber forest products in the selected location. Location is found on the territory of which is managed by the Forests of the Czech Republic, s. p. The thesis was developed in cooperation with the Forest service Pelhřimov. The theoretical part of the thesis deals with the issue of non-timber forest products in Europe and a comprehensive analysis of the conditions, characteristics and properties of analyzed territory. It was used the method of literature search. In the practical part was in the vicinity of the site carried out the questionnaire survey, which became the basis for the preparation of draft nature trails including the accompanying infrastructure. At the conclusion of the work have been established the estimated cost of the implementation of nature trails and a potential source of funding.

Keywords: educational trail, non-timber products, Velký Špičák (Large Tusk)
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1. Introduction

"Hello, forest..." By this short phrase, I have been taught from the childhood how should I appreciate the forest and its products. The forest is full of interesting places, natural phenomena, and products, that one has often at hand and yet to him they are hidden. Discovering the gifts of the forest and the warning to them is one of the missions of the nature trails.

Nature trails combine the knowledge and the time spent in a nature which many people are missing nowadays. In addition, walking through a nature trail is not consuming at all, person does not special equipment nor the finances and it may become an undemanding leisure activity.

One of the places that are worth a visit is also the surroundings of the Velký Špičák (Large Tusk). The surrounding area is characterized by almost untouched nature. The nature in that area is influenced by a man either in a positive or negative sense. A significant influence on this landscape has historical connection with the Velký Špičák. As for today it is a representative sample of the original species, variety of forest communities in the highlands. Currently, the site is a national nature reserve of Velký Špičák protecting for forty years natural mixed forest with typical plant undergrowth.

The idea of a nature trail is to connect the value of places with certain non-timber forest products in this area and also to give interesting information about non-timber forest products in other countries of Europe to visitors of different ages.

Collection of non-timber forest products is very popular and this activity is in the Czech households very widespread. One of our phenomena - collecting the gifts of the forest - sometimes greatly interferes with the field of forestry and nature protection in the forests, so the topic is so very up to date. Picking berries is for many people a common and favorite activity, but some of the pickers don't realize or even have no idea about the risks to the forest environment pantographs with their occasionally irresponsible behavior represent.
Either free time, walks in the forest or picking berries, each activity has some rules. The entrance to the forest is defined by forest law on the General use of forests § 19 Use of forests. According to the law, everyone has the right to enter the forest at their own risk, to collect there for their own use the fruits and dry lying foliage. The person is still obligated to the forest not to harm, to avoid interfering with the forest environment and to respect the instructions of the owner, or tenant of the forest and its employees.

The intention is to focus on the recreational potential of the territory, the issue of the collection of non-timber forest products in the Czech Republic and Europe and the subsequent design of the nature trail.

Important topic for today's and future generations is to be aware of the importance of forests – even only because it gives us so needed oxygen and perform a host of other important functions.
2. **Aim of thesis**

The main goal of this thesis is the study how to familiarize the public with the non-timber forest products in the actual area by the nature trails in the district of Jihlava. The thesis also aims to propose topics of each suspension according to the evaluation and use of information detected by the sociological investigation. Supporting objectives of the thesis is to inform about non-timber forest products in our country and in Europe, a comprehensive analysis of the conditions, characteristics and features of the researched territory.
3. A literary overview of issues

3.1. Definition of terms

Rekreation
Recreation is a human activity in the landscape environment, which realizes in his spare time and which serves to regenerate physical and mental strength and to satisfy personal interests. The word recreation comes from the Latin "creare", which means to form. The prefix "re" indicates the reversible character and it follows that "recreation" is a new formation or better: re-creating. Recreation is the subject of the examination of the discipline recreology. (Schneider et al. 2008)

The recreational potential of the territory
It is a summary of the environmental, vegetation, cultural and social factors that influence the maximum capacity of action of the territory of the man and his recreational activities. The intensity of use of the recreational potential is limited by the loading capacity of the landscape, or the recreational capacity of the territory, which is given the general limits of the use of land and other sociological and cultural aspects of the presented, in particular by preserved landscape impact.

Recreational potential consists of two elements:
- recreation attraction, which is defined as the sum of the appropriate natural, historical, cultural and social conditions of the territory
- recreational infrastructure, which constitute the elements of allowing recreational utilization (accommodation and catering capacity, information centers, etc.) (Schneider et al. 2009)

The nature trail
Nature trails are generally marked educational route led naturally or culturally notable spaces on which they are selected some of the major phenomena and objects, and those are particularly explained. The interpretation of the specified locations is served usually on the information panel or on tour text, or a combination of both ways. If there are only sporadic significant effects and objects, which do not allow the effective establishment of nature trails, it is established a point of information panels. (Schneider et al. 2008)
The function of the forest (in the Czech Republic and Europe)

The forest is a complex system, consisting of forest soil and bedrock, forest cover, air, small watercourse and water surface, as well as from the live folder – phytocenosis and zoocenosis. Forest is a natural wealth; the environmental resource for man, for the community has also social and economic importance, market and non-market importance. Forest is to some extent at the same time a private and a public estate. The social function of the forest only exists because of the existence of man. The person evaluates the social function of the forest on the basis of their requirements and needs in the monetary and non-monetary form. (Ecology forests ecosystems, 2016)

Forest law no. 289/1995 Sb. defines the concept of a function of forest in section 2 (b). The purpose of this act is that the features of the forest benefits from the existence of the forest, which is divided into profitable and non-profitable. The profitable function of the forest has for the community material importance (economic impact), the non-profitable function for the community is the importance of nonmaterial (social impact).

Production (economical) and non-producing (ecological and social) functions of the forest are for the community vital. Economic, ecological and social functions of the forest are from the point of view of the importance as equally essential. Important is their concurrent and sustainable action.

The production function of the forest refers to the ability of the forest ecosystem to produce biomass, especially of wood material, while maintaining the continuity of the production. The market functions of the forest are wood production function and function to produce non-timber raw materials. Non-producing, or non-market functions of the forest can be divided into two groups. First group of ecological functions is stabilizing function, water economy, ground protection and climate-air protection function. Second group is the social features which includes free time, health (for example, the spa forests), cultural-instructive and any other functions (for example forest serving for the defense of the state).

As stated in the book: "For the non-producing functions of the forest tend to be referred to such a function, that forest certainly perform, but are not outwardly visible. It is not
“easy to enumerate all the non-producing functions of the forest, for which there are many.”

(Staněk, 1996)

On the basis of what features in the forest are predominant, the forest is divided into three categories; protective, economic and forests of special purpose. The first group characterizes the localization. This is an alpine forests, forests on extremely unfavorable habitats and forests in the dwarf pine vegetation zone. Forests of special designation are those for which the public interest in the protection and implementation of the non-profitable functions of the forest prevails over the interest of the use of its production function. Economic forests are then all the others.  

(Act no. 298/1995 Sb.)

The needs of the community to the functions of the forest is changing over time, depends on the economic and social level of the society, its cultural traditions and customs. For various cultural societies and nations brings forest different values. For my thesis, it is from the above-mentioned functions of the forest the most important the ability to produce non-timber products suitable for collecting and nutrition. And just picking berries and mushrooms is according to the Šišák research from 1996 focused on the purpose of the visits to the forest in the Czech Republic the second most common reason to visit the forest in our country (28% of the respondents). The main reason to visit the forest is for 48% of the respondents’ relaxation.  

(Šišák, 2009)

**Free time use of forests (in the Czech Republic and Europe)**

The youngest of the functions of the forest include free time and tourist use of forests. The expansion of transport, especially cars, approaches the forests to people from the cities. More and more people seek a healthy environment of the forest to be recovered or for a short time break from dehumanized environments of large cities and industrial areas.  

(Mezi stromy, 2007)
The forest as a free time (restful sports) environment has according to the Křístka a few basic assumptions, which enhance its restful importance:

- forests occupy in industrialized countries, where there is the greatest interest for the rest in nature, a significant portion of the national territory, e.g. in most European states forests represent more than 10% of their land area
- the specificity of forest production and the method of forest management allow the depending on terrain conditions, nature of crop and the conditions of their protection and the free movement of vacationers in growth area
- the microclimate of the forest along with its hygienic influences creates emotive and health effects conducive to refresh and relax the human body
- the emotional effect of the forest landscape and the forest environment is another important restful effect of the forest
- forest provides to its visitors a plethora of learning about the nature

(Křístek et al. 2002)

3.2. Legislation (forest act, etc) of non-timber forest products

The right to enter the forest in the Czech Republic has each person. Except for the forests where there is a warranty term for the state defense. § 20 of the forest act, however, prohibits carry on some specific activities in the forest. These include the disturbance of peace and silence, the erosion of the soil cover, collecting of seedlings, seeds and seedlings of trees and bushes of forest tree species, damage and extraction of trees and bushes, the collection of mistletoe and loranthus. Last but not the least is in the forest prohibited by the law to collect the fruits of the forest in a manner detrimental to the forest, ride a bike, horse, ski or sled off the designated path, entering the enclosed or prohibition of the entry of the marked places, to litter or pollute the forest, ride and park motor vehicles in the forest and some of the other activities. Breach of the prohibition on some activity with the offender commits the offence pursuant the section 53 of the forest act. Authority of the state administration of forests may for some of these offences impose a fine up to 15,000 CZK. For picking up berries in a manner of detrimental the forest threatens a fine of a maximum of 5 000 CZK.
In compliance with the established restrictions we have a supervision of the Forest guard. Its responsibility is, inter alia, pursuant to section 39 of the forest act to supervise the compliance with the obligations associated with the general use of the forests, to notify the defects found in the forest. The forest guard also may impose and collect fines for offences committed in connection with forest law. The delegate can penalize undisciplined collector. However, this is mostly to sporadic clampdowns, with the assistance of the police and on pre-selected sites in the period of the most massive collection. This concerns in particular the collection of blueberries. The collection of other food in nature is not the law quite clearly modified. Forbidden is to collect only the protected species or plants and animals in specially protected territories. Although the forest is as much private property as any other land, the collection of raw materials on its surface has other rules than for the collection on other private properties. Tearing the plants or the fruit on private land outside the forest can be considered as robbery. The sheer access to private land may be undesirable. In the past was therefore recommended before the collection of any flora species, obtain the consent of the owners of the land to the collection of specific species.

The Czech legislation in relation to the collection of food in nature

The Czech laws talks about the wild plants and animals and their protection as follows: Protection of nature and landscape according to § 2 of the law no. 114/1992 Coll. The law about protection of nature and landscape means a defined care of the state and natural and legal persons about the wildlife, flora and their communities, minerals, rocks, paleontological findings and geological units, taking care of the ecological systems and landscape wholes, as well as care about the appearance and accessibility of the landscape.

According to § 5 of the General protection of the flora and fauna of this act, all species of plants and animals protected from destruction, deterioration, collection or capture, which leads or could lead to the threat of these species of its being or to their degeneration, to the disruption of the reproductive capabilities of the species, the extinction of the population of the species or the destruction of the ecosystem of which
they are part of. In violation of these conditions of protection is the authority of nature protection entitled to prohibit or limit intrusive activities.

3.3. Non-timber forest products

The definition of non-wood forest products used here is the one which was adopted at that meeting in Indonesia (FAO, 1995):

NWFPs consist of goods of biological origin other than wood, as well as services derived from forests and allied land uses.

This definition is intended to encourage better accounting of NWFPs, of both plant and animal origin, as a group and their contribution to the national economic indexes which policy-makers use to decide development priorities and policy. As such, it admittedly does not cover many important cultural and environmental forest functions. The definition will no doubt continue to be refined as the field evolves. (FAO, 2016)

The main source of revenue in the forest economy of the Czech Republic is revenues from the wood which represents approximately 85%. However, the forest environment provides other materials both organic and non-organic nature, which has got for human society a great advantage. The importance of the forest for community, therefore, primarily does not only lie in the production of wood, although it is a significant renewable source of eco-friendly material. (Simanov, 2004)

In 1957 Mr. Ivan Klastersky pointed out in his publication The Fruits of our flora the enormous and as yet untapped wealth of our nature. He designed the elaborate plan for the collection of forest fruits, mushrooms and other useful raw materials in order to get the most out of nature in an appropriate way, in hand with the greatest profit. He also focused on subsequent handling of the collected fruits, their transportation, sales, processing in specialized plants and in the home. In the publication there is a detailed botanical description of the flora species.
Even though collecting raw material stays for the many people the main reason why they are in their free time collecting wild foods, the motives for this activity may be more. The investigation of the socio-economic significance of the collection of forest products carried out among the visitors of the forest and gatherers of forest products in 2006 Ms. Havlíková. The main purpose of collecting forest products according to this investigation is the direct consumption in households (47%), the second place is occupied by the free time and relaxation importance (40%). The financial benefit was the most important for 13% of the respondents. 

(Šišák, 2009)

Most of the authors are dividing the raw materials collected in the woods into two groups: mushrooms and berries (e.g. Šišák). In the foreign literature are summarized under the term "non-timber forest products" (non-timber forest product non-wood forest products, special forest products). The associated forest extraction and related forest production in the world can be found under several concepts, such as Minor Forest Products, Non-Wood Forest Products and Non-Timber Forest Products.

- Agro forests (edible fruits, mushrooms, dyes, spices)
- Agren forests (energy wood)
- Crafts (handmade products)
- Hunting, fishing (license, venison, fur)
- Forest Activities - tracking, mountain biking, orienteering, jungle walking, horseback riding, ecotourism, canoeing, photo safari, surviving, war games (paintball), bird watching and wild life observation.

Central Europe (Czech Republic)

The fruits of the forest

Fruits of the forest (forest fruit) are edible fruits and seeds of forest plants, which are not only a rich source of vitamin C, but the contained mineral, aromatic substance and the sugar, give them a characteristic aroma and taste, for which they are sought. Simanov (2004) divides the fruits of the forest into the following groups:
- pome fruit (e.g. pome of crane sweet fruit, haw)
- stone fruits (various drupes, such as sloes, black without)
- berry fruit (the berries of the plant cranberries: blueberries, cranberries; berries of the plant pink bloom: similar to bog of small, mutually grown together drupe: raspberries, blackberries; to berry fruit is assigned also the false berries such as strawberries, rosehip and juniper berries)
- shell fruit (hazelnuts and nuts)

In conditions of the Czech Republic are of particular importance and rowan trees, sloes, haw, cherries birdhouse, crab apples and pears, elderberries, blueberries, cranberries, bilberries, raspberries, blackberries, strawberries, rosehip, juniperberries, hazelnuts and walnuts. As reported by Simanov (2004), traditionally the highest average annual purchase was for elderberries (1882 t), hips (1646 t) and blueberries (625 t). From the existing statistical data shows that in the Czech Republic per year on 1 ha of forest land has been redeemed around 2 kg of berries. Whereas picking up berries for their own use (which the current forest law allows) is likely to be higher than a buyout, this is certainly of significant additional production from the forest land.

The market attractiveness of forest fruit leads to a plantation the way of its acquisition of cultivation on forest land otherwise difficult to recoverable (e.g. under the electric lead), or deliberate bringing into the stands. For example, from the plantations in northern Italy are blueberries, raspberries, blackberries, cranberries, black currant and gooseberry adds 3500 and 4500 tons per year (data from the year 1990). A prospect is considered to be the cultivation of American blueberries (Vaccinium corymbosum) and develops the production of forest crops pharmaceutically significant, e.g. hawthorn general (Cratageus oxyacantha), dogwood the general (Cornus mas), oleaster (Eleagnus sp.), sea buckthorn (Hyppophae rhamnoides), elderberry black (Sambucus nigra), rose flesh bloom (Rosa pomifera), temnoplodce – aronia (Aronia sp., And. melanocarpa, And. arbutifolia, And. prunifolia), and others. (Simanov, 2004)

From the point of view of forestry it is interesting (and may even be commercially successful) the cultivation of fruit trees in forest stands. Planting fruit trees into forest stands enriches their species composition and brings the specific environmental effects, besides, the enlargement of the food chain for some of the organisms of the forest
ecosystem. Important is also the production of well marketable assortments coals (e.g. in 1994, furniture producers purchased veneer cherry cutouts from abroad in the price level of up to 35 000 Czk per 1 m3, when comparable quality oak cut-outs from the territory of the country was the price of the max. 5000 Czk per 1 m3) and the possibility of collection and utilization of the fruit. (Simanov, 2004)

The most commonly picked berries in the Czech Republic belong to the families of the cranberries (Vacciniaceae) and blight (Rosaceae). At this point, I introduce the characteristics of the most popular wild fruits in our country.

**Black berries** (*Sambucus nigra* L.) it belongs to the family of berries; its fruit are the elderberries. It flowers from June to July. The fruits are black in flower fruits. The black berry grows mostly in forests, mainly in the field of ruderals forest decking, on the bushy hillsides, and the bounds, along the roads, on the rubbles and in the fields. It occurs especially on the moister, nitrogen-rich soils from the lowlands to mountain areas. (Kubát, 2002)

Elderberries are collected as a raw material for the production of jams, syrups and many other food items. Besides the fruits, the bloom of black berry can be harvested and after drying, useful for example to prepare tea.

**Blueberry black**, or **cranberry blueberry** (*Vaccinium myrtillus* L.) it belongs to the family of cranberries. We are collecting most often its fruits. Blueberry bushes are high 15 – 60 inches with mostly angular, green branches. The flowers are white, white-greenish or pinkish tinge; grow singly or in racemes of two to four flowers. Blueberry bushes blooms from April to June. The fruit are berries usually blue, rarely then whitish or reddish. It grows most often in the forests, on the heath, the moors and the rocks. It occurs abundantly at different altitudes, in the lowlands, however, rarely. (Kubát, 2002)

The use of blueberries is wide, the fruits can be consumed fresh and preserved, often freeze or produce jams and syrups. From the leaves of blueberry can be used to prepare tea.
The next representative of the family of cranberries is **cranberry** or **cranberry general** (*Vaccinium vitis-idaea L.*). This species form the bushes growing to a height of 10 – 30 centimeters. Cranberry blooms from May to July. The fruit are the berries of red colour, rarely whitish or yellowish. They grow mainly in light forests, on heath, moors, or rocks of different height, in lowlands rather rarely. 

(Kubát, 2002)

Products of cranberry are popular mainly in the countries of northern Europe, where it found widespread use in the cuisine and medicine.

**Strawberry general** (*Fragaria vesca L.*) it belongs to the family of blight. This is a plant of the high-5 to 25 inches with trifoliate leaves. The fruit is a strawberry of red color, and spherical to conical shape. It grows on forest glade, clearings, bushy hillside, embankments, screes. It is widely widespread from the lowlands to the mountain area.

(Kubát, 2002)

Forest strawberries, as fruits of strawberry of the general dubbed, are eaten mostly fresh, but thanks to the intense flavors are also a favorite part of syrups and jams.

**Raspberry general** or blackberry raspberry (*Rubus idaeus L.*) is also a representative of the family of blight. Raspberry is a bush growing up to 0.5 to 2 meters. Fruits of raspberry are red, sometimes yellowish. It grows in bright forests, on forests edge and in intersections, glades, stream bank, on a wet to damp places. But rarely in the most dry timberline places.

(Kubát, 2002)

Popular are particular fresh fruits of raspberry, they can be, however, processed for jams and syrups.

**Black berry** of Rubus (*Rosaceae*). Shrub of black berry is formed high arc shoots. Shrubs of this subgenus bloom quite early, the inflorescences are usually grape like. The flowers are usually white to pink. Sorosis are red to black, in manicured varieties
sometimes yellow. Most of the species grow on forest edges, edges of paths and fields, in open forests. It occurs at various altitudes.  

(Kubát, 2002)

Fruits are for its distinctive color and taste of a favorite part of syrups and a variety of mixed fruit products.

**Mushrooms**

Mushroom pickers, respondents Langová (2011) the main motivation of the collection of the mushrooms, said in the first place the nature, respectively, stay in it, then the rest, the gastronomy, the acquisition of knowledge, aesthetics of mushrooms.

Among the most popular mushrooms, picked in our forests include mushrooms (genus Boletus), for example, the mushroom bun, brown, velvety, oak and many others. Other sought-after species are foxes, the cossacks, mushrooms, and more. Early as possible the mushrooms begin to grow in the deciduous and pine forests, later in spruce. Those, however, are the fungi most abundant.  

(Rozsypal et al. 2003)

**The oyster mushroom** (*Pleurotus ostreatus*) is a very abundant species originating from China. Nowadays it is extended from the tropics to the polar zone. It is woodfailing fungus from the family of Pleurotaceae. Fruiting bodies appear most often in October and November. It grows on living or dead deciduous trees (most commonly on the beech, lindens, poplars, chestnuts and willows). The nutritional value of mushrooms is close to the nutritious value of the vegetables, they are valuable source of proteins and amino acids, minerals and fiber. Woodfailing mushrooms bring in addition appropriate diet’s composition and many of the preventive and medicinal substances for the civilizing disease. Therapeutic and preventive effects of oyster in China are famous since a couple of centuries, traditionally used to strengthen the vascular system, loosening the joints and tension in the muscles.  

(Lepšová, 2002)
Medicinal plants (herbs, trees)

In addition to the mushrooms and berries used as food, it is possible in our forests and wild to collect also many medicinal plants. As an example, centaury, leaved, liverwort, ungulates, lungwort, fern, horsetail, gentian, sphagnum moss, crow eye, sea anemones, lime blossom, birch leaves, the juice of the birch and maple trees.

The collection of medicinal plants from the collection of wild fruits differ in that it is not collected only the fruits, but often also the underground parts of plants, roots, rhizomes and tubers. Such a collection may lead to the demise of the whole plant and the excessive collection often leads to the liquidation of the entire population of the species in the locality. Similar consequences may have taking away the whole seedlings of forest plants from the original habitat into the gardens. Such seedlings are engraving even with roots; it may lead to complete devastation of some sites. As follows they have been from our free nature taking away for example orchids, lily of the valley but also bushes of blueberries. Many of the forest took always seedlings will never take up in the gardens at all.

A special group of wild food is so-called psychoactive plants and fungi that are in our country in recent years very enjoyable and grows popularity. It is essentially about drugs or narcotic substances used in the form of simple or complex products, to achieve the effect on the psyche or changes in sense perception. (Alberts, 2006)

The inhabitants of the Czech Republic can be considered as the diligent gatherers of wild food. Every year on our territory they collect in average, nearly four tens of millions of kilograms of forest products from the above mentioned major categories, which, on a per-household makes per year, more than ten kilograms (see annex 1 Amount of the collection of main forest products to the visitors of the forest in kg/household of the Czech Republic in the period of 1994-2012). The amount of collected crops varies in different regions of the Czech Republic. Differences affect the proportion of wooded areas and population density. Residents of the capital of Prague are going to collect fruits of the forest mainly in the Central Region. The most exposed in terms of the number of pantographs are mainly the areas near the major cities and recreational areas.
**Tilia cordata** is indigenous in Europe, it occurs virtually throughout the territory of the Czech Republic, in the mountains above 900 m, n. m., however, mostly completely missing. Small-leaved lime is a very useful tree. It is planted for timber, as an ornamental and shade tree, as melliferous tree or for its flowers, which are highly prized in folk medicine.

The flower is collected even before the full florescence, as in it may not be the fruits. Picked flowers are dried and used for preparation of lime-blossom tea, or combined medicinal mixtures. The active substances have broad range of application, e.g antispastic effects (against cramps), increase sweating, they calm, lowering blood pressure and softening the skin.

Tea, which is often used in a mixture with the *Sambucus nigra* or *Lamium album* is used in diseases of the respiratory system, especially colds and coughs, where it helps to release mucus. Furthermore, it is used in problems with the kidneys and bladder. It is reported the usefulness of even in the weaker issues of the gallbladder. It regulates the activity of the gastrointestinal track. Decoction helps in nervous tension and scrupulosity, lowers cholesterol and strengthens blood vessels.

Lime bark is used for the production of footwear and ropes. Currently used in basketry and in the manufacture of decorations. (Příroda, 2016)

**Urtica Dioica** is one of the best medicinal plants, an awry, perennial herb tall over 1.5 meters. The most commonly occurs on the edges of forests, in waterways, fences and piles of rubble, from the lowlands up into the mountains of the whole of Europe. This known medicinal plant which is used in cosmetics (creams, shampoos, soaps) or as a cleaning herb in mixtures, or alone. The extract from the nettle can be sip in the long term, but caution is required, some atopic patients can irritate. For its high content of vitamin C and early onset of the vegetation (from the spring can repeatedly freeze) it is popular into the spring stuffing. Experts claim that the best spinach is just from *Urtica dioica*.

The best time to collect *Urtica dioica* is in the spring. From March to April is harvested mainly young shoots, however, if we mow it we can reap almost the entire year. We use 4-6 a maximum perched leaves including the petiole and the shoot. The roots and seeds
are collected from August to November. The roots of the nettle is dried in the sun, the aboveground part of the nettle is dried in bouquets suspended in a dry and shaded place. Dried nettle can be stored in the canvas bags.

*Urtica dioica* has a cleansing, detoxifying, astringent, tonic and modifying antirheumatic effects and also lowers blood pressure. It thus, acts antiviral, against the cough; it is suitable for diabetics, as it reduces the level of blood sugar. It acts good on the stomach and liver, promotes digestion, secretion of bile and emptying the bowels. Nettle can be served in anemia, supports blood formation, purifies blood and it also helps in internal bleeding. It is used in flu, treat urinary and respiratory organs. Especially in the spring helps nettle revive the metabolism.

Nettle is used against hair loss and for their strengthening. Nettle hair water suppresses itching of the scalp and the formation of dandruff. Returns the shine to dark hair and light hair darkens. (BOTANY (a), 2015)

**Christmas trees**

Christmas trees are derived for educational interventions (it is necessary to carefully plan the time of execution), of the side roads and plantations (mainly black pine, and exotics, but also the pine forest). With regard to the current (and future) prices of christmas trees it can be assumed that the profitability of plantations will increase and especially in the production of market desired tree species (*Abies alba, Abies grandis, Abies concolor, Pinus nigra, Pinus srobus, Pseudotsuga sp., Tsuga canadensis, Pices pungens* etc). The cultivation of christmas trees on plantations in Europe, it is known for more than fifty years and for the past period of time has become an important way of the use of agricultural land. (Simanov, 2004)
**Birch wicker**

Birch brushwood is theoretically brushwood, but from a business point of view it is of the annual shoots and perennial branches of birch (*Betula verrucosa, Betula pubescens*) showing the targeted quality characteristics corresponding to the use purpose. Birch brushwood is used for the manufacture of birch brooms, the production of hoops for some types of drums, the enrichment of the steel, carbon (only for high-grade steel, for less high-quality steel was the birch genus replaced cheaper fuel blocks). Birch brushwood is obtained during the extraction, while educational interventions in youngsters and possibly pruning. Benefits are just perfectly lignified and matured branches, and the shoots, i.e., that mining tends to be limited to the period from 1st November to 31st March. At the option of the customer, however, can be realized even mining at the time of the vegetation. (Simanov, 2004)

**Osier**

Osier plantation is used for the production of osier (one-year shoots of willows) and willow sticks (multi-annual shoots, of a thickness of 12 to 30 mm with a length of over 120 cm), which are the basic raw material for basket production. Osier plantation may be formed in positions up to 600 m n. m. on the unshielded more elevated plains, slightly sloping land with a deep and moist soil. It is suitable to soil flooded, not, however, mudded. The willow has a large number of species, varieties and forms, which, from the point of view usable in basket; sorted into groups according to the thickness of the wicker: the species providing the thin willow are *Salix rubra, Salix purpurea*, thicker wicker provide *Salix hippophaeifolia, Salix americana, Salix viminalis* and wicker thick provide *Salix triandra, Salix alba* and *Salix alba, it vitellina*). (Simanov, 2004)

**Foliage**

Foliage is a collective term crown parts of trees with a maximum thickness of 7 cm and branches including assimilation authorities and flower fruits (pine needles, leaves, cones). Foliage can be obtained by pruning standing live trees, limbing (felled trees) and
trimmed (in trimming willow and poplar heads). Foliage remains generally at the site of extraction and after his break with the nutrients it returns to the cycle of nutrients. At the same time, however, constitutes a volume of significant, though little used source of forest dendromasy (formerly were forests in the vicinity of villages cleaned and each house was stored the foliage in the wisps). It is estimated that for every 1 m³ of harvested timber falls 0.15 m³ foliage including the tree green. (Simanov, 2004)

Comely foliage is a traditional product, whose consumption is not decreasing even in modern times. It is gained either by pruning, or limbing, but which may not cause damage to a live tree. The extraction of trees with decorative foliage need to reasonably plan that came out on all „souls day“, or for the pre-Christmas period, when comely foliage increased demand. To produce a decorative foliage is, however, possible throughout the year and either of the common conifer tree species (in particular, they valued the branches with cones), or from introduced wood (Picea pungens, Abies concolor, Tsuga canadensis etc). Customers, however, require even the foliage of the broadleaf (in the winter season into bouquets and wreaths) and it is mainly from oak, beech and alder (cones) and sometimes even the actual pine cones. (Simanov, 2004)

**Europe, the northern part**

Berries and mushrooms, collect not only the Slavic peoples, although, according to the Fin (1998) just the Slavs in the collection of the hub stand out. Similarly passionately as in our country the mushrooms are gathered for example, in Slovakia, in Poland or in Russia.

In some European countries the mushrooms are not collected at all. For example, in the UK are fungi generally considered to be poisonous. (Šišák, 2009)

In the collection in the forest growing berries in Europe stand out the Scandinavians. For example, in Finland, the collection is annually more than 50 million kilograms of wild berries. The most popular forest fruits are for Scandinavians cranberries, which are harvested and exported freezes and is used for example for the production of jams. In addition to the cranberry, however, in Finnish collects about 20 edible species of
berries, such as blueberries, cloudberry and buckthorn berries. The Finns also probably consume the largest number of wild fruits in the world, the 8.3 pounds per person per year. The Finns consider the fruits of the forest public property, their legislation allows the collecting of the fruits in the forests and in the swamps without the permission of the owners of the land. (Himelrick, 2001)

The great advantage of the collection of wild fruits in northern Europe is also that, while most industrial areas and cities are located in the southern areas of the Nordic countries, forests full of wild fruits decompose on the north, therefore, are not so much contaminated by various pollutants of cities and they are not even fertilized or chemically treated. We can say that they are therefore, by our standards, in the BIO quality. (Himelrick, 2001)

*Rubus chamemorus* occurs throughout the subarctic zone of the northern hemisphere. In Europe it grows in Scandinavia, in the northern part of the Baltic region and Russia. This kind of blackberry has a very different taste from the others; it is juicy, slightly acidic, and rich in vitamin C. In the northern countries is used to make marmalades, compotes and liqueurs. Earlier in Scandinavia was used the tea extract leaves for against urological problems. In Sweden jams from them is used as a topping on ice cream, toast or waffles. It is also shown at the Finnish two Euro coins. (BOTANY (d), 2015)

*Arctostaphylos uva-ursi* is a dwarf, evergreen shrub of the family *Ericaceae*, in Europe widespread in Scandinavia. The use of it we can find mainly in medicine, the preparations of *Arctostaphylos uva-ursi* acts pro diuretic and antiseptic to the urinary tract, and therefore is used in particular in inflammations of the kidneys and bladder and in the kidney or bilious stones. In folk medicine it is recommended to take the leaves bear even when dropsy, diabetes, and tuberculosis of the kidney. (Atlas rostlin, 2013)
**Birch sap**

Available sources mainly mention the use of birch sap in the Nordic and Baltic nations (Belarus, Ukraine, and Latvia). Birch water is 100% plant water, an excellent product from the birch, which through the root system filters tap water, ridding it off from toxins then it enriches for the nutrients, vitamins and minerals, and finally the water is completed with solar energy. Strengthens the nervous system, activates the metabolism, helps in the treatment of rheumatism, diseases of the kidney, liver and the digestive system. The juice can be handled, for example, on the ferment, wine and syrup.

(Paleček, 2011)

**Europe, the southern part**

**Truffle**

Truffle (Tuber) belongs to the division of Ascomycota. They occur mainly in the Mediterranean, such as France, Spain, Croatia and Italy. They grow mainly in oak and other deciduous forests. It is known for many species, most of them are prized as a culinary delicacy. The ancient Romans baked or cooked them in red wine and ate food together with olive oil or added into the soups and pates. Furthermore, they were used to the spicing the chicken, to scallop a goose liver, a variety of roast meats, also given into the pates and salamis, making truffle ketchup and the market supply them as a canned food.

(Freedman, 2000)

**Pine nuts**

*Pinus pinea* grows around the Mediterranean Sea, has large ovate cones, which covers a brown seeds, the core inside them is white and they are called pine nuts. They are from the seeds the best digested, have a high content of unsaturated fatty acids, beneficial effect on our blood vessels and heart, strengthens the nervous system, lungs and reproductive organs, improving the throughput of the intestines and have a slightly laxative effect, is also active against dry cough and are an appropriate remedy in
anemia, disorders of the nervous system, anxiety, excessive stress and greater mental strain. (Sunflower, 2016)

**Chestnuts**

*Castanea sativa* is a deciduous tree from the family of *Fagaceae*. Most are grown in southern Europe, in Italy, for example. *Lod* is a well-known delicacy throughout Europe. Usually they are heat-regulating by incising the tip of the cross and a short baking on a hot stove, but they can be even grind into the flour. Edible chestnuts have a higher energy value than potatoes. In southern Europe the people eat chestnuts with vegetables, with meat or with butter and cheese. (BOTANY (b), 2015)

**A cork oak**

*Quercus suber* is a deciduous tree from the family of *Fagaceae*. The original is in the south-western and southern Europe, now occurs in the whole Mediterranean, Tenerife and Gran Canary. *Quercus suber* is cultivated for natural cork, which is obtained by peeling the bark at intervals of 8 to 12 years. The first harvest can be done after about 25 years from planting, when the strain reaches at least 70 cm in circumference, the quality cork for making stoppers it is not until after the third harvest, thus after 75 years. Cork from the first harvest is processed mainly for decorative purposes. Some trees can reach ages up to 500 years. The plantation of these trees, similar to the fruit alleys, is strictly guarded and are protected and controlled by the ministry of agriculture. The biggest grower of the cork oak is Portugal, which is considered to be the country supplying the market cork of the highest quality. Among the other growers and processors in cork is Spain, Italy, to a lesser extent, then France and Italy. (BOTANY (c), 2015)

**Snails**

Garden snail (*Helix pomatia*) has spread to central Europe in the 11th century, and is in some countries called a snail edible.

The collection and breeding of snails as a food raw material has a long tradition in Europe, although its popularity over time has varied. Snails were already the ancient Romans, by importing them from Illyrie and from Africa, where it is treated in the so-
called cochlears, and fed, for example, boiled wine, wine leaves, flour or vegetables. In the middle age were the snails bred in the monastery gardens, for the christians were a fast food. Snails also serve as a source of fresh meat for sailors on long voyages, after capping can withstand without injury alive for a long time without supply of water and food. For the delicacy is considered up to 18th century. In Austria – Hungary were set up snail farms, famous at that time were also Ulms snail farms that year exported $ 4 million snails. State of the art snail farms however, remained in France, where the consumption of these snails ranged in the hundreds of many of millions per year. In France, the distinction between the two main types of snails, the so-called "great white" and "little gray", which was with us at that time quite rare in France, however, high priced. (Soukup, 1906)

**Olives**

Olives are grown mainly in the Mediterranean (60 % of the world's production comes from Italy, Spain and Greece). To produce 1 l of oil is needed 5 kg of olives (pressed with whole fruit). From one tree to reap is approximately 20 kg of fruits per year.

Assessing the quality of the oil:

- after shaking it should not occur bubbles
- after "suctioning" should not create layers
- in the refrigerator should harden

(Mateljan, 2016)

Compare the aspects of collection of wild food in different countries of the world, however, is not simple. The applicability of the data on the market with naturally found ingredients is according to the authors Turtiainena and Nuutinena considerably different in the individual European countries. The Data are often incomplete and incomparable to each of the states. Many countries publish only gross estimates of the amount of the collected raw materials, because the collection of accurate data is too complex, moreover, forest fruit and mushrooms are not considered to be as economically important as other sectors in the country and so there is little interest in monitoring their market. The third important reason, why are the dates on the collection of berries and
mushrooms as insufficient, according to the authors of it, that the only part of the collected raw materials heading to the organized markets. As well as in our country and elsewhere in Europe is so common, that the fruits of the forest sold from the collector directly to consumers, without resellers required permits or most of its profits to any tax, nor this share is recorded in the official statistics, it can be estimated for example by questioning the community.
4. The methodology of the thesis

4.1. The selection of the territory

Suitable attractive site was identified in the framework of the fulfillment of study practice in Forest governance in Pelhřimov. The ranger was recommended to me by relaxing and is an educational area interesting territory (Fig. 1) in the vicinity of the top of a Velký Špičák (Large Tusk).

![Fig. 1: The selection of territory](image)

4.2. The study of literature and other resources related to the issue

To obtain information for the literature review, a comprehensive analysis of the conditions, characteristics and properties of the researched territory and the proposal for the nature trails have used information from books, scripts, scientific articles, internet sources, interviews and communication with interested people, a visit in the tourist centre of Třešť, and with the cooperation of the forest report Pelhřimov, that the forests of selected sites are managed by.
4.3. The field research of the territory
In the selected area was carried out several field surveys. The beginning field surveys were followed with ranger Ms. Kotlíková for the mapping of the appropriate territory and orientation in it. First independent field research serve to the knowledge of the territory, were suggested non-timber forest products. During the second field survey was taken the first photo using Iphone 5S. A field survey was determined feasibility and the current status of forest roads, which should result in a proposed nature trail, the current natural conditions and the state of the landscape. In the field was suggested place for the construction of information boards and other devices of the trail. Place individual information boards have been mapped and recorded by GPS.

4.4. Sociological investigation
In the context of the investigation was created a questionnaire with eighteen questions. For the distribution of the questionnaires was suggest more places where it would be appropriate questionnaires placed or offer to respondents. From the selected surrounding villages we managed to get an agreement on the location of the questionnaires at the municipal office in Třešt, Vílanec, Jezdovice, in the tourist centre of Třešt and in the municipal library of Třešt. Polling and survey information were also made directly in the field surveys at the personal meeting with passersby. Survey was conducted from October 2015 to January 2016.

Completed questionnaires were transcribed into the computer program Microsoft Office Excel and evaluated. The outputs of the investigation were used in the design of the nature trails.

4.5. Content and graphic information boards
The Text and graphics on the information boards corresponds to the principles referred to in the literature. Selected topics of the individual stops and their range were chosen on the basis of field surveys and in consultation with Ing et Ing Jiří Kadlec, PhD. The Content of the individual boards includes the non-timber forest products in a given
location, which visitors will be in the passage of nature trails pass. The draft texts of the posters will also be based on a questionnaire survey.

4.6. Possible sources of funding
We have searched possible funding sources. We approached the Management of the forests in Pelhřimov with requests for the disclosure of relevant and timely information to the financing options for the nature trails.
5. The wider spatial relations and natural conditions

5.1. The administrative breakdown of the

NUTS 1 (the territory of) – Czech Republic (code CZ0)

NUTS 2 (region) – South-east (code CZ06)

NUTS 3 (county) – Highlands (code CZ063)

LAU 1 (district) – Jihlava (code CZ0632)

(Centre for Regional Development of the Czech Republic, 2014)

Village – Třešť, Vílanec

(Regional Authority of the Vysocina Region, 2011)

Cadastral area – Třešť

(Geological locations, 2012)

5.2. Biogeographical breakdown

Martin Culek and collective in their publication Biogeographical subdivision of the Czech Republic divide the territory of the individual breakdown on the bioregions. In the second part of this publication divides the territory of the typological breakdown on the biochores. (Culek, 1995), (Culek, 2005)

Individual division:

Code of the area: 1.46

Province: Mid-European Greenwood

1 – Sub province: Hercynská

46 – Bioregion: Pelhřimovský (Culek, 1995)
Pelhřimov bioregion lies on the border between the southern, central Bohemia and south Moravia, while located on the main European watershed. It occupies the geomorphologic unit Křemešnická uplands and the western edge of the Křižanovské highlands. The area bioregion is 2160 km². (Culek, 1995)

5.3. Geomorphologic breakdown
From the point of view of geomorphologic breakdown assigns Jaromír Demek and others in the book of Mountains and Lowlands of the territory of the codes IIC-5B-2 and IIC-5B-10, which determine the system, the sub report, the whole, sub whole and district. (Demek et al. 2006)

Code of the area: IIC-5B-2
II – system: the Bohemian-Moravian system
C – sub system: Bohemian-Moravian highlands
5 – whole: Křemešnická highlands
B – sub whole: Brtnická highlands
2 – district: Špičácká highlands (Demek et al. 2006)

Code of the area: IIC-5B-10
II – system: Bohemian-Moravian system
C – sub system: Bohemian-Moravian highlands
5 – system: Křemešnická highlands
B – sub system: Brtnická highlands
10 – district: Otínská upland (Demek et al. 2006)
5.4. Geology
The majority of the researched territory is located on the migmatit. In the territory is also located belts of amphibolit, which lead us e.g. through the hill Špičák (Large Tusk). We can find here also a small area with sandy - to loamy-sandy sediment. (Czech geological survey, 2016)

5.5. Pedology
In the most of the territory, which passes through the nature trail, is located kambizem mesobazická, in a lesser extent appears kambizem dymstrická. In places, where is located the sandy-silicate of up to loamy-sand sediment (see ch. 5.4), is located stagnoglej modal. In lesser extent we can on the location find the kambizem oglejena dymstrická and pseudoglej modal. (Czech geological survey, 2015)

5.6. Hydrology
**Jezdovický pond** is a water area between the Jezdovice and Třešť in the district of Jihlava. It lays on the Třešť’s stream, from the west, and into it flows Bukovský stream. With the flat of 28 hectares is the largest pond in the district of Jihlava. It is used to fish farming and the abstraction of water for agriculture. Near the pond is located nesting waterfowl. Flow pond has an elongated shape, its trunk with length of 0,5 km has overgrown by reeds. (Municipal authority Jezdovice, 2014)

**Třešť’s stream** is a right-hand tributary of the Jihlava river in the district of Jihlava in the Highland Region. The length of the flow amounts of 29.8 km. Basin area measures 105.4 km2. The stream raises on the northern slopes of the Míchov hill (786 m n. m.) in the Jihlava’s tops at an altitude of 735 m. First flows through a forested landscape, supplying a range of larger and smaller ponds. North of Třešť near Jezdovice billows water stream Jezdovický pond (see. above). Into the Jihlava river flows on its 160,0 river mile near Kostelec at an altitude of 520 m. (Vlček, 1984)
5.7. Climate

According to the Quitt the solved territory falls into the climate of the region of MT3, which are characterized by highlands, part of the Bohemian-Moravian highlands with a climate slightly warm the sub-region, which with increasing altitude becomes rougher.

(Quitt, 1975)

Location according to the map of Climatic areas of CZECHOSLOVAKIA 1:500 000 (E. Quitt, 1975) ranks among the moderately warm areas (MT3) with the following climatic characteristics:

The number of summer days: 20 – 30
The number of days with average temperature 10°C and more: 120-140
The number of days with frost: 130-160
The number of icy days: 40-50
The average January temperature: -3 to -4°C
The average July temperature: 16-17°C
The average April temperature: 6-7°C
The average October temperature: 6 – 7 °C
The average number of days with precipitation of 1 mm and more: 110 – 120
The sum of precipitation for the growing season: 350 – 450 mm
The sum of precipitation in the winter season: 250 – 300 mm
The number of days with snow covers: 60 – 100
The number of overcast days: 120 – 150
The number of clear days: 40 – 50
5.8. Biota

5.8.1. The fauna

From the animal kingdom is in the forests in the number of species and individuals of the most represented insect. The location is most commonly encountered with forest ants, beetles, wasps and butterflies.

The previous survey of invertebrates in the vicinity of the site nature trails, it has mainly focused on epigeic fauna and the fauna of butterflies. From the fauna epigeich has been processed to the fauna of spiders, among which prevailed relict component (from relicts I. order they were found Saloca dicetos and Astenargus perforatus) and the fauna of the terrestrial isopods, centipedes, galleyworms and earthworms. The most important findings include the earthworm Dendrobaena vejdovskyi and galleyworm Leptoilus marcomannius. In the species-rich fauna of butterflies predominate kinds of natural fir-beech forest of medium and higher positions, are especially Apamea illyria, Acasis viretata and Nothocasis sertata. (Čech et al. 2002)

A very interesting species occur in the stand of oak that influence the species diversity of the territory, and whose merit is possible in the protected area reach thermophilic species of the first to the second cycle degree (Eupithecia abbreviata, Drymonia ruficorns, Harpyia milhauseri). From the species of butterflies they are here in a very large population occurs Aglia tau. In the fauna of vertebrates is dominated by the typical species of the deciduous forest. From the birds they are abundantly represented species nest in tree cavities. Nest here Columba oenas, Picus canus country, Dendrocopos medius, Ficedula parva, Phylloscopus sibilatrix, Coccothraustes coccothrastes and many more. Regularly nesting of Bubo bubo, Corvus corax and Scolopax rusticola, rarely and Ciconia nigra. On the locality there have been repeatedly observed small mammals. So far it has been recorded five species, from which dominate Apodemus flavicollis and Clethrionomys glareolus. (Čech et al. 2002)

In the forests there are living Capreolus capreolus, or Sus scrofa, from the beasts then Martes martes and Vulpes vulpes. In the coniferous forests nest Dryocopus martius, Picus canus country, Parus, Sylvia, or Turdus philomelos, from the birds of prey appear Buteo buteo. The wet meadows are represented by common species of reptiles and
amphibians, such as *Vipera berus*, *Zootoca vivipara*, *Rana bufo* or *Triturus*. In the water flows live the typical species of fish and also *Rana temporaria* and *Salamandra salamandra*. The pond housed *Anas platyrhynchos* or *Fulica atra*. (Čech et al. 2002)

### 5.8.2. Flora

Under the trees, especially deciduous, is located shrub layer, which often in dense spruce stands is missing. Under the bush floor is the floor of the herbal, which is in the conditions of the selected site most often consists of grass, raspberry, bilberry, mosses, and other.

Vegetation cover is made of very well-preserved forest communities mainly from the framework of the union *Fagion*, sub alliance *Eu-Fagenion*. Fir beech forests on gentle slopes can be assigned to the association *Dentario enneaphylli-Fagetum*, sometimes occurs in stands of the association *Festuco altissimae-Fagetum*. Rubble maples in the vicinity of the top of a Large Canine match rubbe forests of the association of *Tilio-Acerion*, the association of *Lunario-Aceretum*. Stands with a predominance of ash and with a remarkable herbal floor on one of the flanks of a Large Canine can be placed within the broader framework of the union *Tilio-Acerion*. From characteristic and endangered plant species of the territory occurs *Galanthus nivalis*, *Lunaria rediviva*, *Allium ursinum*, *Corydalis intermedia*, *Anemonoides ranunculoides*, *Adoxa moschatellina*, *Gage lutea*, *Dentaria enneaphylos*, *D. bulbifera*, *Melica uniflora*, *Hordelymus europaeus*, *Bromus benekenii* and many more. Species composition of woody plants is also quite varied. From protectively major species is *Abies alba* and *Ulmus glabra*. Interesting is the occurrence of *Quercus robur* and *Carpinus betulus*, according to the Čech (2002) nature of their occurrence, however, may be the subject of doubt. The selected territory hosts among others a very remarkable mycoflora with a number of rare decaying muchrooms, for example, *Amylopora crassus*, *Antrodiella faginea*, *A. parasitica*, *Junghuhnia separabilima* and more. (Čech et al. 2002)

The location of the nature trail outweigh the already not so much interesting coniferous forests consisting of the highland regions typical monoculture *Picea abies*, further, we can observe the *Pinus sylvestris* and *Larix decidua*. 
5.8.2.1. Fytogeographic breakdown

Area: Mezofytikum

Circuit: the Bohemian-Moravian mezofytikum

Area: 67 – Bohemian-Moravian highland (Hejný et al. 2003)

5.8.2.2. Potential vegetation

At the location according to maps of potential vegetation (Neuhaslová, 1998) occurs *Dentario enneaphylli-Fagetum*. Currently the stands of *Dentario enneaphylli-Fagetum* across the board are very limited, replacing the spruce monocultures (*Picea abies*), less then *Larix decidua* and *Pinus sylvestris*.

It was about the fellowship of the widespread in the higher mountains of the Czech highlands (with the exception of the Krušné Hory) and the western Carpathian Mountains. Originally it formed a continuous vegetation cover of the lower grades of the Bohemian forests, the Šumava, the Bohemian-Moravian highlands, Krkonoše, etc. It occurs mainly at elevations of 500 – 1000 m, where settling in particular slope position.

*Dentario enneaphylli-Fagetum* is formed by tree and herbal palate. Shrub and moss layer is developed only by fragments or missing at all. In the tree floor is predominant *Fagus sylvatica*, with higher tenure tend is mixed with *Acer pseudoplatanus*, *Abies alba* and *Picea abies*. Herb layer is usually continuously involved, with coverage fluctuating under the canopy of tree floors (predominate species of *Fagetalia* and also most species of the association *Fagion*).

5.9. Recreational interesting places of nature trail

Špičák Hill (Large Tusk, at an altitude of 735 m) and its forested ridge, following the north-south direction are valuable natural lots with several protected areas. The masthead section, with an a Velké Javoří adjoining ridge was declared a Velký Špičák
national nature reserve, protecting for forty years the natural mixed forest (with old individuals of beech, maple, elm and fir), and a typical herbal undergrowth.

(TREKING, 2007)

The object of the protection is the extensive complex nature of the nearby fir beech forest and maple with the representation of spruce in the uppermost portion of the Špičák massif. This is a representative sample of the original species—the bright forest communities of the highlands. (Čech et al. 2002)

In forest cover is predominant beech (Fagus) with fir (Abies) and spruce (Picea), at the foot of the sycamore (Acer pseudoplatanus) and maple perennial (Acer platanoides), European ash (Fraxinus excelsior) and elm mountain (Ulmus glabra), age about 150 years. Remarkable at this altitude is also the occurrence of oak (Quercus robur) and hornbeam wood general (Carpinus betulus). In a rich herb's undergrowth is growing lunaria perennial (Lunaria rediviva), garlic bearish (Allium ursinum) or snowdrop (Galanthus nivalis), in the bush floor rare daphne toxic (Daphne mezereum).

(Region Vysočina, 2016)

According to the habit of the adult beech trees is very likely to grow up in the stand with a high stocking, in which the later points made lightening shade mowing. The territory of the richly younger look by beech and sometimes even ash, seedlings of other tree species are strongly harmed by the animals. On the eastern edge is located under the age of mixed stands resulting in spontaneous forestation enclosed clear cutting in the thirties of the 20th century. Since 1995, in the protected area there is an implementation of active support for the population of Abies alba and Ulmus glabra. Planting autochthonous material and natural younger look are catered by the small individual fences. Otherwise, the stands are left to natural evolution. (Šumpich, 2002)

As stated on the website www.deductivysociny.cz: "...for the protection of the communities’ flowery beech forests and rubble forests and also due to the occurrence of moss Dicranum viride were included into the network of protected territories NATURA 2000. “
In the basement are sedimentary rocks moldanubic. The back portion of the Špičák form cordierit-biotitic pararula, which passes in cordierit-biotitic migmatit. The rounded ridge of the top portion of a Velký Špičák is amended in cryogen modeled the terrain with protruding available cabins, plenty of cryplnance terraces and with less of the stone sea. Depending on the local conditions at the soil-forming substrate formed of differently deep and acidic cambisols (cambism dystric) along with podsol (cryptopodsol) cambic.

(Čech et al. 2002)
6. Results

6.1. The selected territory
The selected territory is very attractive for its varied and rich wood composition, which gives us a wealth of non-timber forest products, interesting types of habitats (forest, meadow, water area and stream) and in the vegetation period a multitude of flowering herbs.

The selected territory is located in the district of Jihlava in the highland region. The route of the nature trail passes through the cadastral areas of municipalities Třešť and Jezdovice. The special interest of the area consists of wooded landscape of the valley of the Border of the stream.

In the location there is lack of places for seating and a momentary rest or picknicking. For this reason, I would vote for the proposal board nature trails with a seating area.

6.2. Field survey of the selected area
During field investigation it was found that forest roads and forest paths, along which leads the route of the nature trail, are viable. No need for landscaping. The trail runs along the paved forest roads and most of the routes only slightly rising terrain. In the vicinity of a Velký Špičák leads trail on unpaved forest roads and along the forest walking lanes.

6.3. The questionnaire survey in the selected location
The questionnaire in paper form has filled a total of 72 respondents who permanently reside in the surrounding villages of the selected site.

The identification data of the respondents

The first four questions of the questionnaire focus on the identification of individual respondents. They focus on the sex, age, education and status of the respondents. The group of respondents consists of 60 % women and 40 % men. The most commonly
The represented age group is the group between 40 – 50 years ago, that is 42 % of the respondents. A little less numerous groups are groups of between 26 – 39 years ago, which includes the 29 % of respondents and between 55 – 64 years, which includes 17 % of the respondents. Into the questionnaire have entered the most respondents with a graduation (51 %). The largest group of respondents has the status of employed (71 %).

The collection of non-timber forest products of the selected site

Questions number 4 – 13 was established if people collect non-timber forest products and were asked to indicate what (3 most common) and whether they are knowledgeable of the forest act. The results are thematically divided into subcategories.

The collection of medicinal plants (herbs and trees)

From the survey it is evident, that one half (50 %) of the respondents collects the medicinal plants and the other half (50 %) no. Most collected plants are *Rubus idaeus* (16 %), *Sambucus nigra* (15 %) flower *Tilia* (13 %), *Rubus* (11 %), *Vaccinium myrtillus* (9 %), *Photinia melanocarpa* a *Fragaria* (both 6 %). Less frequent answer was *Urtica dioica* (5 %), *Betula* (4 %), *Allium ursinum* (3 %), *Tussilago farfara* (3 %), *Petasites hybridus* a *Hypericum perforatum* (2 %), *Thymus*, Rose hip and *Equisetum* each (1 %).

![Fig. 2: Diagram of percentage of answers for question no. 5](image-url)
Products for decorative purposes

Products for decorative purposes obtained from the forest, 74% of the respondents. The survey shows that it is, in most cases, the cone (31 %), brushwood (21 %), moss (18 %) and bark (11%). Other, less collected products for decorative purposes such as rowan and beechnuts, more information is specified in the spreadsheet X.

**Fig. 3: Diagram of percentage of answers for question no. 7**

**Tab. 1: Other answers of the answer to the question no 7:**

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rowan</td>
<td>6%</td>
</tr>
<tr>
<td>Beechnuts</td>
<td>3%</td>
</tr>
<tr>
<td>Dry leaves</td>
<td>2%</td>
</tr>
<tr>
<td>Ferns</td>
<td>2%</td>
</tr>
<tr>
<td>Beech branches</td>
<td>1%</td>
</tr>
<tr>
<td>Stump</td>
<td>1%</td>
</tr>
<tr>
<td>Stone</td>
<td>1%</td>
</tr>
<tr>
<td>Heather</td>
<td>1%</td>
</tr>
<tr>
<td>Rose hip</td>
<td>1%</td>
</tr>
<tr>
<td>Blackthorn</td>
<td>1%</td>
</tr>
<tr>
<td>Dry grass</td>
<td>1%</td>
</tr>
</tbody>
</table>
Christmas trees

Questions concerning the use of Christmas trees asked respondents, whether they are using live Christmas tree, and if so, what kind and where it is obtained.

From the survey it is evident that 82 % of surveyed respondents use live Christmas tree at Christmas. The most used kind is, according to the survey spruce (52 %), the two others are fir (30 %) and pine (18 %). For the Christmas tree respondents most often walk to the supermarket (66 %), trees from private forests used as Christmas 21 % of those surveyed and the sales grove place uses 13 % of respondents.

Fig. 4: Diagram of percentage of answers for question no. 9

Fig. 5: Diagram of percentage of answers for question no. 9
The collection of forest fruits

The fruits of the forest collect 76% of those surveyed. Respondents have expressed that the most collected forest fruits are Blueberries (28%), Raspberries (25%), Strawberries (23%) and Blackberries (21%). Only 4% of the surveyed respondents collect the Cranberries.

Collecting mushrooms

The whole 90% of the surveyed collects mushrooms. The survey shows that the most collected mushrooms are Boletus (33%), Macrolepiota (17%), Amanita rubescens (16%) and Cantharellus cibarius (14%). Other popular mushrooms are Xerocomellus chrysenteron (8%), Leccinum carpini (5%), Pleurotus ostreatus (5%), Suillus (1%) and Leccinum (1%).
Forest and the law

Questions 14 – 18 were used to establish how much the respondents are knowledgeable of the forest act and the forest prohibited activities.

The provisions on the general use of forests in the forest act:

The provisions on the general use of forests in the forest law know 25 % of those surveyed. Only 7 respondents said something about this topic. The answers are recorded in the spreadsheet no...

**Tab. 2: Representation of the answer to the question no 15**

<table>
<thead>
<tr>
<th><strong>Odpověď</strong></th>
<th><strong>Respondenti</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection of non-timber forest products for personal use only</td>
<td>3</td>
</tr>
<tr>
<td>Consideration</td>
<td>1</td>
</tr>
<tr>
<td>What can and can not in the forest</td>
<td>1</td>
</tr>
<tr>
<td>To avoid interfering with the forest environment</td>
<td>1</td>
</tr>
<tr>
<td>Instructions for movement in the forest</td>
<td>1</td>
</tr>
</tbody>
</table>

Prohibited activities in the forest

From the survey is evident that 46 % of the surveyed respondents know that they are in the forest act listed the activities which are in the forest forbidden. Respondents most often referred to prohibited activities in the forest were fire regulations (26 %), destruction of vegetation (20 %), throwing of garbage (15 %), walking the dogs with no leash (15 %) and 13 % of the respondents said that no making a noise in the forest. Among the less frequent answers was the collection of protected plants (5 %), driving a car in a forest (3 %), theft of wood (2 %) and camping (2%).
The final question

This questionnaire supplemented with data, comments and information by a single respondent.

The last question answered only one immature respondent in the questionnaire survey. Here is the literal reasoning: "Forests are important for life on Earth, their felling is destroying nature and on their place there are various buildings and power plants, which secrete the exhaust, which is destroying our planet."

6.4. Proposal nature trails

6.4.1. The draft route, location and signage

The route of the nature trail

The whole course of nature trails marked in annex no. 5. The trail runs along paved and unpaved roads. The whole route is 8,579 km. The slope of the entire route is visible from the longitudinal profile in annex no. 6.
The location of the information boards

The nature trail begins near the village of Třešť, on its eastern side, after passing around the lodge. Here is placed the introductory information board. The initial stop is at an altitude of 593 m. The information board is located here at the crossroads, on the right side of the road, in front of a spruce canopy. The second stop is located at a distance of 0,729 km at an altitude of 643 m. Here is the information board located in front of the forest canopy on the right side of the road. The third stop is at a crossroads, which for the able-bodied can become the starting point for the climbing of a Velký Špičák, and the same route to return back to the trail or continue on without getting to the top. The stop is located at 1,829 km of trails, at an altitude of 623 m and an information board is located to the right of the way before the tree road rim. The fourth stop is located under the oak between the trees on the 2,640 km of the route. At this point there will be information board together with wooden covered rest area and a wooden stand for the bicycles. The altitude here is 619 m. The fifth stop is located near the village Jezdovice, it's up to 3,587 km route. In this place is a crossroads of forest roads. Here is the information board located to the left of the road with views of the pond at a height of 563 m. The sixth station is located on a quiet spot in the Jezdovice pond. The stop is at an altitude of 544 m and is located on the 4,547 km of the route. There is enough room for the location as information boards, wooden roofed rest stops and a wooden rack for bicycles. The seventh stop is located on the 5,398 km at an altitude of 545 m. The information board will be placed directly on a quiet spot in the Jezdovice pond/creek. The eighth stop is located at the crossroads of spruce, where flows an unnamed stream. An information board is positioned to the left from the paved forest roads. The altitude here is 586m and the distance from the beginning of the route is 6,698 km. The ninth stop is located at oak alley. The altitude here is 622 m. The last information board is located here on the right hand side from the path to 7,620 km of the route. The entire trail is long 8,579 km.
Marking nature trails

The route of the nature trail is marked with the agreed tourist signs of nature trails (the white square with dimensions of 100 x 100 mm with a green stripe with a width of 30 mm, which leads from the upper left to the lower right corner of the brand). The entire stretch of the route will the visitors follow this marking.

Fig. 9: Mark nature trails

6.4.2. Text and graphics information boards

Graphic form of information boards has a uniform character.

Accurate processing of graphics of information boards can be found in the annexes no 8. – 16.

The texts of individual information boards are dedicated to the non- timber forest products, which is possible to collect even in the location of the nature trail and informs about the occurrence of non-timber products in Europe. The first information board is the start and it has information about the entire nature trail and instructs on the proper behavior in the woods. Other 8 information boards about non-timber forest products are dedicated to its content and graphics as for kids, so for the grown-ups.
1. Introduction – a forest nature trail GIFTS OF THE FOREST

You find yourselves at the beginning of this instructive trail at an altitude of 593 m. The whole route is 8,579 km. The trail runs mostly along the forest lands in the property of the state, which is managed by Lesy Česká republika, s. p.

The aim of the nature trail is to acquaint the general public with non-timber forest products in the area of the forest and with points of interest along the route. The trail has a total of nine stops equipped with information boards with a text and photos on particular topics. The information boards are with their content dedicated for both adults and children. The individual information boards have their names and numbers. The nature trail is marked by its special sign which is made up of one green stripe between two brown ones.

The beginning of the nature trail is here, at the crossroads of forest paths at the lodge of LČR in Třešt, then it goes through the forest paths around Velký Špičák (Large Tusk), then it continues through an oak alley up to the village Jezdovice, where in close proximity of pond Jezdovický rybník it slowly returns to the forest in Velký Špičák back to the lodge to where you stand.

Thank you for visiting and for your respectful behavior towards the surrounding countryside and we look forward to you visiting us again.

The Law on Forests and Nature Conservation Act prohibits conducting certain activities in the forest, which are represented by pictograms. Let's revise them together again. Using the images, can you recognize which activities are prohibited in the forest?
Small dark blue balls, blueberries, have always been a favored food. Recently they have been classified as a superfood, whose consumption will ensure good health, long life and beauty.

Bilberry does not need to be introduced in length, its fruits are for us undoubtedly among the most popular fruits of the wild. Bilberry bushes can be found mainly in coniferous forests, where it often forms massive carpet stands. Blueberries, berries of dark blue, ripen in the period of June and July, when it is the right time to go into the forest and bring home a greatest possible supply of this concentrated elixir of health.

Blueberries have been a major medicinal food for many centuries. They are known mainly for their richness in vitamin C, which boosts our immune system and acts as prevention and a cure of colds, infectious and other diseases. This cocktail of highly effective and healthy substances makes blueberries a superfood, in addition with Bio attribute, has long list of positive and healing effects on our bodies.

Fresh, dried, frozen or otherwise preserved blueberries are the perfect remedy for all respiratory diseases, it helps to treat the flu, tonsillitis, bronchitis, colds and other infectious and inflammatory diseases of the mucous membranes. Another amazing effect is the ability to improve and maintain our vision. Blueberries have for many generations been used as a remedy for intestinal problems, colic, diarrhea and food poisonings, they also act as an antiseptic. We can hear about the blueberries in relation to prevention of many types of cancer.

Folk medicine recommends that everyone consumes at least 1.5 kg of fresh fruit during the summer for cleansing the body. Blueberries are a wild crop that is not devalued by plant breeding, the ratio of nutritious and healthy substances is unique. They are not treated with any chemicals during the year and nature itself hoes and fertilizes it during the year, so - cheers for blueberries.

TIP: pour 250 ml of boiling water over 2 teaspoons of dried leaves and let it stand for 10 minutes, pour through a strainer and sip throughout the day.
3. Oyster mushroom

Coordinates location: N 49°18'28.14", E 15°29'59.51"

A treasure among mushrooms? Yes, this is exactly how we could call the oyster mushroom. Oyster effects on human health are unique. Oyster is named after the color of the cap, which reminds of a shade of oysters. In our climate there is a variety of beneficial mushrooms growing, however, oyster clearly surpasses all of them.

Oyster mushroom (Pleurotus ostreatus) is a wood-decay mushroom. As a non-green organism, as we humans are too, it receives a lot of substances that are necessary for its life from the green organisms, i.e. trees, they are substances that even we do not turn down. Oyster draws nutrients from the trees, and a man can take them out of the oyster. It grows mainly on deciduous trees, its positive effects were known centuries ago by the ancient Chinese.

Not only does Oyster taste great, but it has many medicinal effects. In addition to stimulating the immune system it acts on fat metabolism and due to the high content of D – glucan it is the elixir of eternal youth. It has a positive effect for patients with cancer, cardiovascular diseases (a heart attack, a stroke), asthma, arthritis and osteoporosis and chronic inflammation. The fruiting bodies have beneficial effects on physical and mental exhaustion, fatigue, on slowing down the aging process. It also works against influenza, tonsillitis and cold as well as against rashes, dermatitis, and allergies. It lowers cholesterol and sugar in blood (glycemia), without reducing the level of insulin. At the same time it prevents damage to the coronary arteries and the heart muscle.

The taste is slightly sweet and the oyster has been known for its intense aroma. Oyster is a very good delicacy and recently has been a great interest of gourmets. It has a very wide application for food preparation. Drying is an excellent preparation for the great tripe soup, it is also suitable for the preparation of roasted meats, stuffings, pasta and rice, and interesting flavorful cold salads can be prepared from it. Crushed oyster mushroom is an excellent aromatic spice.
4. Nettle

Coordinates location: N 49°18'49.10", E 15°29'53.91"

They say, if people knew how nettle is healing, they would grow nothing else in the gardens. Nettle is healing all from rhizomes over the stems and to leaves to flowers. Already in the times of antiquity it was highly appreciated. Albrecht Durer (1471-1528) painted an angel who flies to the throne of the Almighty with a nettle in his hand.

Nettle is most often found on the edges of forests, by roads, fences, gravel, piles of rubble, in lowlands up to mountains. Stinging nettle, hung in a house, was said to be a powerful means for protection against all diseases. If someone in the house became ill all the same, he/she was whipped by a nettle.

Nettle has significant healing effects and is therefore a source of food for us with many advantages. For example, the protein content of nettle exceeds almost twice the protein content in soya beans.

Nettle is our best medicinal plant to purify the blood and hematopoiesis. It also has a good effect on the pancreas, so it is used also for reduction of blood sugar. It treats both diseases and urinary tract inflammations and urinary retention (stoppage). Because at the same time it raises the good course of the bowel movement it is very suitable for spring cleaning treatments.

From a certain age, iron content in the body is reduced. Consequently a fatigue and exhaustion occur, a man feels old and less performance-efficient. In such a case a fresh nettle can be successfully used because of its iron content. It helps us to overcome this state. After a nettle cure we relatively quickly feel physically better, energy and creative force return to us, even our outward appearance is visibly improved.

One good advice: start with a nettle cure today. You can get dried leaves at any pharmacy or in a shop with herbs or you can pick a nettle yourself. Let our medicinal plants re-enter the house again. In spring equip yourselves with gloves and scissors and go out into the countryside. It is a great pleasure if you can pick a nettle outdoors. The fresher we consume it, the greater its curative effect is. While at it, think about a supply
for winter. The best way is to collect a nettle in May. Let the thought that you can do something for your health become a pleasure you!

TIP: For internal use we use a decoction of the roots and aerial parts of nettle, for external use we use infusions, decoctions and tinctures from the roots; macerated leaves are put on a wasp sting.

Name: 5. Lime tree

Coordinates location: N 49°19'0.25", E 15°29'13.17"

Lime tree clings to people as no other tree, it thrives best on village greens and by cottages, it can be a good friend to a man, it is literally a symbol of home. It protects the human community and fellowship, not only tribal assemblies were held under the lime trees, but later also village celebrations, weddings and meetings.

Lime tree is as a medicinal plant very well known throughout Europe since antiquity. Libuše was a lime tree goddess (the word libý is derived from the Slavic ljub - love, kind). Lime tree heart-shaped leaves are therefore more than characteristic.

We know several kinds of this Czech national tree. The most famous of these is the small-leaved lime, named after the shape of leaves. Lime tree is worthy of admiration. It grows to a height of around 30 meters and lives up to the age of one hundred years and its bushy crown attracts the attention of many people and also the bees, especially when it grows in an alley.

We use the fragrant flowers and also leaves for the medicinal purposes. The flowers bloom from June to July and contain mainly mucus, flavonoids and tannins. They are collected only in dry sunny weather, preferably in the afternoon, and they are dried in the shade.

Lime tree significantly increases perspiration and therefore it is very well applicable in feverish illnesses of colds, also dissolves mucus and reduces the urge to cough. It works especially when given for night when it the decreases the fever significantly. Lime tree blossom harmonizes digestion, calms down spasms in the urinary tract, stomach,
gallbladder and intestines and works well against diarrhea. It facilitates the excretion of urine and bile, reduces blood pressure and cholesterol levels. Its ability to thin blood is an excellent prevention of inflammation of the veins, tonsillitis and heart attacks. It acts as a mild sedative, relieves stress and anxiety and together with lemon balm it helps us sleep.

Lime tree is mainly used to make a tea or an infusion. It is also popular with beekeepers as a honey plant - the lime trees are covered with bees during flowering. Lime tree wood is used by carvers. Young lime tree leaves are added to spring salads and lime tree branches were traditionally used as a green fodder for cattle to have fattier milk. Since long time ago, ropes, fishing nets, chord, and even shoes were made from the bast.

Name: 6. Raspberries

Coordinates location: N 49°18'51.81", E 15°29'2.95"

Fragrant sweet raspberries with a slightly sour taste always pleasantly melt in the mouth. In the Czech Republic there are quite ideal conditions for growing raspberries. Raspberries are undemanding plants that grow on the edges of forests and even in mountainous areas.

Although in the folk herbalist books the leaves from raspberry bushes are primarily recommended to collect for various medicinal teas, even sweet red fruits are not without interesting medicinal properties. The red coloring of raspberries is a source of antioxidants, whose significance for the prevention of lifestyle diseases is not doubted now by anyone.

Generally speaking, all berries are, both in terms of prevention and supportive treatment, irreplaceable in the treatment of diseases caused by free radicals from environmental pollution and poor diet. Moreover, these foods also contain high amounts of vitamins C and A. This juicy fruit helps due to the content of vitamin C to strengthen the immune system. Vitamin A along with natural coloring of anthocyanin coloration prevents changes in the eye that cause night blindness and cataracts. Complex of vitamins B helps during metabolism. It also works against stress and migraine. Minerals
phosphorus and iron help in hematopoiesis, a proper function of the heart and nervous system, calcium again takes cares of healthy bones and teeth. Tannins contained help clean the intestines and remove excess fluid from the body. The darker the color of the fruits is, the larger amount of antioxidants it comprises. Antioxidants bind free radicals and thereby protect the body against cancer. They are valuable in the treatment of fever, inflammatory infections and rheumatism. Raspberries are also recommended in the treatment of diabetes. It reduces blood sugar levels, thus works against diabetes and its associated diseases.

TIP: Raspberry vinegar is a fantastic for gargling in case of a sore throat. Prepare it so that 500 grams of raspberries put to 1 liter of wine vinegar and let it stand for two weeks. Only then you strain it and you can use it.

Name: 7. Elderberry

Coordinates location: N 49°18'27.87", E 15°29'8.41"

"Hat tip the chamomile, kneel before the elder" – old proverb

Elderberry is one of the most popular herbs of our folk medicine. Its bushes can be found in our country nearly everywhere, it grows on hillsides and forest edges, by fields and meadows, in parks, along the roads and the like. It blooms on the turn of May and June and its fruits ripen in September and October, which is from far away recognizable by number of birds that like to organize mass raids on bushes heavy with dark purple fruits.

Which parts elderberries are healing? The answer is that all of them. This bush can be used in fact whole for medicinal purposes, young spring shoots, flowers, bark, leaves and roots with the highest concentration of active substances. The easiest way is for us surely to collect flowers and fruits or leaves. Leaves and not ripen fruits contain mildly poisonous substances therefore we do not use it internally. Flowers and ripe fruits treated by heat are, on the contrary, best suited for internal use. We can produce various syrups and lemonades, or prepare a tea out of them. The flowers can even be prepared as a soup or fried like pancakes. A fruit butter and pastes used be commonly prepared
from the fruit, it can also be added to jams and fruit purées, or excellent elderberry liqueur and elderberry wine can be produced out of them. The leaves are traditionally used mainly for the treatment of joint problems as a compress on the affected parts, extracts and infusions are similarly produced from the roots.

Elderberry has a well-deserved respect in folk medicine in the treatment of colds and respiratory diseases such as influenza, tonsillitis, cough, runny nose and the like. It can reduce fever, improves coughing up and eases breathing. For this purpose we can use it in a form of a tea, either alone or in a combination for example with linden flower, nettle, plantain, etc. Syrup from flowers is also an appropriate remedy, we prepare a juice with lemon from it, which is served to the sick person, it can be taken by a teaspoon several times a day, or added it to the tea. Elderflower has also a cleansing effect on our body. It helps us get rid of settled toxins, thus cures diseases such as rheumatism and gout, or it is an excellent prevention of these diseases.

TIP: 0.5 l of boiling water pour over 2 tablespoons of dried flowers and leave to infuse for 10 minutes, strain it and serve either unsweetened or best lightly sweetened with honey.

Name: 8. Spruce

Coordinates location: N 49°18'23.53", E 15°29'29.42"

If you often suffer from cough, fever and colds, it is the high time you went into the forest for spruce shoots. If you have a joint pain and rheumatism trouble you, you should know that even for you spruce can become a true friend in need. It is not only a tree well-build, but also medicinal.

In our region, Norway spruce is a tree with traditional symbolism; it is not only a symbol of Christmas, but it used to be said to be a protector against evil spirits, witches and a means to cleanse the negative energy. We all know spruce maypole, made from a high-hewn trunk, decorated with ribbons. Of course the economic importance of spruce wood cannot be overlooked, which is one of our single most important raw materials of wood and furniture industry. Medicinal properties of the tree were for our ancestors at
least as important as its ritual use. Spruce resin was a drug of much use, it was easily accessible to everyone and was used to treat internal and external problems.

In folk medicine, young twigs, cones and resins containing turpentine have been known for the healing power. It dissolves phlegm, which relaxes the air passages and facilitates coughing up, relieves rheumatism, relieves pain in limbs and muscles, as well as inflammation of the tendon sheath. Young spruce shoots contain large amounts of vitamin C, which removes toxins from the body and strengthens the immune system.

We collect young shoots of spruce and cones from April to May. A tea from pine needles treats gingivitis. A coal from spruce wood absorbs toxins in the intestines and has antiseptic effects. Essential oils of spruce needles are widely used in aromatherapy - applied in a form of inhalations, baths and massages.

Needles and young shoots are prepared in a form of a tea that is suitable to use especially for the treatment of respiratory diseases, because it improves coughing up, dilutes and releases settled secretions in the air passages, including the nasal cavities. For the same purpose, we can also produce home spruce honey - it is made from young shoots of the branches in the spring months. Spruce honey is also suitable for children, we use it as bee honey, alone on a spoon or put into a tea.

TIP: By extracting spruce shoots in alcohol we get another effective remedy - tincture. Traditional folk way is marinating spruce shoots in strong plum brandy. This tincture is then used mainly for the treatment of painful rheumatic joints, where it improves blood circulation, warms it and relieves pain. For internal use we better obtain a tincture prepared professionally and again we follow the prescribed dosage.

Name: 9. Chanterelle

Coordinates location: N 49°18'21.68", E 15°30'0.23"

Late in summer the forests begin to be swarming with mushroom pickers. Mushrooms make up a separate realm, and thus not do rank among the plants. From the mushrooms in the woods we pick fleshy fruiting body growing on a complex filamentous mycelium, which is hidden in the ground. Edible and tasty are, however, only some kinds of
mushrooms. Poisonous mushrooms also grow in our region, so when collecting mushrooms caution and good knowledge is a necessity.

Generally, chanterelle belongs to mushrooms that can be easily identified by even children – they have a yellowish flesh and a typical pleasant mushroom smell. They are found in coniferous and deciduous forests from lowlands up to mountains and they grow from June to full autumn.

As with some other kinds of mushrooms, chanterelle's growth is also dependent on clean air - we have therefore noticed with pleasure their re-abundant occurrence in recent years.

These striking and easily identifiable mushrooms are, like white mushrooms, culinary highly regarded, even in countries where almost exclusively only cultivated species of mushrooms are used for culinary purposes. The price of chanterelle is for their high popularity worldwide quite high. Their use while fresh is versatile in the kitchen and it can also be preserved through a variety of ways. Perhaps it is a pity only to dry the chanterelle. A great advantage of the chanterelle is that it is almost never attacked by insects.

Chanterelle acts against various bacteria, among others against overgrowth of intestinal bacteria Escherichia coli and gold staphylococci (Staphylococcus aureus). A relatively high amount of vitamin D is present in the chanterelle, which is needed for proper function of the immune system and it helps in the prevention of certain types of cancers and other diseases.

TIP: Chanterelle contains a considerable amount of serotonin - whose deficiency causes a reduction in the transmission of nerve impulses and is related to changes in mood and even in the taste receptors. Lack of this substance in the body can occur especially in winter, when there is little sunlight, which is then shown through depression or sleeping disorders. Chanterelle could thus serve as a new natural remedy for winter depression instead of using synthetic antidepressants. A try-out of this is definitely worth it.
6.4.3. Processing component of information boards

The information boards

Wooden construction of the information pane consists of the roof, the supporting pillars, wooden plates from leash, bollard metal anchors and to the ledge attached construction of the benches. The whole design of the information boards is high 2,40 m. Roof consists of a covering of horizontally laid boards of the roof battens and struts. The roof is long 1,76 m and roof slats form an angle of 90°. The horizontal boards forming the covering of the roof have a dimension of 100 x 20 mm. The roof battens have a dimension of 50 x 50 mm and struts of the roof are made up of planks of dimensions 100 x 50 mm. Each roof strut is mounted on two supporting columns. The whole structure has a total of four load-bearing pillars with dimensions of 100 x 100 mm. Both two columns are within 100 mm from each other. Perpendicular to the load-bearing pillars are at a height of 2,10 m and at a height of 1.10 m attached beams measuring 100 x 100 mm. These two beams have towards each other 50 mm wide and 50 mm deep groove, in which is inserted wooden board of the planks of 50 mm wide. On the wooden blackboard is laced with eight retainer bolts printed plastic information signs. The place of attachment are marked on the feature of the crosses (see annex no 9). The plastic blackboard has dimensions of 1260 x 890 mm. On the supporting columns is at a height of 0,45 m laced design double sided benches. The bench consists of the supporting beams of dimensions 100 x 100 mm and on them longitudinally raised and attached six boards with dimensions of 50 x 100 mm. The construction of the information boards is consolidated into the ground by a metal pillar anchors. The individual anchor is 600 mm long. Into the anchor is by two bolts clamped supporting column in the locations indicated on the feature of the crosses (see annex no 7). These anchors are under the ground stored in the basement on foot of plain concrete with dimensions of 200 x 400 mm.

Rest area

Rest area consists of table, two benches, two supporting pillars and the roof. With the attachment of the whole structure to the ground is not counted, the structure itself has
sufficient weight and stability. The roof consists of a wooden beam, two roof prisms and two struts. The roof is covered with horizontal planks of dimensions 200 x 20 mm. Roof prisms with dimensions of 100 x 100 mm, together form an angle of 115°. Struts of the roof are mounted on columns around the resting places and have dimensions of 100 x 100 mm. On top of the supporting columns is mounted longitudinally wooden beam of dimension 100 x 100 mm. The table consists of a wooden board with dimensions of 300 x 80 mm, mounted on support columns at a height of 0.8 m. The benches are made up of longitudinal wooden plates with dimensions of 300 x 80 mm. These plates are fastened to the wooden base in the shape of the profile W, of dimensions of 320 x 100 mm. The wooden boards of the bench are, therefore, located at a height of 0.32 m above the ground.

**Bicycle stand**

Bicycle stand is made up of large logs with notches and two poles to stabilize the rack. With the attachment to the ground does not count. Timber has a diameter of 400 mm and its length is 2 m. To the logs is cut out five notches, of a thickness of 100 mm and a depth of 250 mm. Between those notches is a space of 250 mm. At both ends of the logs is a space of 100 mm from the edge of the vertically mounted rod of a diameter of 100 mm and a length of 70 mm. These rods provide the stability of the rack.

**6.5. Possible sources of funding**

The implementation of nature trails will be entrusted to some of the municipalities whose cadastral territory the trail passes through. The relevant municipality will allow processing the project and subsequently organising the implementation. The possibility of funding is listed below.

Thanks to the obtained cooperation at the time of practical training with the Forest group Pelhřimov, it seems like the most appropriate implementation under the auspices of the funding through sponsorships from the Forests of the Czech Republic. Forests of the Czech Republic as the manager of the forests are owned by the state and their
approach is proactive to the fulfillment of non-productive forest functions, such as functions of the recreation. One of the activities supporting the recreational function of the forest is the creation of forest nature trails. Forests of the Czech Republic, many of them are building in their own direction or in cooperation with local authorities or environmental organizations, and take care of their maintenance.

In 1999 the state enterprise Forests of the Czech Republic accepted the corporate Program 2000 – the fulfillment of the objectives of the public interest in LCR, which is aimed at support and development of beneficial forest functions for the public. In the framework of its implementation is carried out by building nature trails, rest places, equipment, forest information boards, repair of roads, protection and support of threatened species, and many other activities. The document was from the beginning conceived as an open, i.e. can be supplemented by other sub-topics in the wake of the development of knowledge, the needs of the company and of the recommendations or obligations arising from international treaties to which the Czech Republic committed.

On the basis of facts and experience with the current implementation occurred at the turn of the years 2010 – 2011 to its reworking and additions. The updated document with the name of the Program 2020 – ensures the objectives of the public interest in LCR, which is the basis for the construction of nature trails. The document is a guide not only for the employees of LCR, but it is also designed for forest owners and to all visitors and lover of nature.

**The calculation of the cost of implementing**

The part of the cost of the implementation of nature trails has been made up by the cost of manufacture and installation of equipment of the nature trails. In locations intended for installation of the device first performs the adjustment of the plains. Then dig the foundation holes dimensions of 400 x 400 x 200 mm, into which will be cemented its column steel anchor. The steel anchors attach the construction of information boards. Prices in CZK includes value added tax (VAT).

For the calculation of costs of individual elements of a survey was conducted of prices in the market and through e-mail and personal communication with stakeholders. The price of individual items forming the overall price of the information boards, rest stops and bike rack has been provided by Ing. Kotlíkovou (LCR).
Tab. 3: Cost of production and installation of information boards

<table>
<thead>
<tr>
<th>Information board</th>
<th>Material - wood</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing - wood</td>
<td>0,0576 m³</td>
<td>2600 CZK/m³</td>
<td>149,8</td>
<td></td>
</tr>
<tr>
<td>Roof batten</td>
<td>0,0060 m³</td>
<td>4400 CZK/m³</td>
<td>26,4</td>
<td></td>
</tr>
<tr>
<td>Strut</td>
<td>0,0070 m³</td>
<td>2600 CZK/m³</td>
<td>18,2</td>
<td></td>
</tr>
<tr>
<td>Jamb</td>
<td>0,0800 m³</td>
<td>4400 CZK/m³</td>
<td>352</td>
<td></td>
</tr>
<tr>
<td>Prism</td>
<td>0,0360 m³</td>
<td>4400 CZK/m³</td>
<td>158,4</td>
<td></td>
</tr>
<tr>
<td>Panes - planks</td>
<td>0,0736 m³</td>
<td>2600 CZK/m³</td>
<td>191,3</td>
<td></td>
</tr>
<tr>
<td>Planks</td>
<td>0,0540 m³</td>
<td>2600 CZK/m³</td>
<td>140,4</td>
<td></td>
</tr>
<tr>
<td>Prism</td>
<td>0,0160 m³</td>
<td>4400 CZK/m³</td>
<td>70,4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material - Other</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beton</td>
<td>0,032 m³</td>
<td>2000 Kč/m³</td>
<td>64</td>
</tr>
<tr>
<td>Mullion anchor</td>
<td>4 pc.</td>
<td>300 Kč/pc.</td>
<td>1200</td>
</tr>
<tr>
<td>Coating material</td>
<td>2,5 kg</td>
<td>150 Kč/kg</td>
<td>375</td>
</tr>
<tr>
<td>Fasteners</td>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Vinyl panes with print</td>
<td>1,1 m²</td>
<td>3500 CZK/m²</td>
<td>3850</td>
</tr>
<tr>
<td>Total material</td>
<td>Σ costs</td>
<td></td>
<td>6795,9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working costs</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>8 h</td>
<td>300 CZK/h</td>
<td>2400</td>
</tr>
<tr>
<td>Settlement plains</td>
<td>2 m²</td>
<td>300 CZK/m²</td>
<td>600</td>
</tr>
<tr>
<td>Excavation work</td>
<td>1 h</td>
<td>200 CZK/h</td>
<td>200</td>
</tr>
<tr>
<td>Concreting works</td>
<td>2 h</td>
<td>201 CZK/h</td>
<td>200</td>
</tr>
<tr>
<td>Installation</td>
<td>3 h</td>
<td>202 CZK/h</td>
<td>200</td>
</tr>
<tr>
<td>Moving masses</td>
<td>0,6 km</td>
<td>25 CZK/km</td>
<td>15</td>
</tr>
<tr>
<td>Total work</td>
<td>Σ costs</td>
<td></td>
<td>3615</td>
</tr>
</tbody>
</table>

Cost per information board | 10 410,90 CZK
Tab. 4: Cost of production and the installation of rest stops

<table>
<thead>
<tr>
<th>Material - wood</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofing - planks</td>
<td>0,1296 m³</td>
<td>2600 CZK/m³</td>
<td>337</td>
</tr>
<tr>
<td>Roof batten</td>
<td>0,0440 m³</td>
<td>4400 CZK/m³</td>
<td>193,6</td>
</tr>
<tr>
<td>Strut</td>
<td>0,0336 m³</td>
<td>4400 CZK/m³</td>
<td>147,8</td>
</tr>
<tr>
<td>Support</td>
<td>0,0180 m³</td>
<td>4400 CZK/m³</td>
<td>79,2</td>
</tr>
<tr>
<td>Jamb</td>
<td>0,0720 m³</td>
<td>5000 CZK/m³</td>
<td>360</td>
</tr>
<tr>
<td>Plate</td>
<td>0,1296 m³</td>
<td>5000 CZK/m³</td>
<td>648</td>
</tr>
<tr>
<td>Basis - profile W</td>
<td>0,1152 m³</td>
<td>5000 CZK/m³</td>
<td>576</td>
</tr>
<tr>
<td>Material - Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coating material</td>
<td>3,5 kg</td>
<td>150 CZK/kg</td>
<td>525</td>
</tr>
<tr>
<td>Fasteners</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td><strong>Total material</strong></td>
<td><strong>Σ costs</strong></td>
<td><strong>3266,6</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working costs</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>4 h</td>
<td>300 CZK/h</td>
<td>1200</td>
</tr>
<tr>
<td>Settlement plains</td>
<td>4 m²</td>
<td>300 CZK/m²</td>
<td>1200</td>
</tr>
<tr>
<td>Installation</td>
<td>0,5 h</td>
<td>200 CZK/h</td>
<td>100</td>
</tr>
<tr>
<td>Moving masses</td>
<td>4 km</td>
<td>25 CZK/km</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total work</strong></td>
<td><strong>Σ costs</strong></td>
<td><strong>2600</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Cost per rest area** | **5 866,60 CZK**
**Tab. 5: Cost of production of the bike rack**

<table>
<thead>
<tr>
<th>Bicycle stand</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material - wood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logs</td>
<td>0,2513 m³</td>
<td>1500 CZK/m³</td>
<td>377</td>
</tr>
<tr>
<td>Timber</td>
<td>0,0110 m³</td>
<td>300 CZK/m³</td>
<td>3,3</td>
</tr>
<tr>
<td>Material - Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coating material</td>
<td>0,5 kg</td>
<td>150 CZK/kg</td>
<td>75</td>
</tr>
<tr>
<td>Fasteners</td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td><strong>Total material</strong></td>
<td></td>
<td><strong>Σ costs</strong></td>
<td><strong>505,3</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working costs</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>0,5 h</td>
<td>300 CZK/h</td>
<td>150</td>
</tr>
<tr>
<td>Settlement plains</td>
<td>2 m²</td>
<td>300 CZK/m²</td>
<td>600</td>
</tr>
<tr>
<td>Installation</td>
<td>0,5 h</td>
<td>200 CZK/h</td>
<td>100</td>
</tr>
<tr>
<td>Moving masses</td>
<td>4 km</td>
<td>25 CZK/km</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total work</strong></td>
<td></td>
<td><strong>Σ costs</strong></td>
<td><strong>950</strong></td>
</tr>
</tbody>
</table>

| Cost per bicycle stand | 1 455,30 Kč |

The cost of installation and the production of one of the information boards is 10 411 CZK. The cost of installation and manufacture of wooden rest stops is 5 867 CZK. Installation and production of the bike rack has a cost of 1 456 CZK.

The total cost of the implementation and operation of the nature trail can be divided into pre-investment, investment and operating. The pre-investment costs consist of the cost of the project nature trails. Investment costs include costs for the production and installation of the equipment of the trail and the cost of the marking. Operating costs consist of the cost of the promotion and for the regular care of a nature trail. The total cost of the implementation of the trails is 218 843 CZK.
### Total cost of the nature trail

<table>
<thead>
<tr>
<th>Pre-investment costs</th>
<th>Number of MJ</th>
<th>Price in CZK per MJ</th>
<th>Total price in CZK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project</strong></td>
<td></td>
<td></td>
<td>35000</td>
</tr>
<tr>
<td><strong>Investment costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production and installation of information panels</td>
<td>10 pc.</td>
<td>10 411 CZK/pc.</td>
<td>93699</td>
</tr>
<tr>
<td>Production and installation of odpočívadel</td>
<td>2 pc.</td>
<td>5867 CZK/pc.</td>
<td>11734</td>
</tr>
<tr>
<td>Production and installation of stojanů na kola</td>
<td>2 pc.</td>
<td>1455 CZK/pc.</td>
<td>2910</td>
</tr>
<tr>
<td><strong>Markings</strong></td>
<td></td>
<td></td>
<td>500</td>
</tr>
<tr>
<td><strong>Operating costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceremonial opening</td>
<td></td>
<td></td>
<td>40000</td>
</tr>
<tr>
<td>Caring for the trail (per year)</td>
<td></td>
<td></td>
<td>35000</td>
</tr>
</tbody>
</table>

**Total costs of the trails** | **218 843 CZK**
7. Discussion

In dealing with this thesis there have been several topics for discussion.

The nature trail firstly emerges in the form of an idea or ideas. Whether it is the first impetus of the favorite tourist route or the theme of nature trails, it is necessary to imagine all the other essentials. The nature trail must not miss the information board with interesting and informative content.

This is a very widespread element in the landscape and the number of trails is steadily increasing. Design and implementation of nature trails in such a form to suit the local residents, vacationers, government and authorities of nature protection, and / or other concerned authorities, is very challenging. Each of the groups has different requirements on the route of the nature trail and its focus. The locals are rather keen on the accompanying infrastructure, as the theme of the trails does not change and after a certain time they won't be likely to read the information panels.

The potential vacationer and tourist would like to have the route of the nature trail led in very attractive locations but they are often protected and the management of the nature reserve is trying to protect these areas against damage and contamination, which would have increased by the number of people. Similar protective case occurred in the solution of the thesis. In the locality is the occurrence of bear’s garlic, in the sociological investigation the bear's garlic was not dominant, which is from a protective point of view optimal. Here is also a variant; to give the residents in vicinity of bear's garlic to the subconscious mind the information board with a tip on where to collect this important herb. Near The trail is a national nature reserve, where the movement out of the way is not limited, but the collection of plants are prohibited by law. So the danger is penalties

The respondents of the sociological investigation are rather ignorant of the forest law, therefore, the first information board includes not only basic information about the nature trail but also about the existence of the forestry law and in a fun way using the pictograms of prohibited activities in the forest. Questionable is in this case the laying of the questions in the questionnaire. It could be given at least one example of prohibited activity, to become a better guide for the respondents.
Sociological investigation showed that most of the people in the surrounding woods collect berries and mushrooms. Two information boards are therefore dedicated to forest fruits – blueberries and raspberries. This provides a topic for discussion, whether the subject is at first glance attractive. After reading the text from the board about the medicinal effects and tips on using whole plants I find due to the popularity with the respondents very convenient.

The sociological investigation also showed that the most widespread tree in the area also used as a Christmas tree is the spruce, widely used is the clearing of conifers; the whole information board therefore belongs to the spruce. The second widely occurred tree is the Linden which is along the water bodies. From which is used lime blossom, let me introduce its big advantages, and at the same time the whole Linden. Familiarize the public with the utility of spruce and linden seems appropriate.

The sociological investigation shows the popularity of collecting mushrooms in the forest. In the questionnaire survey fewer respondents reported that they collect oyster mushrooms. Oyster is very healthy, in the locality this fungus occurs; it has here the ideal conditions thanks to the beech stands. According to images and information about the oyster, I would take as a great advantage, if the collection of this great food has increased. When landscaping surveys was detected at the site, the appearance of mushrooms chanterelles, which respondents mentioned in the questionnaire surveys the less. With the information boards they would learn the therapeutic effects, the characters for collection and use.

Debatable question for many was the location of the nettle on the information board. Nettle is a common plant you can find everywhere; the aim is to draw attention to its medicinal effects, to consult for the best for collection and use. According to the respondents is a favorite collection of elderberry, using information boards will know exactly when to collect it, and how best to use it.

A moot question is whether on the path place the latest information panel, which is saying goodbye to the visitors. The trail is conceived as a circle, from the last of the ninth information board, dedicated to the fungi and is saying goodbye to the visitors at
the same time, there is still the termination of the route to reach the first information board.

It is very important to a nature trail regularly maintain properly restore the marking in order to be still functional. Regularly need to check and repair damaged facilities trails. Damage to information boards cause not only natural factors, but a common cause of damage is vandalism, people. The cost of removal of this kind of damage, not only on the nature trails, they are mostly very high. The information boards are often over-sprayed by color spray. Plastic board with imprinting is on the information board the most valuable part of it. Nature trails are often damaged, because the device paths may be placed somewhere in the open country, where the vandals when can be hard to catch in their activities. The protection of nature trails prior to this unwanted destruction basically does not exist. It is a problem which cannot be effectively prevented. Therefore, it is important to think of, during the implementation of the trails, a sufficient financial reserve that would cover compensation for any damages caused by vandalism.

Debatable question is whether to place or not on the route of the nature trail rubbish bins. In this case, it is very important, which way the route of the nature trail leads? As a suitable option appears to be the location of the trash can at the beginning and at the same time, thus ending the nature trail and also on the route of the trail, which leads marginally municipalities Jezdovice. The regular emptying of these bins will be taken care of by the employees of the municipality, in whose area the trail is located. If, however, the route of the trail, which runs free through the countryside, is the location of the bins is problematic. Trash cans in the open air will no one regularly and consistently empty and trash will accumulate. Features the following placed trash bins, therefore, will not be filled. A much preferable solution is the trash bins not to place into the open countryside at all in order to force visitors to have their garbage taken home with them or placed in two rubbish bins on the route.
8. Conclusion

Favorable placement of forests and popularity of the population in visiting the forests in all seasons puts on the recreational functions of forests of large claims and often acts as quite a significant damage (in the summer mountain biking or horseback riding outside the marked route, in winter, skiing outside marked trails or in the absence of snow). Despite some of the negative effects is, however, free access to the forest understood as a distinct service of forestry to the public and is also enshrined in the forest act.

The work introduces the reader the selected location. On the basis of all obtained data and literature to a particular site has been compiled a comprehensive analysis of the wider spatial relations and natural conditions of the selected area. Furthermore, it was determined a more detailed characterization of naturally very interesting top of the Velký Špičák (Large Tusk) nearby.

The main objective of this thesis was to familiarize the public with non-timber forest products in the vicinity of their place of residence, where it manages forests the Forest management of Pelhřimov. To achieve this goal was used the method of field research, sociological investigation in the form of a questionnaire and searches thru literature. On the basis of the obtained information seemed like a timely opportunity to inform the public through nature trails.

The nature trail was designed in the length of 8,579 km, on which is located 9 stops, which inform on non-timber forest products in the area, teaches them to explore, collect and use them. The trail is intended not only for children, but for adult visitors too, which has more enjoyable trip and at the same time is a fun way to learn and educate. The route is conceived as a circle and leads to the rugged terrain after already existing field and forest roads. The elevation of the trail is 99 meters.

Design of the information panels and graphics panes was chosen in accordance with the point information panel of Forests of the Czech Republic. Construction of information boards is made of wood, therefore, from a natural and renewable material. Boards have a uniform appearance and regularly recurring graphic elements. Each information board is designed so that it has on the poles of their design attached bench, the design of the information boards it is, therefore, also to relax or postpone things. Boards are placed so
that in the landscape they cause the least disturbing effect, and they take up less space for example, in the view. The range between each other is 0.729 – 1.3 km. Other proposed accompanying infrastructure are on the fourth and the sixth stop in addition to the information boards also wooden landing and a wooden stand for bicycles. Wooden rest areas include two benches, a table, and they are all protected by the roof.

The topic of each stop has been selected on the basis of the results of the questionnaire survey. It is dedicated to information about the location of favorite non-timber forest products, their utilization and usage. The themes of each stop of the nature trail are as follows: 1. Introduction – forest nature trail GIFTS OF THE FOREST, 2. Blueberries, 3. Oyster mushroom, 4. Nettle, 5. Lime tree, 6. Raspberries, 7. Elderberry, 8. Spruce and 9. Chanterelle. It was designed a specific form of individual information boards, i.e. graphics, texts, images and photos.

The next part of the thesis deals with the determination of anticipated costs for implementation of the nature trails. Costs are divided into material costs and the cost of the work. The total costs include the cost of the project, production and installation of the equipment trails, signage and on the subsequent care of the nature trail. The estimated total cost of the implementation of nature trails including the accompanying infrastructure is 218 843 CZK including VAT.
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10. List of literature


Act no. 289/1995 Sb., o lesích a o změně a doplnění některých zákonů (lesní zákon). In Sbírka zákonů, CR. 1995.


SIMANOV, V. Energetické využívání dříví. Olomouc, 1995 115 s.


SOUKUP, V. Hlemýžď čili plž jedlý a jeho příprava pro kuchyn. Praha, 1906.


11. List of annex

Annex 1 – Questionnaire
Annex 2 – Tables frequency questionnaire responses
Annex 3 – Table of amount of collection of major forest crops
Annex 4 – Photodocumentation

Independently annex

Annex no 5 – Depiction of the trails
Annex no 6 – Longitudinal profile
Annex no 7 – Information table – Technical looks and incision
Annex no 8 – Information table – 1. Introduction
Annex no 9 – Information table – 2. Blueberries
Annex no 10 – Information table – 3. Oyster mushroom
Annex no 11 – Information table – 4. Nettle
Annex no 12 – Information table – 5. Lime tree
Annex no 13 – Information table – 6. Raspberries
Annex no 14 – Information table – 7. Elderberry
Annex no 15 – Information table – 8. Spruce
Annex no 16 – Information table – 9. Chanterelle
Annex no 17 – Original questionnaire
MONITORING THE COLLECTION OF NON-TIMBER FOREST PRODUCTS

Dear Madam/Sir,

I am addressing you with a request for cooperation in the analysis of the collection of non-timber forest products on the territory of the forests in the vicinity of your residence. This questionnaire is part of a thesis elaborated by a student of Forestry and wood faculty, Mendel University in Brno. The aim of the analysis is a collection of specific non-timber forest products in a given locality and the findings of the public awareness about the issue of forest law. The results will be used for research and evaluation of the use of non-timber forest products by the general public.

Please, be kind enough and carefully answer the questions of the questionnaire. The investigation is anonymous and the information obtained cannot be associated with your person.

Thank you for the helpfulness and cooperation

Bc. Anetta Mejzliková

Gender:

- female
- male

1. What is your age?

- 0 – 17
- 18 – 25
- 26 – 39
- 40 – 54
- 55 – 64
- 65 and more
2. **What is your highest education level?**
   - Elementary school
   - High school with vocational certificate
   - High school with graduation
   - Higher vocational school
   - College degree
   - With no education

3. **What is your status?**
   - Student
   - Employed
   - Businessman
   - Unemployed
   - Household
   - Pensioner

4. **Do you collect any medicinal plants? (herbs, trees)?**
   - yes
   - no

5. **If you chose in the q. 4 YES – could you add 3 most collected, please?**

6. **Do you collect forest products for decorative purpose?**
   - yes
   - no

7. **If you chose in the q. 6 YES – could you add 3 most collected, please?**

.............................................................................................................
8. Do you use live Christmas tree at Christmas time?
   - yes
   - no

9. If you chose in the q. 8 YES, which kind and where do you get it? (e. g. own forest, from the grove, from the supermarket…)
   .......................................................................................................................................................... 

10. Do you collect forest berries in the forest?
    - yes
    - no

11. If you chose in the q. 10 YES – could you add 3 most collected, please?
    ..........................................................................................................................................................

12. Do you collect mushrooms in the forest?
    - yes
    - no

13. If you chose in the q. 12 YES – could you add 3 most collected, please?
    ..........................................................................................................................................................

14. Are you aware of the general provisions on the use of forest in the forest law?
    - yes
    - no

15. If you chose in the q. 14 YES – could you write about those provisions by your own words, please?
    ..........................................................................................................................................................
16. Are you aware that some of the enumerated activities are prohibited in the forest by forest code?

- yes
- no

17. If you chose in the q. 16 YES – could you add 3 such activities, please??

.................................................................

18. If you wish to add something into this questionnaire, any information, any comments, please do so in this place. Your objectives and communications will help in my thesis and in the survey.

.................................................................
Annex 2 – Tables frequency questionnaire responses

Gender

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>43</td>
<td>60%</td>
</tr>
<tr>
<td>Male</td>
<td>29</td>
<td>40%</td>
</tr>
</tbody>
</table>

1. What is your age??

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 17</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>18 – 25</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>26 – 39</td>
<td>21</td>
<td>29%</td>
</tr>
<tr>
<td>40 – 54</td>
<td>30</td>
<td>42%</td>
</tr>
<tr>
<td>55 – 64</td>
<td>12</td>
<td>17%</td>
</tr>
<tr>
<td>65 and more</td>
<td>6</td>
<td>8%</td>
</tr>
</tbody>
</table>

2. What is your highest education level?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary school</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>High school with vocational certificate</td>
<td>22</td>
<td>31%</td>
</tr>
<tr>
<td>High school with graduation</td>
<td>37</td>
<td>51%</td>
</tr>
<tr>
<td>Higher vocational school</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>College degree</td>
<td>10</td>
<td>14%</td>
</tr>
</tbody>
</table>
3. What is your status?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Employed</td>
<td>51</td>
<td>71%</td>
</tr>
<tr>
<td>Businessman</td>
<td>5</td>
<td>7%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Household</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Pensioner</td>
<td>4</td>
<td>6%</td>
</tr>
</tbody>
</table>

4. Do you collect any medicinal plants? (herbs, trees)?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>36</td>
<td>50%</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
<td>50%</td>
</tr>
</tbody>
</table>

5. If you chose in the q. 4 YES – could you add 3 most collected, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Rubus idaeus</em></td>
<td>16</td>
<td>16%</td>
</tr>
<tr>
<td><em>Sambucus nigra</em></td>
<td>15</td>
<td>15%</td>
</tr>
<tr>
<td><em>Flower Tilia</em></td>
<td>13</td>
<td>13%</td>
</tr>
<tr>
<td><em>Rubus</em></td>
<td>11</td>
<td>11%</td>
</tr>
<tr>
<td><em>Vaccinium myrtillus</em></td>
<td>9</td>
<td>9%</td>
</tr>
<tr>
<td><em>Photinia melanocarpa</em></td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td><em>Fragaria</em></td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td><em>Urtica dioica</em></td>
<td>5</td>
<td>5%</td>
</tr>
<tr>
<td><em>Betula</em></td>
<td>4</td>
<td>4%</td>
</tr>
<tr>
<td><em>Allium ursinum</em></td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td><em>Tussilago farfara</em></td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td><em>Petasites hybridus</em></td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td><em>Hypericum perforatum</em></td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td><em>Thymus</em></td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><em>Rose hip</em></td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td><em>Equisetum</em></td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>
6. Do you collect forest products for decorative purpose?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>53</td>
<td>74%</td>
</tr>
<tr>
<td>No</td>
<td>19</td>
<td>26%</td>
</tr>
</tbody>
</table>

7. If you chose in the q. 6 YES – could you add 3 most collected, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone</td>
<td>37</td>
<td>31%</td>
</tr>
<tr>
<td>Brushwood</td>
<td>25</td>
<td>21%</td>
</tr>
<tr>
<td>Moss</td>
<td>21</td>
<td>18%</td>
</tr>
<tr>
<td>Bark</td>
<td>13</td>
<td>11%</td>
</tr>
<tr>
<td>Rowan</td>
<td>7</td>
<td>6%</td>
</tr>
<tr>
<td>Beechnuts</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Dry leaves</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Ferns</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Beech branches</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Stump</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Stone</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Heather</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Rose hip</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Blackthorn</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Dry grass</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

8. Do you use live Christmas tree at Christmas time?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>59</td>
<td>82%</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>18%</td>
</tr>
</tbody>
</table>
9. If you chose in the q. 8 YES, which kind and where do you get it? (e. g. own forest, from the grove, from the supermarket…)

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spruce</td>
<td>17</td>
<td>52%</td>
</tr>
<tr>
<td>Fir</td>
<td>10</td>
<td>30%</td>
</tr>
<tr>
<td>Pine</td>
<td>6</td>
<td>18%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supermarket</td>
<td>47</td>
<td>66%</td>
</tr>
<tr>
<td>Private forest</td>
<td>15</td>
<td>21%</td>
</tr>
<tr>
<td>The gamekeeper</td>
<td>9</td>
<td>13%</td>
</tr>
</tbody>
</table>

10. Do you collect forest berries in the forest?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>55</td>
<td>76%</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>24%</td>
</tr>
</tbody>
</table>

11. If you chose in the q. 10 YES – could you add 3 most collected, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blueberries</td>
<td>46</td>
<td>28%</td>
</tr>
<tr>
<td>Raspberries</td>
<td>41</td>
<td>25%</td>
</tr>
<tr>
<td>Strawberries</td>
<td>37</td>
<td>23%</td>
</tr>
<tr>
<td>Blackberries</td>
<td>34</td>
<td>21%</td>
</tr>
<tr>
<td>Cranberries</td>
<td>6</td>
<td>4%</td>
</tr>
</tbody>
</table>

12. Do you collect mushrooms in the forest?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>65</td>
<td>90%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>10%</td>
</tr>
</tbody>
</table>
13. If you chose in the q. 12 YES – could you add 3 most collected, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boletus</td>
<td>69</td>
<td>33%</td>
</tr>
<tr>
<td>Macrolepiota</td>
<td>36</td>
<td>17%</td>
</tr>
<tr>
<td>Amanita rubescens</td>
<td>34</td>
<td>16%</td>
</tr>
<tr>
<td>Cantharellus cibarius</td>
<td>29</td>
<td>14%</td>
</tr>
<tr>
<td>Xerocomellus chrysenteron</td>
<td>17</td>
<td>8%</td>
</tr>
<tr>
<td>Leccinum carpini</td>
<td>11</td>
<td>5%</td>
</tr>
<tr>
<td>Pleurotus ostreatus</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td>Suillus</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Leccinum</td>
<td>3</td>
<td>1%</td>
</tr>
</tbody>
</table>

14. Are you aware of the general provisions on the use of forest in the forest law?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18</td>
<td>25%</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>75%</td>
</tr>
</tbody>
</table>

15. If you chose in the q. 14 YES – could you write about those provisions by your own words, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection of non-timber forest products for personal use only</td>
<td>3</td>
<td>43%</td>
</tr>
<tr>
<td>Consideration</td>
<td>1</td>
<td>14%</td>
</tr>
<tr>
<td>What can and can not in the forest</td>
<td>1</td>
<td>14%</td>
</tr>
<tr>
<td>To avoid interfering with the forest environment</td>
<td>1</td>
<td>14%</td>
</tr>
<tr>
<td>Instructions for movement in the forest</td>
<td>1</td>
<td>14%</td>
</tr>
</tbody>
</table>

16. Are you aware that some of the enumerated activities are prohibited in the forest by forest code?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>33</td>
<td>46%</td>
</tr>
<tr>
<td>No</td>
<td>39</td>
<td>54%</td>
</tr>
</tbody>
</table>
17. If you chose in the q. 16 YES – could you add 3 such activities, please?

<table>
<thead>
<tr>
<th>Response</th>
<th>The absolute frequency</th>
<th>The relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fires</td>
<td>16</td>
<td>26%</td>
</tr>
<tr>
<td>Destruction of vegetation</td>
<td>12</td>
<td>20%</td>
</tr>
<tr>
<td>Throwing rubbish</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td>Dogs off leash</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td>Noise</td>
<td>8</td>
<td>13%</td>
</tr>
<tr>
<td>Collection of protected plants</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>To go by car</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Stealing timber</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Camping</td>
<td>1</td>
<td>2%</td>
</tr>
</tbody>
</table>

18. If you wish to add something into this questionnaire, any information, any comments, please do so in this place. Your objectives and communications will help in my thesis and in the survey.

The last question answered only one immature respondent in the questionnaire survey.

Here is the literal reasoning: "Forests are important for life on Earth, their felling is destroying nature and on their place there are various buildings and power plants, which secrete the exhaust, which is destroying our planet."
Annex 3 – Table of amount of collection of major forest crops

Tab. 1 Quantity collection of the main forest crops collected by the visitors of the forest in kg/household of the Czech Republic in the period 1994 – 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Products</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mushrooms</td>
<td>Blue-berries</td>
<td>Rasp-berries</td>
<td>Black-berries</td>
<td>Cranberies</td>
<td>Elder-berries</td>
<td>Total</td>
</tr>
<tr>
<td>1994</td>
<td>6,15</td>
<td>2,95</td>
<td>1,11</td>
<td>0,70</td>
<td>0,17</td>
<td>1,03</td>
<td>12,11</td>
</tr>
<tr>
<td>1995</td>
<td>7,76</td>
<td>3,90</td>
<td>1,52</td>
<td>0,74</td>
<td>0,34</td>
<td>1,00</td>
<td>15,26</td>
</tr>
<tr>
<td>1996</td>
<td>4,79</td>
<td>2,47</td>
<td>0,82</td>
<td>0,46</td>
<td>0,19</td>
<td>0,39</td>
<td>9,12</td>
</tr>
<tr>
<td>1997</td>
<td>4,66</td>
<td>2,28</td>
<td>1,04</td>
<td>0,43</td>
<td>0,25</td>
<td>0,57</td>
<td>9,23</td>
</tr>
<tr>
<td>1998</td>
<td>4,63</td>
<td>2,69</td>
<td>1,28</td>
<td>0,61</td>
<td>0,16</td>
<td>0,68</td>
<td>10,05</td>
</tr>
<tr>
<td>1999</td>
<td>5,28</td>
<td>3,39</td>
<td>0,92</td>
<td>0,61</td>
<td>0,31</td>
<td>0,83</td>
<td>11,34</td>
</tr>
<tr>
<td>2000</td>
<td>6,21</td>
<td>2,27</td>
<td>1,06</td>
<td>0,70</td>
<td>0,19</td>
<td>0,46</td>
<td>10,89</td>
</tr>
<tr>
<td>2001</td>
<td>6,11</td>
<td>2,32</td>
<td>0,96</td>
<td>0,61</td>
<td>0,19</td>
<td>0,37</td>
<td>10,56</td>
</tr>
<tr>
<td>2002</td>
<td>5,55</td>
<td>2,84</td>
<td>0,94</td>
<td>0,56</td>
<td>0,24</td>
<td>0,55</td>
<td>10,68</td>
</tr>
<tr>
<td>2003</td>
<td>3,52</td>
<td>1,70</td>
<td>0,68</td>
<td>0,52</td>
<td>0,09</td>
<td>0,37</td>
<td>6,68</td>
</tr>
<tr>
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Source: Ministry of Agriculture, 2012
Annex 4 – Photodocumentation

Photo no. 1: Landscape from the second to the third stopping

Photo no. 2: The trail of from the third to fourth stopping
Photo no. 3: Walk around the Jedovnický pond

Photo no. 4: Surveying of GPS apparatus (the sixth stops with rest area)
Photo no. 5: The trail of from the seventh to eighth stopping

Photo no. 6: The trail of from the ninth to the final stopping