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Floristic inventory of villages in southern Moravia (Czech Republic)

by

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Zusammenfassung: Die vorliegende Arbeit gibt eine Übersicht über die Flora ausgewählter Dörfer im südöstlichen Teil der Tschechischen Republik. Ein kurzer historischer Abriss über die Dorfentwicklung wird gegeben. Das Untersuchungsgebiet besteht aus zwei Teilen: Es umfasst das Altsiedelgebiet und das Gebiet neuer Siedlungen. Insgesamt 15 Dörfer mit unterschiedlichen Umweltbedingungen und unterschiedlichen sozioökonomischen Verhältnissen wurden ausgewählt, acht im Altsiedelgebiet und sieben im Jungsiedelland. Auf jeder Dorfgemarkung wurden zwei Bereiche getrennt untersucht: der innerörtliche zentrale Bereich und der Außenbezirk. 22 Habitattypen wurden unterschieden. Die häufigsten im innerörtlichen Bereich sind Rasen, sonstige Grünflächen, Gehwege, Straßenränder und die Uferbereiche von Flüssen und Bächen. Im außerörtlichen Bereich gehören dazu Äcker, Ackerrandstreifen und Feldwege. Für jedes Dorf wurde eine Liste der Pflanzenarten erstellt. Insgesamt wurden 608 Arten erfasst. Die Artenzahlen pro Dorf reichen von 171 bis 262 Sippen. Eine Gruppe von 111 Arten, die in mehr als 70 % der Dörfer vorkommen, wurde ausgewählt und ihre Bindung an bestimmte Habitattypen untersucht. Das Verhältnis einheimischer Arten zu Anthropophyten wurde für jedes Dorf untersucht. In Jungsiedelland ist die Anzahl einheimischer Arten höher als die Anzahl von Anthropophyten. Die Gruppe der Anthropophyten wurde in die drei Gruppen, Archäophyten, Neophyten sowie Kultur- und Zierpflanzen, unterteilt. Insgesamt wurden 81 Archäophyten, 46 Neophyten und 74 Kultur- und Zierpflanzen erfasst. 20 Archäophyten und 18 Neophyten wurden ausschließlich im Altsiedelgebiet gefunden. Dagegen wurden nur 4 Archäophyten und 2 Neophyten ausschließlich für das Jungsiedelgebiet dokumentiert. Bezüglich der Anzahl von Kultur- und Zierpflanzen konnte für die beiden Teile des Untersuchungsgebietes kein Unterschied festgestellt werden.

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Summary: The paper provides a floristic survey of selected villages in the south-eastern part of the Czech Republic. A brief survey of village modernisation is presented. The study area consists of two parts, an old settlement area and a young settlement area. In the old settlement area eight villages and in the young settlement area seven villages with different environmental and socio-economic factors have been selected for the investigation. The area of each village was divided into intravilan (inner part) and extravilan (the nearest village surroundings). Twenty-two habitat types were distinguished. The most common habitat types in the intravilan are lawns, other green areas, pavements, roadsides and surroundings of streams and rivers; in the extravilan they include fields, field edges and field roads. In each village all plant species have been listed. In total, 608 plant species were recorded for all villages. The number of plant species for one village varies from 171 to 262. A group of 111 plant species occurring in more than 70 % villages was selected, and their affinity to habitat types was described. The proportion of native species and anthropophytes was expressed for each village. In the young settlement area the number of native species is higher than the number of anthropophytes. The group of anthropophytes was further divided into three groups, including archaeophytes, neophytes and cultural/ornamental plants. A total of 81 archaeophytes, 46 neophytes and 74 cultural/ornamental species were found. In the old settlement area twenty archaeophytes and eighteen neophytes were exclusively recorded, compared to only four archaeophytes and two neophytes recorded exclusively in the young settlement area.

1 Introduction

In the Czech Republic, the investigation of flora of human settlements has been an object of interest for a long time. However, most research was focused on cities and only few studies dealt with the flora of villages.

The lists of plant species and their frequency in 10 villages were recorded in the area of Bohemian Karst (PYŠEK 1985). In western Bohemia ruderal flora of 19 villages was compared with the industrial town of Plzeň (PYŠEK, P. & PYŠEK, A. 1991). The numbers of archaeophytes, neophytes, ergasiophygophytes and indigenous species were also compared. An increase in the percentage of anthropophytes was observed along a gradient from rural to urban localities. In another study (PYŠEK 1989), ruderal floras of western and central Bohemia were compared with regard to the proportion of archaeophytes and neophytes and how they reflect the influence of climate and human activity. In general, a higher number of archaeophytes was recorded in less urbanised villages. In south-western part of Moravia floristic notes on ruderal habitats, including also several villages, were published (KÜHN 1998).

The floristic investigation of human settlements in southern Moravia was not sufficient in the past, even though the colonization is very old and the settlements differ with regards to their origin. This research aims to improve the knowledge about the rural flora in this region and tries to answer the following questions: Do the old and young villages differ the proportions of native species and anthropophytes? Do some of the plant species show higher affinity to one of the settlement areas? The purpose of this paper is to present a floristic survey of selected villages with different environmental and socio-economic background in southern Moravia, to relate their occurrence to habitat types and to compare the villages with respect to the proportion of native species and anthropophytes.

2 Study area

Southern Moravia is situated in the south-eastern part of the Czech Republic. For the purpose of the current study, its area was divided into two parts according to different environmental and socio-economic factors (Fig. 1).

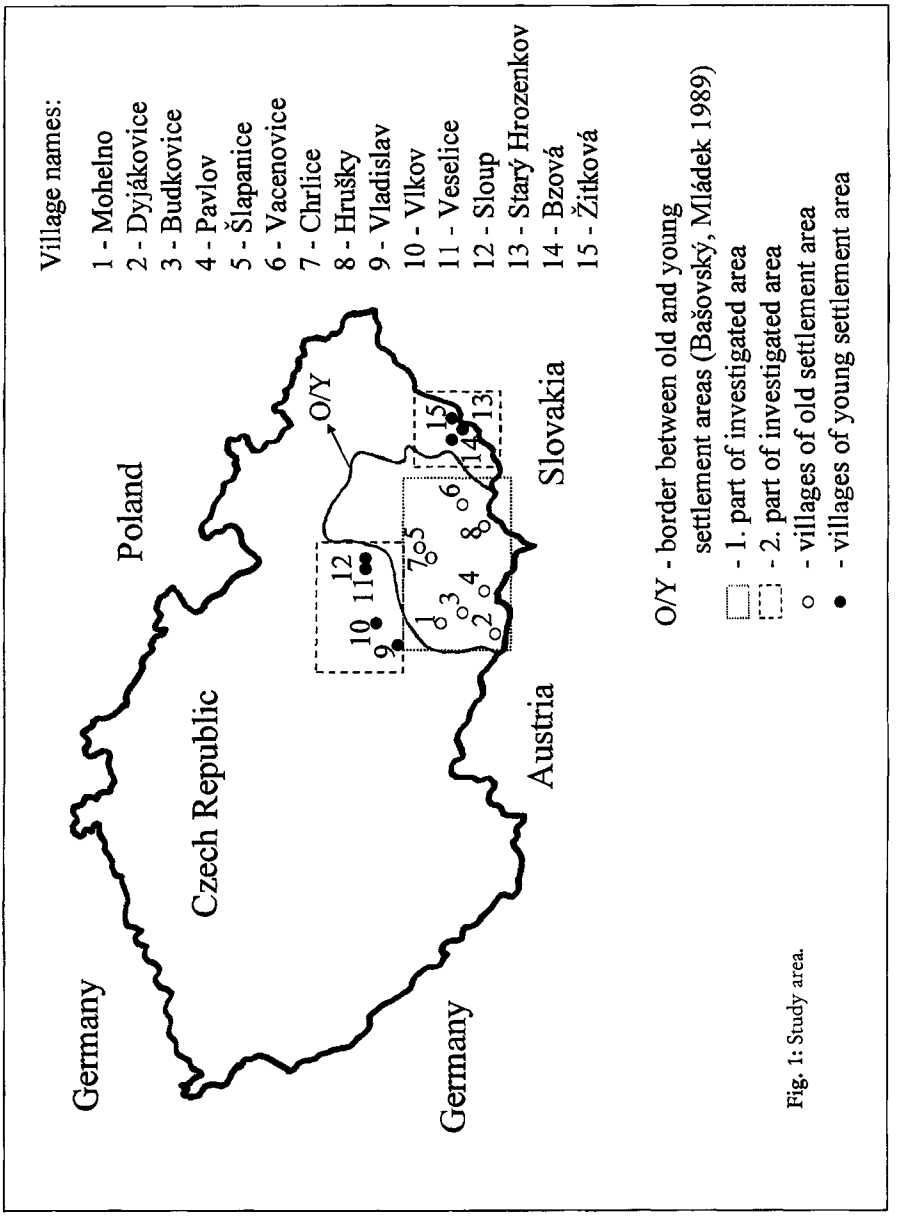

Fig. 1: Study area.

1. Old settlement area. This part of the study area is situated in its centre, in the lowlands. It is formed of Palaeogene flysch sandstones and claystones, Neogene sediments, locally overlaid by loess, sands and Holocene alluvial deposits. The Pavlovské hills in the south are formed of limestone. Mean annual temperature is 8 - 10 °C and annual precipitation is about 450 - 650 mm. The substrate and climate support local development of chernozem, the most fertile soil in the country (TOMÁŠEK 2000).

Due to favourable environmental conditions this area has been permanently colonized since the Neolithic Age (LOŽEK 1973). In the Middle Ages villages usually arose "around a square" (ŠKABRADA 1999). The square had different shape, and its size was dependent in many cases on the number of the first settlers. The houses were built close to each other and the number of houses increased as families grew. Most people living in the old settlement area were farmers. This traditional way of living also influenced the surroundings of villages. Nowadays the fields prevail there.

Eight villages were chosen in the old settlement area: Mohelno, Dyjákovice, Budkovice, Pavlov, Šlapanice, Vacenovice, Chrlice and Hrušky (Fig. 1). The number of inhabitants varies from 300 to 6 000. Some local environmental factors for each village are presented in Tab. 1 (BUDAY 1963, DUDEK 1963, SVOBODA 1963, QUITT 1975, HANŽL 1999).

2. Young settlement area. This part of the study area is formed of foothills of several mountain ranges which create a semicircle around the old settlement area. From east to west, they include the White Carpathians, the Chřiby Hills, the Hostýnské Hills, the Drahanská Highland (with Moravian Karst) and the Bohemian-Moravian Highland. The altitude of these mountains ranges from 400 to 1000 m. On the border with Slovakia, in the White Carpathians, flysch bedrock prevails. Limestone occurs in the Moravian Karst. In the Bohemian-Moravian Highlands mostly gneiss and granitoids prevail. The mean annual temperature is between 6-7 °C and precipitation ranges between 550-800 mm. Cambisol is the most common soil type of this young settlement area (TOMÁŠEK 2000).

The young settlement area is situated in hilly and less fertile parts of southern Moravia. Its permanent colonisation took place in the Middle Ages. Most villages in the young settlement area were established along a line such as a small stream or trade road. These villages are mostly situated above 300 m a. s. l. The houses are usually well-spaced. A special type of villages called "kopanice" is locally found in the White Carpathians. These villages consist of "a centre" where about 50% of inhabitants live and the remaining houses which are scattered over a greater distance (MLÁDEK 1992). In the young settlement area, people were traditionally also farmers but very often herdsmen and shepherds as well. In some villages people mainly lived from trade. Nowadays the landscape is a mosaic of forests, meadows, pastures and arable fields. Some villages still profit from trade and some of them from tourism.

Tab. 1: Abiotic characteristics of the studied villages.

village	bedrock type	soil	annual precipitation (mm)	mean annual temperature (°C)	altitude (m)
Mohelno	gneiss. alluvial deposits	fluvisol, orthic luvisol	450-550	8-10	345
Dyjákovice	sands, sandstones, calcareous clays, alluvial deposits	chernozem, fluvi-gleyic phaeozem, fluvisol	450-550	8-10	185
Budkovice	Permo-Carboniferous conglomerates, sands, clays	cambisol, fluvisol	450-550	8-10	270
Pavlov	clays, claystones - partially calcareous, alluvial deposits	chernozem, calcaric regosol	550-650	8-9	245
Šlapanice	loess, loess loams, calcareous clays, conglomerates, fluvial sandy loams, alluvial deposits	chernozem, fluvi-gleyic phaeozem, fluvisol	550-650	8-9	230
Vacenovice	alluvial deposits, shifting sands	luvisol, chernozem, calcaric regosol	550-650	8-9	208
Chrlice	alluvial deposits, sands, calcareous clays	fluvisol, orhic luvisol, chernozem	550-650	8-9	205
Hrušky	alluvial deposits, shifting sands	chernozem	550-650	8-9	175
Vladislav	gneiss, syenodiorit, alluvial deposits	planosol, cambisol	550-700	7-8	364
Vlkov	gneiss, alluvial deposits	gleysol, planosol, cambisol	550-700	7-8	503
Veselice	Vavrinec limestones, hornblende-biotite granodiorite, colluvial sediments (sandy loams)	cambisol	600-700	6-7	548
Sloup	fluvial sandy gravels, colluvial sediments (sandy loams), greywackes, light grey Vilémovice limestones	cambisol, fluvisol, rendzina	600-700	6-7	471
Starý Hrozenkov	flysh, alluvial deposits	fluvisol, cambisol	700-800	(5) 6-7	378
Bzová	flysh, alluvial deposits	fluvisol, calcaric regosol, stagno-gleyic cambisol	700-800	(5) 6-7	390
Žitková	flysh	cambisol	700-800	(5) 6-7	590

Seven villages were chosen in the young settlement area: Vladislav, Vlkov, Veselice, Sloup, Starý Hrozenkov, Bzová and Žitková (Fig.1). The number of inhabitants varies from 250 to 1 200. Some environmental factors for each village are presented in Tab.1 (BUDAY 1963, DUDEK 1963, SVOBODA 1963, QUITT 1975, HANŽL 1999).

3 Land use and villages in a historical perspective

One of the typical features of modern villages is their rapid transformation. This trend began in the Czech Republic in the 1950s. After the World War II collectivisation was one of the first steps in the changes of the countryside. Its purpose was to make private fields to state property. From small fields arose big fields and the structure of the landscape has changed. The mosaic of small fields and ridges were disappeared in many places. At the same time the way of farming has changed and all activities were regulated from one centre (CHALUPA & TARABOVÁ 1983, BAŠOVSKÝ & MLÁDEK 1989).

The next idea of the communist regime was to concentrate all inhabitants into so called central villages, with all modern facilities. This plan assumed the degradation of all small villages around these bigger centres

Also architecture of most of villages was transformed. Family houses were built in a modern way and replaced traditional rural houses; village centres were rebuilt as well. Many traditional roads disappeared, being replaced with asphalt ones. Modern drainage systems were built.

In spite of all these modern facilities an extensive migration of inhabitants from villages to towns started, especially among the young generation, in the communist era. The contact with private property and tradition has lost. Old rural way of living was destroyed.

The houses, which were no longer used for traditional living in the countryside, were rebuilt by urban residents into weekend houses. This wave of village transformation started already in the late sixties, mainly in places rich in natural beauties.

In 1989 the political system changed. In the 90s a new phenomenon emerged when rich inhabitants of towns preferred to live in villages near the towns. New villages' quarters are built usually at village edges, having a different architecture. The inhabitants of new quarters commute to towns and their life in the countryside is far from the traditional rural way of living.

The period of communist regime and these newcomers have changed the way of living in villages. In the past inhabitants of villages mainly worked in agriculture and forestry. Nowadays most village residents have found their jobs outside of the villages, mainly in towns, and regularly commute there.

As a result of these changes the original rural life like private agriculture, cattle grazing, poultry rearing and regular hand mowing along roadsides may only occasionally be found in today's villages. Many typical rural habitats have been lost (RYŠAVÝ 1990).

4 Methods

For this floristic study the area of each village was divided into an intravilan and extravilan part. The intravilan is the part of the village which includes the centre of the village with built-up areas. The extravilan part is the immediate surroundings of the village. For the purpose of this research, it was bounded by a line

drawn around each village from outer edges of private areas, surrounded usually by fences, towards the open landscape at a distance of about 150 m.

Twenty-two habitat types were distinguished in all the villages. They can be divided into two groups with different affinities to either intravilan or extravilan parts.

In each village a list of vascular plants was recorded. Trees and shrubs were excluded. The plant species presence was separately recorded in the intravilan and extravilan parts of each village with respect to the above mentioned habitats. At the same time the abundance was roughly estimated, using a simple 5-degree scale.

The names of spontaneous species are according to EHRENDORFER (1973). The nomenclature of ornamental plants follows to ERHARDT (2000).

A simple classification of plant species according to their origin was done. The species were divided into two groups: native species and anthropophytes.

The group of native species includes apophytes, i.e. native species confined to human-influenced or created habitats, and native species of semi-natural and natural habitats.

Anthropophytes were further divided into three subgroups using definitions and lists published by different authors (FRANK & KLOTZ 1988, HOLUB & JIRÁSEK 1967, HEJNÝ & SLAVÍK 1988-1992, SLAVÍK 1995-2000, PYŠEK 1995, 1996, 1998):

a) Archaeophytes include plants introduced to Central Europe before 1500.

b) Neophytes are plant species which are not indigenous in our flora, being introduced intentionally or unintentionally after 1500.

c) Ornamental/cultural plants include the escapees from the cultivation in fields or gardens. Some of them are for already long time established in the villages while some others just occasionally escape from gardens and then disappear.

5 Results

5.1 Species constancy

The total number of plant species recorded in all villages was 608. The list of plant species will not complete because the current survey was the first systematic on this area. To complete the list, a much longer time of observation would be required to state also the ephemeral species.

According to the presence of plant species in the villages, the species can be grouped as followed: species occurring in 1 – 5 villages (361 species), in 6 – 10 villages (136 species) and in 11 – 15 villages (111 species). Rare occurrence is determined by specific local environmental conditions: tall-sedge beds – *Carex gracilis, C. riparia, C. otrubae, Iris pseudacorus*; sand substrate – *Corynephorus canescens, Salsola kali* subsp. *ruthenica*; non-calcareous substrate – *Herniaria glabra, Petrorhagia prolifera*. Some species are rare in the villages due to overall rarity in the study area, e.g. *Androsace maxima, Butomus umbellatus, Marrubium peregrinum, Papaver albiflorum*. Some archaeophytes and neophytes and most of the ornamental/cultural plant species contribute significantly to the group of rare species.

The group of the most common species in villages includes species which occur on several village habitats. The early spring aspect is dominated mainly by *Capsella bursa-pastoris, Lamium amplexicaule, L. purpureum, Taraxacum officinale* agg. and *Veronica persica.* In the late spring and summer aspect, common species include *Arrhenatherum elatius, Artemisia vulgaris, Chenopodium album* agg., *Lolium perenne, Pastinaca sativa, Poa annua, Plantago major, P. media* and *Tripleurospermum inodorum.*

5.2 Typical plant species for old and young settlements

In total 148 species occurred only in the old settlement area and 130 species only in the young settlement area. From each list those plant species were chosen which occurred in more than half of the villages of the particular settlement area: In the old settlement area these include *Cardaria draba, Conium maculatum, Onopordum acanthium, Sambucus ebulus, Urtica urens;* in the young settlement area *Ajuga reptans, Alchemilla sp., Galeopsis tetrahit, Myosotis palustris* agg., *Stellaria graminea.*

5.3 Archaeophytes, neophytes and cultural/ornamental plant species

A total of 81 archaeophytes were found in the study area (Tab. 2). Figure 2 shows the number of archaeophytes in each village. Generally the number of archaeophytes in the old settlements is higher than in the young ones.

Neophytes include 46 species (Tab. 3). The number of neophytes in each village is shown (Fig. 2). Again, there is a higher number of neophytes in the old than in the young settlement area.

There were large differences between the numbers of archaeophytes and neophytes occurring only in the old respectively young settlement areas. Twenty archaeophyte species occurred exclusively in the old settlement area compared to only four archaeophyte species in the young settlements. A similar pattern is apparent for neophytes: Eighteen neophytes occurred only in the old settlements and two neophytes only in the young ones.

The list of ornamental/cultural plants includes 74 species (Tab. 4). The differences in the number of ornamental/cultural plants between the old and young settlement areas are not so striking as in the case of archaeophytes and neophytes (Fig. 2). In general, a higher number of ornamental/cultural plants was recorded in the old settlement area.

Figure 2 shows the proportions between native species and anthropophytes in the villages. The difference in the number of plant species between these two groups in the young settlement area is higher than in the old one.

Tab. 2: The group of archaeophytes.

Adonis aestivalis	*Euphorbia helioscopia*
Anagallis arvensis	*Euphorbia peplus*
Anchusa officinalis	*Fallopia convolvulus*
Androsace maxima	*Fumaria officinalis*
Anthemis arvensis	*Geranium molle*
Arabidopsis thaliana	*Hyoscyamus niger*
Arctium lappa	*Lamium album*
Artemisia absinthium	*Lamium amplexicaule*
Asparagus officinalis	*Lathyrus tuberosus*
Atriplex acuminata	*Lepidium ruderale*
Atriplex oblongifolia	*Malva neglecta*
Atriplex rosea	*Marrubium peregrinum*
Atriplex prostrata	*Marrubium vulgare*
Avena fatua	*Matricaria chamomilla*
Ballota nigra	*Melilotus alba*
Bromus sterilis	*Melilotus officinalis*
Bromus tectorum	*Onopordum acanthium*
Buglossoides arvensis	*Plantago lanceolata*
Capsella bursa-pastoris	*Plantago major*
Carduus acanthoides	*Portulaca oleracea*
Centaurea cyanus	*Ranunculus arvensis*
Chenopodium bonus-henricus	*Raphanus raphanistrum*
Chenopodium botrys	*Reseda lutea*
Chenopodium ficifolium	*Scleranthus annuus*
Chenopodium glaucum	*Setaria glauca*
Chenopodium hybridum	*Setaria verticillata*
Chenopodium opulifolium	*Setaria viridis*
Chenopodium pedunculare	*Sinapis arvensis*
Chenopodium polyspermum	*Sisymbrium officinale*
Chenopodium rubrum	*Solanum nigrum*
Chenopodium urbicum	*Sonchus oleraceus*
Cichorium intybus	*Spergula arvensis*
Conium maculatum	*Stachys annua*
Consolida regalis	*Thlaspi arvense*
Descurainia sophia	*Torilis arvensis*
Digitaria sanguinalis	*Urtica urens*
Dipsacus fullonum	*Verbena officinalis*
Echinochloa crus-galli	*Veronica arvensis*
Echium vulgare	*Veronica triphyllos*
Erodium cicutarium	*Vicia hirsuta*
Euphorbia exigua	

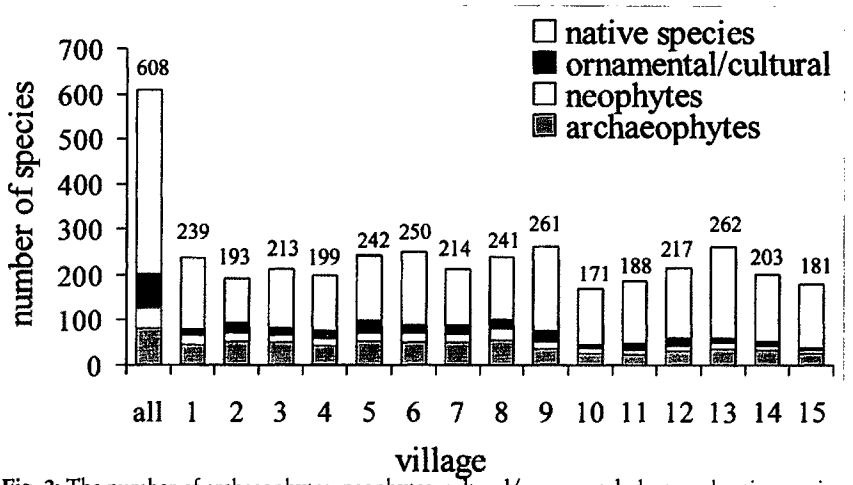

Fig. 2: The number of archaeophytes, neophytes, cultural/ornamental plants and native species in villages. See Fig. 1 for village names.

Tab. 3: The group of neophytes.

Amaranthus albus	*Galega officinalis*
Amaranthus blitoides	*Galinsoga ciliata*
Amaranthus retroflexus	*Galinsoga parviflora*
Aristolochia clematitis	*Heracleum mantegazzianum*
Armoracia rusticana	*Impatiens parviflora*
Asclepias syriaca	*Leonurus cardiaca*
Atriplex tatarica	*Lepidium densiflorum*
Berteroa incana	*Matricaria discoidea*
Bidens frondosa	*Medicago sativa*
Borago officinalis	*Medicago* x *varia*
Bryonia alba	*Mercurialis annua*
Bunias orientalis	*Nepeta cataria*
Cardaria draba	*Oenothera biennis*
Chaenorrhinum minus	*Oenothera* cf. *moravica*
Chenopodium botrys	*Ornithogalum umbellatum*
Chenopodium pumilio	*Oxalis corniculata*
Conyza canadensis	*Phacelia tanacetifolia*
Cruciata glabra	*Rumex patientia*
Cynodon dactylon	*Sisymbrium altissimum*
Datura stramonium	*Sisymbrium loeselii*
Dipsacus sativus	*Solidago canadensis*
Echinops sphaerocephalus	*Vicia sativa*
Eragrostis minor	*Vicia villosa*

Tab. 4: The group of cultural/ornamental species.

Aconitum x *cammarum*	*Lactuca sativa*
Alcea rosea	*Linum austriacum*
Amaranthus cruentus	*Lolium multiflorum*
Anethum graveolens	*Lupinus polyphyllus*
Antirrhinum majus	*Lycium barbarum*
Artemisia dracunculus	*Lycopersicon esculentum*
Artemisia pontica	*Lysimachia punctata*
Aster laevis agg.	*Malva sylvestris*
Aster lanceolatus	*Muscari armeniacum*
Aster novi-belgii agg.	*Narcissus* sp.
Atriplex hortensis	*Ocimum basilicum*
Bergenia cordifolia	*Paeonia* sp.
Brassica napus	*Papaver croceum*
Brassica oleracea	*Parthenocissus quinquefolia* agg.
Calendula officinalis	*Physalis alkekengi*
Cannabis sativa	*Phytolacca americana*
Cerastium biebersteinii	*Portulaca grandiflora*
Commelina communis	*Potentilla alba*
Convallaria majalis	*Primula veris*
Coriandrum sativum	*Rheum rhabarbarum*
Cosmos bipinnatus	*Ribes* sp.
Cucurbita pepo	*Ribes uva-crispa*
Cymbalaria muralis	*Rudbeckia laciniata* 'Golden Glow'
Doronicum cf. *pardalianches*	*Saponaria officinalis*
Echinacea sp.	*Sedum spectabile*
Euphorbia marginata	*Sedum spurium*
Fallopia baldschuanica	*Sempervivum tectorum*
Fallopia japonica	*Silybum marianum*
Helianthus annuus	*Sinapis alba*
Helianthus tuberosus agg.	*Sorbaria sorbifolia*
Hesperis matronalis	*Tanacetum parthenium*
Hieracium aurantiacum	*Trifolium pratense* subsp. *sativum*
Hyacinthus orientalis	*Tropaeolum majus*
Ipomoea purpurea	*Tulipa gesneriana*
Iris sp.	*Viola arvensis* x *V.* x *wittrockiana*
Kochia scoparia	*Viola* x *wittrockiana*
Lathyrus sativus	*Vitis vinifera*

5.4 Intravilan habitat types

In the following, the habitat types are described from the most frequent ones to rare ones:

1) The most frequent habitat types include lawns, other green areas, pavements, roadsides and surroundings of streams and rivers. Among them the lawns cover the largest proportion of the intravilans' areas. They are usually village's property and are regularly mown. Other green areas include (a) the areas which were used for planting cultural plants in the past and the remnant plants of these past cultures dominate until now; (b) privately owned areas without regular management, often with ruderal species belonging to the Artemisietea vulgaris – mainly Dauco-Melilotion; (c) meadows, namely in the young settlement area (e.g. Arrhenatherion elatioris). The habitat of pavements includes all paved roads and squares in villages. Roadsides consist of several microhabitats: unpaved part, pavement, ditch, small terrace slope or adjacent house wall. Each of these microhabitats is colonised by different plant species. The village streams are usually channelled and their banks are often paved.

2) Less common habitat types include unkempt front gardens and unkempt public green areas, trampled areas, places along house walls, rubbles, surroundings of newly built buildings and cemeteries. Trampled areas can be found around bus stops, on non-paved areas and along non-asphalted small roads. The areas along house walls can be consist of pavements or non-paved paths, small green areas or unkempt narrow lanes between two closely built houses. Rubbles are usually temporary habitats in demolition areas or disintegrating abandoned houses. Surroundings of newly built buildings consist of heaps of unused building materials, heaps of sands. In cemeteries the places without graves and unkempt graves were investigated.

3) Rare habitat types include muck heaps behind farm buildings, unused playgrounds, railway stations and embankments along railways. Decline of home breeding of animals caused a disappearance of muck heap habitats. There are two types of unused playgrounds in the investigated villages: cinder playground and football pitch. Both types of playgrounds create different conditions for plant species. Two type of railway embankments were observed: old type and newly built type.

5.5 Extravilan habitats

1) The most common habitat types in the extravilan part are fields, their edges and field roads. The fields around villages can be either a mosaic of small private fields or big fields which belong to agriculture companies. Field roads usually go around the whole village and connect the inner part of the village with the open landscape.

2) Less common habitats are muck heaps on the fields, fallow lands, rubbishing and nitrophilous edges. Due to decline of home breeding of animals muck heaps on the fields steadily disappear. Also the decline of private agriculture caused an appearance of fallow lands on small private fields. Habitats of rubbishing are mostly situated on the village edges. The nitrophilous edges are found along ruderalised stream banks and tree-lines along roads.

3) Vineyards occurs only in old settlement area.

5.6 Relationship between recorded plant species and habitats

The group of the plant species which occur in more than 10 villages is selected. The presence is recorded for each plant species in each village and according to it the constancy of plant species between both settlement areas is compared. The abundance for habitat types in old and young settlement areas is expressed (Tab. 5).

6 Discussion

The flora of fifteen villages investigated in southern Moravia shows a clear difference between the old and new settlement areas, the former being richer in archaeophytes and neophytes. These data can be compared with the investigation of flora in ten villages of the Bohemian Karst carried out by PYŠEK (1985). Floristic lists provided in PYŠEK's paper were compared with the list of plant species recorded in eight villages in the old settlement area in southern Moravia. Villages from the young settlement area of southern Moravia were excluded as they differ in their climatic conditions (colder and wetter) from the Bohemian Karst. In general, the floristical composition of both areas showed a high similarity. Almost all plant species recorded in the villages in the Bohemian Karst occur also in the villages in southern Moravia. Differences were observed in the frequency of the plant species in both areas. With the same frequency in both areas occur *Agropyron repens, Anthriscus sylvestris, Chaerophyllum aromaticum, Geranium pratense, Lolium perenne, Plantago major, Matricaria discoidea, Poa annua, Polygonum aviculare* agg., *P. lapathifolium, Potentilla anserina, Tanacetum vulgare, Urtica dioica*. On the contrary the group of plant species with low frequency in the Bohemian Karst and high frequency in southern Moravia includes *Achillea millefolium* agg., *Aegopodium podagraria, Artemisia vulgaris, Atriplex acuminata, Ballota nigra, Chenopodium album* agg., *Sisymbrium officinale, Stellaria media, Taraxacum officinale* agg. and *Tripleurospermum inodorum*.

These differences in frequency of species can be caused by different circumstances. One of them is probably a progressive trend of distribution of several ruderal plant species, e.g. *Atriplex acuminata* (KOPECKÝ & LHOTSKÁ 1990) or higher competitive ability, e.g. *Chenopodium album* agg. (KOVÁŘ 1988) in the last decades. PYŠEK (1989) compared the occurrence of apophytes and anthropophytes in villages in western and central part of the Czech Republic. In his study the group of neophytes [illegible] ornamental/cultural species, is the most numerous

Tab. 5: Presence, constancy and abundance of plant species in different habitats. The list of plant species is reduced to species present in more than 10 villages.
P – presence; 0 – absence of plant species in the old (left) and young (right) settlement areas according to habitat types.
P>P; P<P – higher constancy of plant species in one of the settlement areas. P – abundance of plant individuals in one of the settlement areas.

species	intravilan														extravilan							
	lawns	other green areas	pavements	front gardens + public green areas	roadsides	streams and rivers	trampled areas	areas along houses walls	rubbles	surroundings of newly built buidings	cemeteries	muck heaps behind houses	unused playgrounds	railway stations, r. embankments	fields	field edges	field roads	muck heaps on fields	fallow lands	nitrophilous edges	rubbishings	vineyards
Achillea millefolium agg.	P/P										P/0		P/P			P/P	P/P					P/0
Aegopodium podagraria				P/P	P/P			P/P								P/P		P/P				
Agropyron repens				P/P					P/0										P/P	P/P	P/P	
Agrostis stolonifera					P/P																	
Amaranthus retroflexus				P/P						P/P				P/0				P/P	P/P			
Anagallis arvensis															P>P				P>P			
Anthoxanthum odoratum		P<P																				
Anthriscus sylvestris																				P/P		
Arctium lappa					P/P				P/P	P/P						P/P				P/P	P/P	
Armoracia rusticana						P/P		P/P								P/P						
Arrhenatherum elatius					P/P						P/0		P/0	P/P		P/P						P/0
Artemisia vulgaris					P/P				P/P			P/P	P/0			P/P				P/P	P/P	
Atriplex acuminata					P>P				P/0	P>P		P>P		P/0		P>P		P>P			P>P	
Atriplex patula				P/P					P/0			P/P				P/P		P/P			P/P	
Ballota nigra						P/P		P/P				P/P						P/P			P/P	
Bellis perennis	P<P																					
Berteroa incana					P>P				P/0	P/0	P/0					P>P						
Bidens tripartita						P>P																
Bromus hordaceus subsp. *hordaceus*	P>P	P>P			P>P								P/0									
Calamagrostis epigejos					P/P						P/0					P/P						
Capsella bursa-pastoris	P/P			P/P	P/P		P/P								P/P				P/P		P/P	

Carduus acanthoides					P/P											P>P			P/P			
Carduus crispus					P/P											P/P			P/P			
Carum carvi		P<P																				
Cerastium holosteoides	P>P																					
Chelidonium majus								P/P			P/0	P/P								P/P		
Chenopodium album agg.				P/P	P/P			P/P	P/P	P/P		P/P		P/0	P/P	P/P		P/P	P/P		P/P	
Chenopodium bonus-henricus								P<P														
Cichorium intybus	P>P				P>P																	
Cirsium arvense					P/P					P/P			P/0			P/P		P/P				
Cirsium vulgare					P<P											P<P						
Convolvulus arvensis				P/P			P/P			P/P					P/P		P/P		P/P		P/P	P/0
Conyza canadensis			P/P		P/P								P/0	P/0					P/P			
Coronilla varia		P/P									P/0											
Crepis biennis		P/P			P/P											P/P						
Dactylis glomerata	P/P				P/P						P/0		P/0			P/P					P/P	
Daucus carota		P/P			P/P								P/0									
Echinochloa crus-galli		P>P	P>P	P>P	P>P					P>P					P>P	P>P		P>P			P>P	
Echium vulgare		P>P			P>P								P/0	P/0		P>P						
Epilobium hirsutum						P/P																
Equisetum arvense				P<P						P<P				P/0					P<P			
Erodium cicutarium	P>P				P>P					P>P				P/0	P>P							
Euphorbia cyparissias		P/P																	P/P			
Euphorbia helioscopia															P/P				P/P		P/P	
Euphorbia peplus			P>P	P>P																		
Fallopia convolvulus															P/P				P/P		P/P	
Galinsoga parviflora			P/P		P/P																	
Galium aparine					P/P			P/P	P/P	P/P		P/P				P/P		P/P	P/P		P/P	
Galium mollugo agg.	P/P	P/P											P/P	P/P								
Galium verum		P<P																				
Geranium pratense		P<P			P<P																	
Geranium pusillum	P/P			P/P	P/P					P/P					P/P							P/0
Geum urbanum								P/P				P/P									P/P	
Glechoma hederacea	P/P				P/P																P/P	
Heracleum sphondylium					P/P			P/P								P/P				P/P	P/P	
Holosteum umbellatum	P/P														P/P				P/P			P/0
Hypericum perforatum		P/P			P/P																	

Lamium album					P/P			P/P				P/P									
Lamium amplexicaule	P>P			P>P						P>P					P>P				P>P			P/0
Lamium purpureum	P>P			P>P						P>P					P/P				P/P			P/0
Lapsana communis		P<P			P<P											P<P						
Lathyrus tuberosus		P>P													P>P				P>P			
Leontodon autumnalis	P<P																					
Linaria vulgaris					P/P																	
Lolium perenne	P/P	P/P			P/P		P/P				P/0						P/P					
Lotus corniculatus	P>P	P>P												P/0								
Malva neglecta	P/P						P/P															
Matricaria discoidea					P/P		P/P							P/0			P/P					
Medicago lupulina	P/P				P/P																	
Medicago sativa		P/P			P/P																	
Melilotus alba		P/P			P/P					P/P				P/0							P/P	
Melilotus officinalis					P>P																	
Papaver rhoeas					P/P					P/P					P/P	P/P			P/P			
Pastinaca sativa		P/P			P/P								P/P			P/P						
Plantago lanceolata	P/P		P/P				P/P			P/P			P/0									
Plantago major			P/P		P/P		P/P			P/P	P/0		P/P	P/P			P/P					
Poa annua	P/P		P/P				P/P			P/P			P/P	P/P			P/P					
Poa compressa			P<P																			
Poa pratensis	P/P	P/P											P/0									
Polygonum aviculare agg.			P/P		P/P		P/P			P/P	P/0			P/P			P/P		P/P			
Polygonum lapathifolium						P/P																
Potentilla anserina					P<P					P<P												
Potentilla reptans					P>P																	
Ranunculus acris		P/P			P/P			P/P		P/P						P/P			P/P			
Rubus caesius					P/P					P/P				P/0		P/P					P/P	
Rumex crispus		P<P			P<P							P<P										
Rumex obtusifolius		P/P			P/P					P/P						P/P						
Salvia pratensis		P/P									P/0			P/P								
Senecio vulgaris			P>P		P>P			P>P		P/P				P>P								
Silene vulgaris		P>P			P>P																	
Sinapis arvensis					P/P										P/P	P/P			P/P			
Sisymbrium officinale					P<P			P<P														
Sonchus arvensis																P/P			P/P			

Sisymbrium officinale					P<P			P<P													
Sonchus arvensis															P/P			P/P			
Sonchus oleraceus				P/P	P/P			P/P		P/P											
Stellaria media	P/P			P/P						P/P					P/P				P/P			P/0
Symphytum officinale					P/P			P/P											P/P			
Tanacetum vulgare		P/P			P/P																
Taraxacum officinale agg.	P/P		P/P	P/P	P/P		P/P			P/P	P/0		P/P	P/P	P/P				P/P			P/0
Thlaspi arvense															P/P				P/P			
Tragopogon pratensis		P<P			P<P						P/0											
Trifolium pratense	P/P	P/P									P/0											
Trifolium repens	P>P				P>P						P/0		P>P	P>P			P>P					
Tripleurospermum inodorum				P/P	P/P					P/P	P/0			P/0	P/P	P/P		P/P	P/P		P/P	
Tussilago farfara					P/P					P/P	P/0											
Urtica dioica				P/P	P/P			P/P	P/P	P/P	P/0	P/P						P/P		P/P	P/P	P/0
Verbascum thapsus					P>P								P/0									
Veronica persica	P/P			P/P	P/P										P/P				P/P			P/0
Vicia cracca					P<P					P<P	P/0								P<P			
Viola arvensis	P/P			P/P	P/P										P/P				P/P			P/0

(except the Bohemian Karst). On the contrary, in southern Moravia the group of archaeophytes is more numerous. The differences in distribution of anthropophytes among western part of Bohemia and central part (Bohemian Karst, Labe Basin) might be caused by climatic differences. The western part is colder, less archaeophytes and neophytes occur there than in the warmer central part. In southern Moravia these differences in the number of archaeophytes and neophytes can also be stated between old and young settlement areas, which at the same time are also different in their climatic conditions. In western part of Bohemia and in the Bohemian Karst typical rural settlement were found during time of PYŠEK's investigation. In these typical rural settlements were recorded higher number of archaeophytes. On the contrary in the Labe Basin, the settlements were more urbanised and the occurrence of archaeophytes was lower. In southern Moravia no difference was observed between more and less urbanised villages with regard to the numbers of archaeophytes or neophytes. These differences can be a consequence of the countryside transformation. The data sets in PYŠEK's study were collected from 1966 to 1984. Since that time the countryside has underwent a process of urbanisation. This transformation probably increased uniformity of villages, so the floristic differences observed by PYŠEK cannot be observed in today's villages in southern Moravia.

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