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BEOGRAD**

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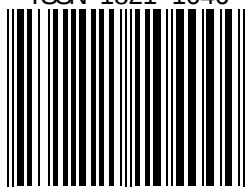
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**ZBORNİK RADOVA
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SADRŽAJ CONTENTS

TOM 61-62

Zoran MILETIĆ

**THE POSSIBILITY OF USING SOME CONIFEROUS SPECIES FOR THE
IMPROVEMENT OF THE CHARACTERISTICS OF MINE SOILS**

7

*Ljubinko RAKONJAC, Zagorka TOMIĆ, Aleksandar VASILJEVIĆ,
Mihailo RATKNIĆ, Milorad VESELINOVIC*

**THE SITE CHARACTERISTICS, FLORISTIC COMPOSITION AND
STRUCTURE OF THE SPRUCE FOREST (ASS. *PICEETUM EXCELSAE*
MONTANUM SERBICUM GREBENŠČIKOV 1950.) IN PESHTER PLATEAU**

15

Mihailo RATKNIĆ, Ljubinko RAKONJAC

**SESSILE OAK AND HORNBEAM FOREST RESOURCES
IN PESHTER PLATEAU**

27

Sonja BRAUNOVIĆ, Mihailo RATKNIĆ

**THE ENDANGERMENT OF THE ECOSYSTEM DIVERSITY OF
GRDELICHKA GORGE AND VRANJSKA BASIN OWNING
TO THE ANTHROPOGENIC FACTOR**

41

*Vesna GOLUBOVIĆ-ĆURGUZ, Mara TABAKOVIĆ-TOŠIĆ,
Dragan KIKOVIĆ, Ljubinko JOVANOVIĆ*

**THE INHIBITORY EFFECT OF FUNGICIDES BENFUNGIN WP AND
KAPTAN FLON ON THE GROWTH OF MYCELIUM
OF MYCORRHIZAL FUNGI**

55

*Mara TABAKOVIĆ-TOŠIĆ, Snežana RAJKOVIĆ,
Vesna GOLUBOVIĆ-ĆURGUZ, Miroslava MARKOVIĆ*

**COMPATIBILITY OF THE MICROBIOLOGICAL PESTICIDES IN THE
SYNCHRONISED SUPPRESSION OF POWDERY MILDEWS
AND THE GYPSY MOTH**

65

Katarina MLADENOVIĆ, Bojan STOJNIĆ, Zlatan RADULOVIĆ
**FAUNA OF PREDATORY MITES (ACARI: PHYTOSEIIDAE)
IN THE ARTIFICIALLY ESTABLISHED STANDS
ON THE RECLAIMED MINE SOILS**

75

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SESSILE OAK AND HORNBEAM FOREST RESOURCES IN PESHTER PLATEAU

Mihailo RATKNIC, Ljubinko RAKONJAC¹

Abstract: *Sessile oak and hornbeam is the relict association (G1.A1A) reported on the limestone chernozem and dystic cambisol. The total of 138 plants, out of which 16 tree species, 15 bush species and 107 ground flora species, were registered. The mean value of the ecological indices for humidity is 2.54, of the chemical reaction of soil 3.24, of the nutrients 2.48, of the light 3.19, and of the temperature 3.36. Out of total number of the registered plants, there are 56 medicinal plants, i.e. 40.1%: 10 of them belongs to the first, 5 to the second, 12 to the fourth, and 15 species to the fifth healing classes. Due to the high degree of degradation, the sessile oak and hornbeam forests are not rich in the forest fruit trees. The total of 58 honey plants, out of which 8 ligneous, 18 bushy and 32 herbaceous species, was reported in the sessile oak and European hornbeam forests. The mean honey yield of the association is 3.00. The number of the honey plants in blossom is the highest in May, June and July, which enables the long-lasting honey-bee harvesting during the summer months. The beech forest occupy 412.85 hectares of the territory. The coppice stands account for 22.16%, and 5.4%, subsequently, whereas in other parts it occurs in the form of thick scrubs, with the trees thinner than 10 cm. In the aim of site regeneration, the main, accompanying and secondary tree species were defined.*

Key words: sessile oak and hornbeam forests, G1.A1A, sustainable use, natural resources

1. INTRODUCCION

The disappearance of forests, which accounts for 10 million hectares annually, points out to the seriousness of problem and requires the urgent measures

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aimed at the inhibition of degradation and devastation of the current forest ecosystems. In the concept of ecocentric (or biocentric) use of the resources, the ecosystem is the complex of the living organisms and has its value by itself, which refers to the assessment of the human needs and their relation to nature in another way. The way in which nature creates and maintains the ecosystems is respected. The ecocentric concept protects, preserves and regenerates the functions of the natural ecosystems by the simultaneous use of all goods and services, which implies satisfying the human needs at the stable and permanent bases. The ecological processes in the ecosystems, which implies satisfying the economic needs of the society, but not the industrial use, are favoured. The integral part of this approach is the treatment of soil, water, biodiversity and biomass. The meeting of these goals is based on the ecological, socio-demographic and economic criteria. The concept is based on the Concept of the sustainable development and focused on the smaller territorial units (areas).

The sessile oak and hornbeam is the relict association. In Serbia sessile oak and hornbeam forests are orographically and edaphically determined, i.e. they occur as the extrazonal vegetation, and the association is not present in the classical form, which means that sessile oak and hornbeam do not occur in the tree layer (Gajic, M., 1970), but as the different combinations of several oak species with European hornbeam. The first "real" *Querceto-Carpinetum*, i.e. variant in which sessile oak and hornbeam is dominant in tree layer, has been first described by Rudski (1949).

This association is the extension of the association from the southeastern parts of Bosnia and Croatia, where the sessile oak and hornbeam forest is the climatogenic association. The association is of the mesophilic character and occurs at the higher altitudes. It also spreads in the spatially separated ranges within the area of climatogenic Hungarian and Turkey oak forest (Stefanovic, 1977), on the shaded slopes, fresh valleys of the brooks, on the lessive soil and pseudogley. Sessile oak and hornbeam forests were reported in Rudnik (Gajic, 1961), Avala (Borisavljevic, et al., 1955), Frushka gora (Jankovic et Mishic, 1960), Majdanpechka domena (Jovanovic, 1948) and Suva planina (Jovanovic, 1955), which means that in Serbia sessile oak and hornbeam association is clearly differentiated.

In the forests located in the lower hilly zone of Kopaonik, sessile oak and hornbeam forests are extremely disturbed, by the massive occurrence of oriental hornbeam (*Carpinus orientalis*) in the second layer (Rajevski et Borisavljevic, 1956). Sessile oak and hornbeam forest in Bosnia, where it is regionally extended in the moderate continental-humid climate, narrow their range in the southeast direction towards the area of Serbia and Montenegro. On the werferian sediments, as well as on the sediments from the Tertiary and Paleozoic formation, sessile oak and hornbeam forest (*Querceto-Carpinetum iliricum*) in the border area of Hungarian and Turkey oak forest, occupy the most favourable sites, whereas the sessile oak forests are found on the less favourable sites (Stefanovic, 1964). In the virgin forest reserve Perucica, sessile oak and hornbeam forests were registered at the altitudes around 800 meters above the sea level as the thermophilic variants of sessile oak and hornbeam forest (Fukareket Stefanovic, 1958; Ratknic, 2004.).

2. MATERIAL AND METHOD

The research was conducted in sessile oak and hornbeam forest in the Peshter Plateau (southwestern Serbia). The soil characteristics were also studied based on the soil profiles, and the soil types were determined based on the soil classification (Shkoric, et al. 1985), as well as by using FAO classification. The sites were classified based on EUNIS classification. For the determination of the species “Flora of Social Republic of Serbia”(1970–1986), *Ikonographie der flora des südöstlichen Mitteleuropa* (Jávorka, S., Csapody, V., 1979), “Flora and vegetation of Golija and Javor” (Gajic, M., 1989), “Flora of Tara National Park ” (Gajic, 1988) were used. The biological spectra of plants were processed by using the method devised by Kojic et al. (Kojic, et al., 1994). The types of the life forms were classified by using Rankiaer’s method (Diklic, 1984). The area covered by forests and forest stands, classification of area based on the types of stands, wood volume and volume increment, were analyzed. The percent of the trees in the total volume, thinner than 30 cm, was separately analyzed.

3. RESULTS

The adequate biodiversity protection at the spatial and genetic levels is not possible without the adequate site protection. The site becomes the central unit of protection in the concept of the biodiversity protection. The site is defined as the “association of plants and animals” (as well as other members of biocoenosis), which along with the abiotic factors (soil, climate, amount and quality of water, etc.) is the unique functional unit (Davies et Moss, 2002). The system of site classification in Serbia is based on the EUNIS system of classification. The sites which are within the EUNIS system kept the same names and codes, whereas the sites which are not found in the EUNIS system got the new names and codes, thereby mainly based on the *EUNIS* logics of naming. The new codes are integrated in EUNIS system of classification. Each site also got the suitable new code, relevant to the national system of classification (Lakushic, et al, 2005). The site classification is the integral part of EUNIS system (European information system) and was created in the aim of providing universal and inclusive site classification for Europe.

In order to satisfy the needs of EUNIS classification, the term “site” was defined in the following way: “place inhabited by plant and animal species, which is mainly characterized by the physical characteristics (topography, plant or animal physiognomy, soil characteristics, climate, water quality, etc.), as well as by the plant or animal species which live there”.

EUNIS classification is the data base which provides the comprehensive typology of European sites: from natural to artificial ones, from water to terrestrial ones. The sites were classified in a hierarchal way, at the certain levels and marked by alphanumeric codes. Based on these criteria, sessile oak and hornbeam forests would have the following hierarchal codes (Lakušić, et al, 2005).

G FOREST AND FOREST SITES AND OTHER REFORESTED AREA

G1 Broadleaf deciduous forests

G1.A Meso- and eutrophic forests with <Quercus>, <Carpinus>, <Fraxinus>, <Acer>, <Tilia>, <Ulmus> and related forests

G1.A1 Oak forests <Quercus> - ash <Fraxinus> and hornbeam <Carpinus betulus> on eutrophic and mesotrophic soils

G1.A1A – Illyrian oak-hornbeam <Quercus> -<Carpinus betulus> forest

Equivalent association: *Querco-Carpinetum illyricum*

In the Peshter Plateau, sessile oak and hornbeam are completely devastated. These forests have disappeared due to the multi-century destruction, and have been preserved only as the low-lying bushes in Djetanica. Although the hornbeam is resistant to the adverse effects, these forests have not been preserved on the limestone terrains. The sessile oak, which did not managed to preserve in the conditions which are unfavourable to its development, disappeared from these forests. Such conditions were reflected in the shallow skeletal soil. Nowadays in Peshter Plateau they occur on the northern slopes of the valley of the Trijebinska River (silicate bedrock) and in the Uvac River valley, below the limestone cliffs of Uvacka Gorge. These forest do not have the preserved canopy, on the slopes of the cliffs the common hazel is dominant, and between the common hazelnut groups the short oriental hornbeam and hop-hornbeam are located. Due to the incomplete canopy the species of the surrounding forest and grass associations are present.

In Trijebina in the first layer aspen, birch, juniper tree are present, and in Chedovo and Uvac *Corylus avellana*, *Cornus mas*, *Juniperus communis*, *Viburnum lantana*, *Pyrus pyraeaster*, *Viburnum opulus*, *Crataegus monogyna*, *Cotoneaster intergerrimus*, etc. Although the terrains on which this association occurs are steep, and characterized by the shallow soil, humid air masses converge along the valley, so in the parts in the direction to Bare it occurs in the different site conditions than the ones in Uvac area. Owing to the vicinity of the rural settlements, the forests are destroyed, and not regenerated. Although the hornbeam is the biologically stronger edificator (which is able to multiply in vegetative and generative ways), it did not succeed in regenerating and preserving. The sessile oak has been, as the technically more valuable species, completely removed from these stands.

The association have two geographically-ecologically range of distribution. The first one is located below the limestone cliffs of the Uvacka Gorge, on its lateral slopes, on the limestone chernozem and occupy smaller areas of the brown limestone soil in the altitudinal zone ranging from 1,000 to 1,100 m, at all exposures, on the slopes ranging from 30 to 40° degrees, as well as in the valley itself (on the gentler slopes and deeper soils). The fragments of the previous stands are better preserved in the parts which are closer to the river. In the upper, flattened parts, limestone chernozem are from 10 to 30 cm deep, and has only managed to uproot and survive. In the past the soil was deeper, but by the process of forest destruction and occurrence of erosion its ability has been considerably reduced. The main site characteristics are analyzed in the Table 1.

On the diabase-chert formation, on the dystic cambisol, the better preserved stand of this association, which occurred as the result of the reduced anthropogenic influence over the last years, was reported. The remain of this

association was also studied in some parts of Trijebine village, on sands and clay, on dystric cambisol. Out of the remains of the previous forests only one hornbeam has remained, whereas aspen and birch are increasingly present.

Table 1. *Characteristics of the site of sessile oak and hornbeam forest*

The number of record	Parent rock	Soil	Altitude (m)	EExposure	NSlope ₀
1	Limestone	Limestone chernozem	1010	N-W	40
2	Limestone	Limestone chernozem	1010	S	30
3	Limestone	Limestone chernozem	1090	W	30
4	Sandstones, shales and hornstones	Dystric cambisol	1010	N	30
5	Peskovi i gline	Dystric cambisol	1250	N-W	20

Floristic composition of sessile oak and hornbeam forests – In sessile oak and hornbeam association the total of 138 plants, 16 tree species, 15 bushy species, and 107 species occurring in the ground flora layer were reported (*Acer campestre*, *Achillea millefolium*, *Achnatherum calamagrostis*, *Aegopodium podagraria*, *Agrimonia eupatoria*, *Alchemilla vulgaris*, *Anemone silvestris*, *Aremonia agrimonoides*, *Arrhenatherum elatius*, *Asarum europaeum*, *Asperula cynanchica*, *Asperula taurina*, *Avena planiculmis*, *Betula pendula*, *Brachypodium silvaticum*, *Briza media*, *Bupleurum sibthorpiatum*, *Calamintha vulgaris*, *Campanula persicifolia*, *Campanula rotundifolia*, *Carpinus betulus*, *Carum carvi*, *Centaurea atropurpurea*, *Chaerophyllum aromaticum*, *Chaerophyllum hirsutum*, *Chamaespartium sagittale*, *Cirsium pannonicum*, *Convolvulus arvensis*, *Cornus mas*, *Coronilla coronata*, *Corylus avelanna*, *Cotoneaster integerrimus*, *Crataegus calycina*, *Crataegus monogyna*, *Dactylis glomerata*, *Danaa cornubiensis*, *Danthonia provincialis*, *Daphne mezereum*, *Deschampsia flexuosa*, *Dianthus petraeus*, *Doronicum columnae*, *Dorycnium herbaceum*, *Euphorbia amygdaloides*, *Evonymus verrucosus*, *Fagus silvatica*, *Festuca amethystine*, *Festuca heterophylla*, *Filipendula hexapetala*, *Fragaria vesca*, *Galium boreale*, *Galium corrudifolium*, *Galium mollugo*, *Galium purpureum*, *Galium silvaticum*, *Genista ovate*, *Glechoma hirsute*, *Helianthemum nummularium*, *Helleborus odoratus*, *Hepatica nobilis*, *Heracleum sphondylium*, *Hypericum hirsutum*, *Hypericum perforatum*, *Inula helenium*, *Juniperus communis*, *Knautia sarajevensis*, *Lathyrus venetus*, *Leontodon crispus*, *Leucanthemum vulgare*, *Lonicera alpigena*, *Lonicera xylosteum*, *Luzula luzuloides*, *Luzula pilosa*, *Lysimachia nummularia*, *Medicago falcata*, *Medicago orbicularis*, *Melampyrum pratense*, *Melica nutans*, *Mercurialis perennis*, *Minuartia hybrid*, *Myrrhis odorata*, *Ostrya carpinifolia*, *Pedicularis comosa*, *Peucedanum officinale*, *Phyteuma spicatum*, *Picea abies*, *Pimpinella saxifraga*, *Pirus piraster*, *Plantago lanceolata*, *Plantago major*, *Poa nemoralis*, *Poa pumila*, *Polygala comosa*, *Polygonatum verticillatum*, *Populus tremula*, *Potentilla erecta*, *Primula acaulis*, *Prunella vulgaris*, *Prunus spinosa*, *Pulmonaria officinalis*, *Quercus petraea*, *Ranunculus repens*, *Rhamnus catharticus*, *Rhamnus saxatilis*, *Ribes grossularia*, *Rosa agrestis*, *Rosa pendulina*, *Rubus idaeus*, *Salix capreae*, *Salix pentandra*, *Sanguisorba minor*, *Sanicula europaea*, *Scabiosa columbaria*,

*Silene esca*pa var. *balcanica*, *Silene roemeri* subsp. *sendtneri*, *Silene viridiflora*, *Solidago virga-aurea*, *Stachys officinalis*, *Stellaria graminea*, *Stellaria holostea*, *Succisa pratensis*, *Tanacetum corymbosum*, *Teucrium chamaedrys*, *Tilia cordata*, *Trifolium alpestre*, *Trifolium diffusum*, *Trifolium montanum*, *Trifolium pignanii*, *Trifolium pretense*, *Trifolium repens*, *Vaccinium myrtillis*, *Veratrum album*, *Veronica chamaedrys*, *Viburnum lantana*, *Viburnum opulus*, *Vicia cracca*, *Vicia incana*, *Viola hirta*, *Viola silvestris*).

The spectrum of life forms – In the spectrum of life forms the high percent of chemicryptophytes (56.52%) was reported. The percent of geophytes (9.42%) points out to the relatively favourable pedological conditions of the stands in the vicinity of watercourses where the relative air humidity is high. Due to the open canopies and absorption of the high quantity of light, the particularly favourable conditions for the development of nano-phanerophytes (10.87%) are created. Phanerophytes and nano-phanerophytes account for 22.46%. Chamaephytes account for 8.69%, out of which there are 3.62% ligneous and 5.07% herbaceous species. Terophytes account for 2.17%, and terophytic/chamaephytes for 0.72% (Table 2.).

Table 2. *Life form spectrum of plants in sessile oak and hornbeam forests*

Life forms (%)							
Phanerophytes	Nano-phanerophytes	Ligneous chamaephytes	Herbaceous chamaephytes	Chemicryptophytes	Geophytes	Terophytes	Terophytes/Chamaephytes
p	np	dc	zc	h	g	t	th
11.59	10.87	3.62	5.07	56.52	9.42	2.17	0.72
22.46		8.69					

Spectrum of floral elements – The Eurasian floral elements are most dominant in the spectrum of floral elements, accounting for 31.11%. Although the Eurasian elements are most dominant individual types in this range, Sub-Eurasian and Sub-South Siberian are also very frequently found. There is also a high percent of the group of Mid-European floral elements (23.70%), out of which Mid-European and Sub-Mid-European ones are the most frequently found individual range types. Sub-Mediterranean floral elements account for 17.04%, which points out to the more expressive influence of the Sub-Mediterranean climate. Pontic-Central Asian floral elements account for 13.33%, which is the result of the climate conditions in the Uvac and Vapa valley. Sub-Atlantic floral elements account for only 3.70%. Floral elements of the north regions and circumpolar ones account for 3.70%, and circumpolar and cosmopolites for 7.41% (Table 3.).

Table 3. *Spectrum of floral elements in sessile oak and hornbeam forests*

Name of the group of the floral elements	Floral element	Percent %
1 FLORAL ELEMENTS OF NORTHERN REGIONS		
Arctic floral elements		
Boreal floral elements	Boreal-circumpolar	22.22
	Sub-boreal-European –West-Siberian	00.74
	Boreal-Eurasian	00.74
		33.70

Name of the group of the floral elements	Floral element	Percent %	
2 MID-EUROPEAN FLORAL ELEMENTS			
Mid-European	Mid-European	11.11	223.70
and European	Sub-Mid-European	11.85	
	Alpine- Carpathian	00.74	
3 SUB-ATLANTIC FLORAL ELEMENTS			
Sub-Atlantic and Atlantic	Sub- Atlantic- Sub-Mediterranean	33.70	33.70
4 SUB-MEDITERRANEAN FLORAL ELEMENTS			
Sub-Mediterranean	Sub-Mediterranean	110.37	117.04
East-Sub-Mediterranean	East-Sub-Mediterranean	11.48	
Balkan and	Sub-Moesian	00.74	
Balkan-Apennine	Scardo-Pindic	00.74	
	Mid-Balkan	11.48	
	Sub-Mid-Balkan	00.74	
	Mid-Balkan –Central-South-Apennine	00.74	
	Sub-Balkan-Apennine	00.74	
5 PONTIC-CENTRAL ASIAN FLORAL ELEMENTS			
	Sub-Pontic-Central Asian	22.96	113.33
	Sub-Pontic- Cenral Asian – Sub-Mediterranean	00.74	
Pontic	Pontic	00.74	
	Sub-Pontic	22.96	
	Pontic-Sub-Mediterranean	22.22	
	Pontic-East-Sub-Mediterranean	11.48	
	Sub-Pontic-Sub-Mediterranean	00.74	
	Sub-Pontic-Sub-Pannonian	11.48	
6 EURASIAN FLORAL ELEMENTS			
	Sub-South Siberian	55.93	331.11
	Eurasian	117.04	
	Eurafrican	00.74	
	Sub-Eurasian	77.41	
7 CIRCUPOLAR COSMOPOLITAN FLORAL ELEMENTS			
	Circumpolar	66.67	77.41
	Cosmopolites	00.74	

Ecological indices of sessile oak and hornbeam forests – In sessile oak and hornbeam forests the ecological indices of humidity, chemical soil reaction, nutrients, light and temperature were determined.

The mean value of the ecological indices of humidity is 2.54 (depending on the record, the values ranges from 2.47 to 2.77). Sub-mesophilic plants, which favour more mesophilic sites, but can be also found in xerophilic conditions, are most dominant on these sites.

The mean value of the ecological indices of the chemical soil reaction is 3.24 (from 3.15 to 3.36) and mainly points out to the neutrophilic plants, which are found on the neutral and low acidified soil.

The mean value of the ecological indices of nutrients (amount of nitrogen in the soil) is 2.48 (from 2.31 to 2.59), which points out that the plants that are intermediate between oligotrophic and mesotrophic ones are most frequently found.

The mean value of ecological indices of the light is 3.19 (from 2.83 to 3.39), which means that half-sciophytes are most frequently found in birch forests.

The mean value of ecological indices of the temperature is 3.36 (from 2.06 to 3.46) and points out to the high percent of mesothermal species which are dominant in the montane conditions.

Medicinal plants in sessile oak and hornbeam forests – In sessile oak and hornbeam forests the presence of 138 plant species was reported. Out of this number 56 species, i.e. 40.1%, are medicinal ones.

Within the first healing class 10 species, i.e. 7.2% , were reported (*Achillea millefolium*, *Betula pendula*, *Crataegus monogyna*, *Hypericum perforatum*, *Juniperus communis*, *Quercus petraea*, *Sanicula europaea*, *Tilia cordata*, *Vaccinium myrtillis*, *Veratrum album*). All species are in the circulation, and only *Quercus petraea* is not subject to the limits in the amount of collection. *Veratrum album* is found in the Red Book, determined as the highly endangered taxon and its collection is prohibited.

In the second healing class 5 species, or 3.6%, were reported (*Agrimonia eupatoria*, *Plantago lanceolata*, *Pulmonaria officinalis*, *Sanguisorba minor*, *Solidago virga-aurea*). All species are in the circulation, except for *Sanguisorba minor*, which is not under the control of collection and circulation.

In the third healing class 12 species, or 8.7%, were determined (*Asarum europaeum*, *Cornus mas*, *Daphne mezereum*, *Fagus silvatica*, *Glechoma hirsute*, *Helleborus odoratus*, *Hepatica nobilis*, *Populus tremula*, *Potentilla erecta*, *Prunus spinosa*, *Rhamnus catharticus*, *Rubus idaeus*). The species *Glechoma hirsuta*, *Hepatica nobilis* and *Populus tremula* are not in the circulation and are important in the folk medicine. The species *Daphne mezereum*, *Fagus silvatica*, *Helleborus odoratus*, *Prunus spinosa*, *Rhamnus catharticus* i *Rubus idaeus* are in the circulation. *Asarum europaeum*, *Cornus mas* and *Potentilla erecta* are under the control of collection.

The total of 12 plant species, or 8.7%, belong to the fourth healing class (*Carum carvi*, *Corylus avelanna*, *Euphorbia amygdaloides*, *Filipendula hexapetala*, *Fragaria vesca*, *Heracleum sphondylium*, *Hypericum hirsutum*, *Plantago major*, *Ranunculus repens*, *Stachys officinalis*, *Teucrium chamaedrys*, *Veronica chamaedrys*). There are no limits to the species *Carum carvi*, *Filipendula hexapetala*, *Plantago major*, *Ranunculus repens*, regarding the amount which can be collected from the natural sites. The species *Corylus avelanna*, *Fragaria vesca*, *Teucrium chamaedrys* and *Veronica chamaedrys* are under the control of collection and circulation. The species *Euphorbia amygdaloides*, *Heracleum sphondylium* and *Stachys officinalis* are important in the folk medicine.

In the fifth healing class 15 species, or 10.9%, were reported (*Aegopodium podagraria*, *Alchemilla vulgaris*, *Doronicum columnae*, *Galium boreale*, *Inula helenium*, *Lysimachia nummularia*, *Medicago falcata*, *Picea abies*, *Pimpinella saxifraga*, *Primula acaulis*, *Prunella vulgaris*, *Ribes grossularia*, *Salix capreae*, *Salix pentandra*, *Trifolium pretense*, *Trifolium repens*, *Viburnum opulus*). The species *Picea abies* is in the circulation without any limit, and *Alchemilla vulgaris*, *Inula helenium* and *Pimpinella saxifraga* are under the control of collection and circulation, whereas the other species are not of the great economic significance.

Fruit trees in sessile oak and hornbeam forests – In sessile oak and hornbeam forests the following species of fruit trees were reported: *Crataegus monogyna*, *Juniperus communis*, *Vaccinium myrtillis*, *Cornus mas*, *Rhamnus*

catharticus, *Rubus idaeus*, *Fragaria vesca*, *Ribes grossularia*, *Cotoneaster integerrimus*, *Lonicera alpigena*, *Lonicera xylosteum* i *Rosa agrestis*.

Honey plants in sessile oak and hornbeam forests – Based on the analysis in sessile oak and hornbeam forests, 58 honey plants, out of which 8 ligneous ones, were reported (*Tilia cordata*, *Acer campestre*, *Picea abies*, *Populus tremula*, *Quercus petraea*, *Betula pendula*, *Carpinus betulus*, *Fagus silvatica*), 18 bushy (*Corylus avelanna*, *Crataegus calycina*, *Rosa pendulina*, *Rubus idaeus*, *Salix capreae*, *Viburnum lantana*, *Cornus mas*, *Coronilla coronata*, *Cotoneaster integerrimus*, *Crataegus monogyna*, *Evonymus verrucosus*, *Genista ovata*, *Prunus spinosa*, *Ribes grossularia*, *Teucrium chamaedrys*, *Viburnum opulus*, *Daphne mezereum*, *Vaccinium myrtillis*) and 32 herbaceous (*Calamintha vulgaris*, *Campanula persicifolia*, *Pulmonaria officinalis*, *Stachys officinalis*, *Trifolium alpestre*, *Trifolium montanum*, *Veronica chamaedrys*, *Vicia cracca*, *Galium mollugo*, *Anemone silvestris*, *Filipendula hexapetala*, *Galium boreale*, *Inula helenium*, *Lysimachia nummularia*, *Phyteuma spicatum*, *Plantago major*, *Primula acaulis*, *Prunella vulgaris*, *Scabiosa columbaria*, *Solidago virga-aurea*, *Veratrum album*, *Vicia incana*, *Aegopodium podagraria*, *Fragaria vesca*, *Helleborus odorus*, *Heracleum sphondylium*, *Hypericum perforatum*, *Medicago falcata*, *Plantago lanceolata*, *Polygala comosa*, *Succisa pratensis* Mnch, *Trifolium repens*). The mean honey yield of the association is 3.00. The number of honey plants in blossom is the highest in May, June and July (Figure 1).

Wood resources of sessile oak and hornbeam forests – Sessile oak and hornbeam occupy 412.85 hectares. Coppice stands account for 22.16% and 5.4%, subsequently, whereas in other parts of the area it occurs in the form of the thick scrubs, with the trees thinner than 10 cm.

Regeneration of sessile oak and hornbeam forests – The selection of the tree species for the regeneration of the ecosystem will enable its faster revitalisation. The following species were defined:

“Main tree species” which are used for the reforestation of the completely preserved sites or sites which are slightly degraded: *Quercus petraea*, *Carpinus betulus*

“Accompanying tree species” refer to the species of the different ecological requirements. The selection of the accompanying species is made depending on the level of degradation of the site, parent rock and pedological conditions: *Acer campestre*, *Fraxinus ornus*

“Bushy species” are typical for the degradational phases of the stand and can be used in the process of the faster revitalization of the damaged or destroyed ecosystems: *Ligustrum vulgare*, *Evonymus europaeus*, *Cornus sanguinea*

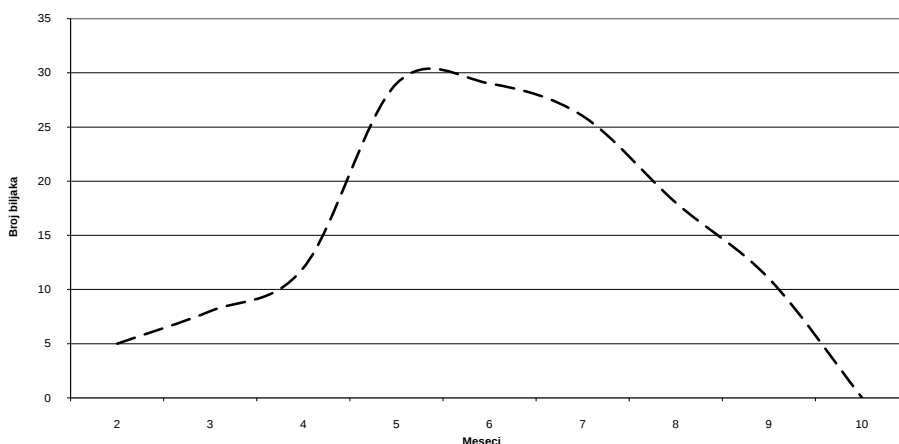
4. DISCUSSION AND CONCLUSIONS

The condition of the plant resources in the Peshter Plateau is endangered by the multi-annual destruction, which is directly reflected in the socio-demographic status of the population. These researches are aimed at the definition of the condition of the natural resources, determination of the priorities of the activities for the inhibition of the adverse effects and subsequent selection of the

methods for the improvement of the condition. By achieving the aims of the research of the sustainable use of the plant resources of the Peshter Plateau, the bases for the following activities are made:

- Implementation of the European standards and models and creation of the methodology of the registration of the renewable plant resources;

Figure 1. *The number of honey plants in sessile oak and hornbeam forests which are in blossing during a year*



- Creation of the strategic frame for the sustainable management by the renewable resources based on the principles of the sustainable development and the level of the researches of the current natural resources which have been conducted so far;
- Preservation and increase of the ecological, biological, climate, social-cultural and economic benefits of the use of the plant resources;
- Environment protection, social and spiritual functions and value of the natural ecosystems achieved by: establishment, extension and suitable management by the protected areas and associations, forest presentation the representative ecological systems and regions, preservation and management by the game, preservation of the gene pool, measures of supporting and providing of the sustainable use of the biological resources and biodiversity preservation;
- Supporting and improvement of the national programs of reforestation and reclamation of the degraded sites, establishment of the new ones and improvement of the current forests of different purposes, in order to reduce the pressure with which the current forest ecosystems are faced up;
- Base the concept of the planning of the permanent management by the renewable plant resources on the criterion – preservation of the environment quality, which means that the economic use of the renewable plant resources must not reduce the numerous ecological functions, and the preservation and enriching of the site biodiversity;
- Create the conditions for the establishment of the elements of the sustainable agricultural production;

- Preservation and improvement of the biodiversity.

The collected data enable the multi-layer comparative analysis of the area by using GIS technology, as well as the determination of the level of the threats posed to the natural ecosystems and suitability of the area for the certain activities. The anticipation of the direct and indirect results of the unintended use of the area is enabled, which means that before the final decision is made the great faults can be prevented. The series of sub-program activities which are in the interactive relations can be formulated in several general program aims: environmental protection, optimal use of the natural resources, improvement of the secondary activities, advertising analyses and analyses of the commercialization of the offer of this area, strictly in the aim of preservation of the natural resources and environmental protection (by using the principles of the sustainable development of the renewable plant resources).

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