

The usable taxons in spontaneous flora of railway areas of the central-eastern part of Poland

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(Received: 10.05.2006)

S u m m a r y

A wide range of ecological conditions on anthropogenic sites makes it easy for different usable species to infiltrate and spread there. The data were collected since 1998. The spontaneous flora of railway areas of the central-eastern part of Poland is composed of already recorded 950 vascular plants, of which 373 are recognized as usable, including 78 dye plants, 162 medicinal, 324 nectariferous or polleniferous taxons. The majority of taxons are distributed in disperse (128 species – 34%) or occur rarely (96 species – 26%). The common or frequent species constitute 40% of usable flora of the studied area. Medicinal and melliferous plants occur most frequently on slopes of trenches and railway embankments in nearly natural habitats. They mostly grow as single individuals or form loose and rarely dense patches. The analysis of their geographical status confirms the ultimate prevalence of apophytes over anthropophytes. Considering syntaxonomic structure, there are mainly species typical for phytoceneses from *Molinio-Arrhenatheretea*, *Artemisietea vulgaris*, *Stellarietea mediae*, *Festuco-Brometea*, *Quercu-Fagetea* classes.

Key words: railway areas, usable taxons, vascular plants, central eastern part of Poland

INTRODUCTION

Ever since the beginning of mankind, human being has always taken advantage of medicinal, dye and melliferous plants. Herbaceous species contain different bioactives, e.g. used as a source of pharmacological raw materials which are obtained not only from crops, but still in a big scale from wild taxons. The nectariferous and polleniferous species provide the base for apiaries and create feeding band for different *Apoidea*. The usable taxons were mainly analysed in natural and semi-natural habitats, rarely in anthropogenically transformed areas (Sk r z y c z y ń s k a and S t a c h o w i c z, 2003; D r o b i k et al. 2004).

A wide range of ecological conditions in different anthropogenic habitats makes it easy for a different range of usable species to infiltrate and spread there. The particular richness of the flora is visible on those railway sections which run through open spaces, e.g. fields and meadows where railway lines are situated on embankments, or cross natural hills (Wrzesień and Święś, 2006). Such habitats provide conditions both for feeding or convenient nesting and winter surviving of the wild *Apoidea*. Numerous studies, i.e. based on palynological analysis of bee products, prove that not only crop plants but also the synantropic flora with non-nectarious and anemophilous taxons are significant sources of bee flows (Warakomska, 1997; Wróblewska, 2002; Denisow, 2004)

The purpose of the research was to present the share of medicinal, dye and flow plants in spontaneous flora of railways of the central-eastern part of Poland. Also, the value of the object, especially of species recognized as usable, for the protection of natural gene resources was presented. The results can serve as a source of data concerning floristic diversity in the discussed group of plants on the regional scale. It also shows the applicational possibilities of flora originating mainly from railways which have been withdrawn from operation and therefore are of low contamination rate.

MATERIAL AND METHODS

Data referring to the flora of railway areas were based on field research (published or unpublished) which had been carried out since 1998 on the Lublin Upland, the Roztocze, the Polesie and the Volhynia Upland (Fig. 1). The studied area was divided into 883 incomplete squares of the ATPOL net units which belong to 86 squares of 10 km long sides (Zajac, 1978). The characteristic concerns all types of habitats related to railway areas, the total length being about 900 km, and includes, *inter alia*, railway tracks, cargo yards, ridges and embankment slopes, trenches and drainage ditches, and edges of the nearby semi-natural communities, etc.

The usable taxons occurring on the railway areas were selected according to the data available in literature (Broda, Mowszowicz, 1996; Jędrzejko et al. 1997; Warakomska, 1997; Farmakopea VI, 2002; Wróblewska, 2002; Lewkowicz-Mosiej, 2003). The alphabetical list of species provides taxonomic nomenclature by Mirek et al. (2002). The description of each taxon includes its geographic historical status (Zajac and Zajac, 1975; Zajac et al. 1998), sinecological group (Matuszkiewicz, 2001), average time of the blooming period (according to own observations), frequency of occurrence in the squares of the ATPOL net units (10 x 10 km), location of stations and the degree of density.

RESULTS

The flora of the studied area is composed of already recorded 950 vascular plants of which 373 are recognized as usable, including 78 dye plants, 162 medicinal, 324 nectariferous or polleniferous (Tab. 1). The taxons under consideration migrate

Tab. 1
Alphabetical list and characterization of species.

| A | B | C | D | E | F | G | H |
|--|-------|-----|---------|---------------|---|-------|-------|
| <i>Acer negundo</i> L. | Ag | - | N,P | 05.04 - 20.05 | F | O,S | 2,3 |
| <i>Acer platanoides</i> L. | Ap | Q-F | B,N,P | 15.04 - 20.05 | D | O,S | 1 |
| <i>Acer pseudoplatanus</i> L. | Ap | Q-F | N,P | 30.04 - 30.05 | D | O,S | 1 |
| <i>Achillea millefolium</i> L. | Ap | M-A | L,B,N,P | 20.05 - 30.09 | C | O,S | 2,3 |
| <i>Aegopodium podagraria</i> L. | Ap | Q-F | L,B,N,P | 20.05 - 10.07 | C | O | 1,2 |
| <i>Aesculus hippocastanum</i> L. | Ag | - | L,N,P | 10.05 - 25.05 | R | O | 1 |
| <i>Aethusa cynapium</i> L. | Arch. | SM | L,N,P | 10.06 - 20.08 | R | O | 2 |
| <i>Agrimonia eupatoria</i> L. | Ap | F-B | L,B,N,P | 10.06 - 15.08 | C | O,S | 1 |
| <i>Ajuga reptans</i> L. | Ap | - | N,P | 05.05 - 10.07 | D | O | 2 |
| <i>Alchemilla monticola</i> Opiz | Ap | M-A | L | - | R | O | 2 |
| <i>Allium angulosum</i> L. | Ap | M-A | N,P | 15.07 - 15.08 | D | O,S | 1 |
| <i>Allium oleraceum</i> L. | Ap | F-B | N,P | 05.07 - 10.08 | D | O,S | 1 |
| <i>Allium vineale</i> L. | Ap | F-B | N,P | 15.07 - 10.08 | R | O,S | 1 |
| <i>Alnus glutinosa</i> (L.) Gaertn. | Ap | - | L,B | - | F | O | 1 |
| <i>Althaea officinalis</i> L. | Ap | M-A | L,B,N,P | 10.06 - 20.08 | R | O | 1 |
| <i>Anchusa arvensis</i> L. | Ap | SM | N,P | 10.06 - 20.08 | F | O,S | 1 |
| <i>Anchusa officinalis</i> L. | Ap | AR | B,N,P | 15.05 - 30.09 | D | O,S | 1 |
| <i>Anemone nemorosa</i> L. | Ap | Q-F | P | 15.04 - 10.05 | D | O | 2 |
| <i>Angelica sylvestris</i> L. | Ap | M-A | N,P | 15.07 - 20.08 | R | O | 1 |
| <i>Anthemis arvensis</i> L. | Arch. | SM | B,N,P | 15.06 - 20.07 | D | T,O | 1 |
| <i>Anthemis tinctoria</i> L. | Ap | F-B | B,N,P | 15.06 - 20.07 | D | O | 1 |
| <i>Anthriscus sylvestris</i> (L.) Hoffm. | Ap | AR | B,N,P | 15.05 - 15.06 | F | O,S | 2 |
| <i>Aquilegia vulgaris</i> L. | Ap | - | L,P | 20.05 - 15.06 | R | O | 1 |
| <i>Arabidopsis thaliana</i> (L.) Heynh. | Ap | SM | N,P | 15.04 - 15.06 | F | T,O | 1,2 |
| <i>Arabis glabra</i> (L.) Bernh. | Ap | - | N,P | 10.05 - 20.06 | R | O | 1 |
| <i>Arabis hirsuta</i> (L.) Scop. | Ap | F-B | N,P | 10.05 - 20.06 | R | O,S | 1 |
| <i>Arctium lappa</i> L. | Ap | AR | L,B,N,P | 10.07 - 20.08 | F | O,S | 2 |
| <i>Arctium minus</i> (Hill.) Bernh. | Ap | AR | N,P | 05.07 - 20.08 | D | O | 1 |
| <i>Arctium tomentosum</i> Mill. | Ap | AR | L,N,P | 01.07 - 01.09 | F | O,S | 1,2 |
| <i>Armoracia rusticana</i> Gaertn. | Arch. | AR | L | - | D | O,S | 1,2 |
| <i>Artemisia absinthium</i> L. | Arch. | AR | L,B,P | 10.07 - 30.09 | C | O,S | 1,2,3 |
| <i>Artemisia dracunculus</i> L. | Ep | - | L | - | R | S | 2 |
| <i>Artemisia vulgaris</i> L. | Ap | AR | L,P | 15.07 - 20.10 | C | T,O,S | 1,2,3 |
| <i>Asarum europaeum</i> L. | Ap | Q-F | L,P | 10.04 - 15.05 | R | S | 2 |
| <i>Asparagus officinalis</i> L. | Ap | F-B | L,N,P | 25.05 - 10.07 | R | S | 1 |
| <i>Aster novi-belgii</i> L. | Ag | - | N,P | 10.08 - 20.09 | D | O,S | 2 |
| <i>Astragalus cicer</i> L. | Ap | TG | N,P | 15.05 - 20.07 | R | O,S | 2,3 |
| <i>Atriplex patula</i> L. | Ap | AR | P | 20.07 - 20.09 | R | T,O | 1,2 |
| <i>Ballota nigra</i> L. | Arch. | AR | L,N,P | 01.07 - 10.09 | C | T,O | 1,2 |
| <i>Barbarea vulgaris</i> R.Br. | Ap | - | N,P | 01.05 - 25.05 | D | T,O | 1 |
| <i>Bellis perennis</i> L. | Ap | M-A | L,N,P | 20.04 - 15.07 | C | O,S | 1 |
| <i>Berberis vulgaris</i> L. | Ap | RP | L,B,N,P | 10.05 - 15.06 | D | S | 2 |
| <i>Berteroa incana</i> (L.) DC. | Ap | AR | N,P | 10.05 - 30.09 | C | T,O,S | 1,2,3 |
| <i>Betonica officinalis</i> L. | Ap | M-A | L,N,P | 10.06 - 10.08 | D | S | 1 |
| <i>Betula pendula</i> Roth | Ap | Q-F | L,B | - | C | O,S | 1 |
| <i>Betula pubescens</i> Ehrh | Ap | - | L | - | R | S | 1 |
| <i>Bidens tripartita</i> L. | Ap | BAT | L,B | 20.06 - 20.08 | D | O | 1 |
| <i>Brassica nigra</i> L. | Ag | - | L,N,P | 10.06 - 20.08 | R | T | 1 |
| <i>Bryonia alba</i> L. | Ag | - | L | - | R | O | 2 |
| <i>Bryonia dioica</i> Jacq. | Ep | - | L | - | R | O | 2 |

| A | B | C | D | E | F | G | H |
|--|-------|-----|---------|---------------|---|-------|-------|
| <i>Bunias orientalis</i> L. | Ep | - | N,P | 05.05 - 10.06 | F | T,O,S | 2,3 |
| <i>Calendula arvensis</i> L. | Ep | - | L,N,P | 10.07 - 15.08 | R | O | 1 |
| <i>Calluna vulgaris</i> (L.) Hull. | Ap | NC | L,B,N,P | 05.08 - 20.09 | D | S | 2 |
| <i>Caltha palustris</i> L. | Ap | M-A | P | 05.05 - 25.05 | R | O | 1 |
| <i>Calystegia sepium</i> (L.) R.Br. | Ap | AR | N,P | 10.06 - 10.09 | R | S | 2 |
| <i>Campanula glomerata</i> L. | Ap | F-B | N,P | 10.06 - 01.09 | D | O | 1 |
| <i>Campanula patula</i> L. | Ap | M-A | N,P | 20.05 - 10.07 | F | O | 1 |
| <i>Campanula persicifolia</i> L. | Ap | Q-F | N,P | 05.07 - 20.08 | D | O,S | 1 |
| <i>Campanula rapunculoides</i> L. | Ap | TG | N,P | 10.06 - 01.09 | F | O | 1 |
| <i>Campanula rotundifolia</i> L. | Ap | - | N,P | 10.06 - 01.09 | D | O | 1 |
| <i>Campanula sibirica</i> L. | Ap | F-B | N,P | 20.06 - 15.07 | R | O,S | 1 |
| <i>Camabis sativa</i> L. | Ep | - | L | 01.07 - 20.08 | R | O | 2 |
| <i>Capsella bursa-pastoris</i> (L.) Med. | Arch. | SM | L | 10.04 - 10.10 | C | T,O,S | 1 |
| <i>Cardamine pratensis</i> L.s.s. | Ap | M-A | N,P | 10.05 10.06 | F | O,S | 1 |
| <i>Cardaminopsis arenosa</i> (L.) Hayek | Ap | - | N,P | 20.04 - 20.05 | C | T,O | 1,2 |
| <i>Cardaria draba</i> (L.) Desv. | Ag | AIR | N,P | 05.05 - 01.06 | F | O,S | 2,3 |
| <i>Cardus acanthoides</i> L. | Arch. | AR | L,N,P | 20.06 - 15.09 | F | O | 1 |
| <i>Cardus crispus</i> L. | Ap | AR | N,P | 25.06 - 01.09 | F | O,S | 1,2 |
| <i>Carum carvi</i> L. | Ap | M-A | L,N,P | 10.05 - 20.06 | R | O | 1 |
| <i>Centaurea cyanus</i> L. | Arch. | SM | L,B,N,P | 10.06 - 01.08 | D | O,S | 1 |
| <i>Centaurea jacea</i> L. | Ap | M-A | N,P | 20.06 - 20.08 | C | O | 1 |
| <i>Centaurea pannonica</i> (Heuff.) Hayek | Ap | F-B | N,P | 20.06 - 20.08 | D | O,S | 1 |
| <i>Centaurea scabiosa</i> L. | Ap | F-B | N,P | 20.06 - 10.09 | D | S | 1,2 |
| <i>Centaurea stoebe</i> L. | Ap | F-B | N,P | 25.06 - 20.08 | C | T,O | 1,2 |
| <i>Centaureium pulchellum</i> (Sw) Druce | Ap | IN | L | - | R | O | 1 |
| <i>Cerasus fruticosa</i> Pall | Ap | RP | B,N,P | 20.04 - 30.04 | R | S | 1,2 |
| <i>Chamaecytisus ratisbonensis</i> (Schaeff.) Rothm. | Ap | - | N,P | 10.05 - 15.06 | D | S | 2 |
| <i>Chamaenerion angustifolium</i> (L.) Scop. | Ap | EP | L,N,P | 20.06 - 20.07 | F | S | 2 |
| <i>Chamomilla recutita</i> (L.) Rauschert | Arch. | SM | L,B,N,P | 10.06 - 20.07 | C | T,O | 1,2 |
| <i>Chamomilla suaveolens</i> (Pursh) Rydb. | Ep | M-A | L,N,P | 10.06 - 20.07 | C | T,O | 1 |
| <i>Chelidonium majus</i> L. | Ap | AR | L,P | 05.05 - 10.10 | C | T,O | 1 |
| <i>Chenopodium album</i> L. | Ap | SM | P | 20.06 - 20.09 | F | O | 1,2 |
| <i>Cichorium intybus</i> L. | Arch. | AR | L,N,P | 10.06 - 01.09 | C | O,S | 1 |
| <i>Cirsium arvense</i> (L.) Scop. | Ap | AR | B,N,P | 30.06 - 20.08 | C | T,O,S | 1,2,3 |
| <i>Cirsium oleraceum</i> (L.) Scop. | Ap | M-A | L,N,P | 20.06 - 30.08 | D | S | 1 |
| <i>Cirsium palustre</i> (L.) Scop. | Ap | M-A | N,P | 20.06 - 30.08 | R | S | 1 |
| <i>Cirsium rivulare</i> (Jacq.) All. | Ap | M-A | N,P | 20.05 - 30.06 | D | S | 1,2 |
| <i>Cirsium vulgare</i> (Savi.) Ten. | Ap | AR | N,P | 15.07 - 15.08 | F | O | 1 |
| <i>Clematis vitalba</i> L. | Ag | RP | P | 20.06 - 20.08 | R | O | 2 |
| <i>Conium maculatum</i> L. | Arch. | AR | L | - | R | O | 1,2 |
| <i>Consolida regalis</i> Gray | Arch. | SM | L,N,P | 10.06 - 20.07 | F | T,O | 1 |
| <i>Convallaria majalis</i> L. | Ap | - | L,N,P | 05.05 - 25.05 | D | S | 2 |
| <i>Convolvulus arvensis</i> L. | Ap | AIR | L,N,P | 10.06 - 10.09 | C | T,O,S | 2,3 |
| <i>Conyza canadensis</i> (L.) Conquist | Ep | SM | L | - | C | T,O | 1,2,3 |
| <i>Coronilla varia</i> L. | Ap | TG | B,N,P | 10.06 - 10.08 | C | O,S | 1,2 |
| <i>Corylus avellana</i> L. | Ap | Q-F | L,P | 20.03 - 20.04 | F | O | 1 |
| <i>Crataegus macrocarpa</i> Hegetschw. | Ap | RP | N,P | 15.05 - 30.07 | D | O,S | 1 |
| <i>Crataegus monogyna</i> Jacq. | Ap | RP | N,P | 15.05 - 30.05 | F | O,S | 1 |
| <i>Datura stramonium</i> L. | Ep | AR | L,N,P | 20.06 - 05.08 | R | O | 1,2 |
| <i>Daucus carota</i> L. | Ap | M-A | L,B,N,P | 20.06 - 15.09 | C | T,O,S | 1,2 |

| A | B | C | D | E | F | G | H |
|--|-------|-----|---------|---------------|---|-------|-------|
| <i>Dianthus carthusianorum</i> L. | Ap | F-B | N,P | 15.06 - 20.07 | D | S | 1,2 |
| <i>Dianthus superbus</i> L. s.s. | Ap | M-A | N,P | 20.06 - 20.07 | R | O | 1,2 |
| <i>Dryopteris filix - mas</i> (L.) Schott H. | Ap | Q-F | L | - | D | O | 1 |
| <i>Echinops sphaerocephalus</i> L. | Ep | AR | N,P | 10.07 - 10.08 | D | O | 1 |
| <i>Echium vulgare</i> L. | Ap | AR | B,N,P | 10.06 - 10.09 | C | T,O,S | 1,2 |
| <i>Elymus repens</i> (L.) Gould. | Ap | AIR | L | - | C | T,O,S | 2,3 |
| <i>Epilobium hirsutum</i> L. | Ap | AR | N,P | 10.06 - 20.09 | F | S | 1,2 |
| <i>Epilobium montanum</i> L. | Ap | AR | N,P | 20.06 - 30.08 | C | O,S | 1 |
| <i>Equisetum arvense</i> L. | Ap | AIR | L,B | - | C | T,O,S | 1,2,3 |
| <i>Erodium cicutarium</i> (L.) L Her. | Ap | - | L,N,P | 20.05 - 20.07 | D | T,O | 1 |
| <i>Euonymus europea</i> L. | Ap | RP | L,B,N,P | 15.05 - 10.06 | F | S | 1 |
| <i>Euonymus verrucosa</i> Scop. | Ap | RP | L,N,P | 15.05 - 15.06 | D | S | 1 |
| <i>Eupatorium cannabinum</i> L. | Ap | AR | L,B,N,P | 20.06 - 15.08 | F | S | 2,3 |
| <i>Euphorbia cyparissias</i> L. | Ap | F-B | L,B,N,P | 01.05 - 20.05 | C | O,S | 1,2,3 |
| <i>Euphorbia esula</i> L. | Ap | - | N,P | 20.05 - 20.07 | C | O,S | 1,2 |
| <i>Euphorbia helioscopia</i> L. | Arch. | SM | N,P | 10.05 - 10.06 | R | O | 1 |
| <i>Euphrasia rostkoviana</i> Hayne | Ap | M-A | L | - | D | S | 1 |
| <i>Fagus sylvatica</i> L. | Ap | Q-F | L | - | R | O | 1 |
| <i>Fallopia convolvulus</i> (L.) A.Love | Arch. | SM | N,P | 20.05 - 20.06 | F | O,S | 2 |
| <i>Ficaria verna</i> Huds. | Ap | Q-F | L,P | 10.04 - 10.05 | D | O | 1,2 |
| <i>Filipendula ulmaria</i> (L.) Maxim. | Ap | M-A | L,B,P | 15.06 - 20.07 | D | S | 1,2 |
| <i>Filipendula vulgaris</i> Moench | Ap | F-B | P | 20.06 - 10.08 | D | S | 1,2 |
| <i>Fragaria vesca</i> L. | Ap | EP | L,N,P | 10.05 - 10.06 | C | O | 1,2,3 |
| <i>Fragaria viridis</i> L. | Ap | TG | N,P | 10.05 - 10.06 | D | O | 1,2 |
| <i>Frangula alnus</i> Mill. | Ap | - | L,B,N,P | 20.05 - 20.06 | D | O | 1 |
| <i>Fraxinus excelsior</i> L. | Ap | Q-F | L | - | F | O | 1 |
| <i>Fumaria officinalis</i> L. | Arch. | SM | L,B | 20.05 - 20.08 | D | O | 1,2 |
| <i>Gagea lutea</i> (L.) Ker Gawl. | Ap | Q-F | N,P | 20.04 - 10.05 | R | O | 1 |
| <i>Galeopsis angustifolia</i> (Ehrh.) Hoffm. | Ap | TR | N,P | 15.06 - 20.08 | D | T | 1,2 |
| <i>Galeopsis pubescens</i> Besser | Ap | AR | L,N,P | 15.06 - 01.09 | F | T,O | 1 |
| <i>Galeopsis tetrahit</i> L. | Ap | SM | L | - | F | T,O | 1 |
| <i>Galium aparine</i> L. | Ap | AR | B,N,P | 10.06 - 15.09 | C | O,S | 1,2 |
| <i>Galium mollugo</i> L. | Ap | M-A | B | - | C | T,O,S | 1,2 |
| <i>Galium odoratum</i> (L.) Scop. | Ap | Q-F | L,B,N,P | 05.05 - 01.06 | D | O | 1,2 |
| <i>Galium verum</i> L. | Ap | TG | L,B,N,P | 10.07 - 20.09 | C | O,S | 1,2,3 |
| <i>Genista tinctoria</i> L. | Ap | NC | L,B,N,P | 15.06 - 30.07 | D | O | 2 |
| <i>Geranium palustre</i> L. | Ap | M-A | N,P | 10.06 - 10.08 | D | S | 1,2 |
| <i>Geranium pratense</i> L. | Ap | M-A | N,P | 10.06 - 10.08 | F | O,S | 1,2 |
| <i>Geranium robertianum</i> L. | Ap | AR | L,B,N,P | 15.05 - 20.07 | C | T,O | 1,2,3 |
| <i>Geranium sanguineum</i> | Ap | TG | N,P | 20.05 - 10.07 | D | O,S | 1,2 |
| <i>Geranium sibiricum</i> L. | Ep | - | N,P | 20.06 - 15.08 | R | T,O | 2 |
| <i>Geranium sylvaticum</i> L. | Ap | BA | N,P | 10.06 - 20.08 | R | S | 2 |
| <i>Geum urbanum</i> L. | Ap | AR | L,B | 01.06 - 20.06 | F | O,S | 1 |
| <i>Glechoma hederacea</i> L. | Ap | AR | L,N,P | 20.04 - 10.07 | C | O | 1,2 |
| <i>Hedera helix</i> L. | Ap | - | L,B | - | R | O | 2 |
| <i>Helianthus tuberosus</i> L. | Ag | - | L,N,P | 20.08 - 15.10 | D | O | 2,3 |
| <i>Helichrysum arenarium</i> (L.) Moench | Ap | KG | L,B | 20.07 - 20.08 | D | O | 1,2,3 |
| <i>Hepatica nobilis</i> Schreb. | Ap | Q-F | L,P | 10.04 - 30.04 | R | O | 2 |
| <i>Heracleum mantegazzianum</i> Sommier & Levier | Ag | - | N,P | 15.06 - 20.07 | R | O | 3 |
| <i>Heracleum sibiricum</i> L. | Ap | M-A | N,P | 10.07 - 05.08 | F | O | 1 |

| A | B | C | D | E | F | G | H |
|---|-------|-----|---------|---------------|---|-------|-------|
| <i>Heracleum sphondylium</i> L. | Ap | M-A | N,P | 15.06 - 01.09 | F | O | 1 |
| <i>Hemiaria glabra</i> L. | Ap | KG | L | - | D | O | 1,2 |
| <i>Humulus lupulus</i> L. | Ap | - | L,P | 10.06 - 10.07 | F | O,S | 2,3 |
| <i>Hyoscyamus niger</i> L. | Arch. | SM | L,N,P | 01.06 - 15.07 | D | O | 1 |
| <i>Hypericum perforatum</i> L. | Ap | - | L,B,P | 05.06 - 30.07 | C | T,O,S | 1 |
| <i>Impatiens glandulifera</i> Royle | Ag | AR | N,P | 20.07 - 30.09 | R | S | 2 |
| <i>Impatiens noli-tangere</i> L. | Ap | Q-F | B,N,P | 20.07 - 30.09 | D | O | 1 |
| <i>Impatiens parviflora</i> DC. | Ag | AR | N,P | 20.07 - 10.09 | F | T,O | 1,2,3 |
| <i>Inula helenium</i> L. | Ag | - | L,N,P | 10.07 - 20.08 | R | O | 1 |
| <i>Iva xanthifolia</i> Nutt | Ep | AR | P | 20.08 - 20.10 | D | T,O | 1,2 |
| <i>Jasione montana</i> L. | Ap | KG | N,P | 10.06 - 30.07 | F | O | 1,2 |
| <i>Knautia arvensis</i> (L.) J.M.Coult. | Ap | M-A | N,P | 10.06 - 30.07 | C | O,S | 1 |
| <i>Lamium album</i> L. | Arch. | AR | L,N,P | 20.04 - 30.09 | C | O | 1 |
| <i>Lamium amplexicaule</i> L. | Arch. | SM | N,P | 01.04 - 30.06 | F | O | 1 |
| <i>Lamium purpureum</i> L. | Arch. | SM | N,P | 15.04 - 01.09 | F | O | 1 |
| <i>Lathyrus niger</i> (L.) Bernh. | Ap | Q-F | N,P | 15.06 - 15.07 | R | O | 1,2 |
| <i>Lathyrus palustris</i> L. | Ap | M-A | N,P | 10.07 - 20.08 | R | S | 2 |
| <i>Lathyrus pratensis</i> L. | Ap | M-A | B,N,P | 15.06 - 15.07 | F | O,S | 2,3 |
| <i>Lathyrus sylvestris</i> L. | Ap | TG | N,P | 05.07 - 30.07 | D | T,O | 2,3 |
| <i>Lathyrus tuberosus</i> L. | Arch. | SM | N,P | 10.07 - 20.08 | F | O,S | 1,2 |
| <i>Lathyrus vernus</i> (L.) Bernh. | Ap | Q-F | N,P | 10.04 - 20.05 | R | O | 1,2 |
| <i>Leonurus cardiaca</i> L. | Arch. | AR | L,N,P | 20.06 - 15.08 | F | O,S | 1,2 |
| <i>Lepidium campestre</i> (L.) R.Br. | Arch. | - | N,P | 20.05 - 20.06 | D | T,O | 1 |
| <i>Ligustrum vulgare</i> L. | Ag | RP | N,P | 10.05 - 10.06 | R | O | 2 |
| <i>Lilium martagon</i> L. | Ap | Q-F | N,P | 20.05 - 10.06 | R | S | 1 |
| <i>Linaria vulgaris</i> Mill. | Ap | AR | L,N,P | 15.06 - 20.09 | C | T,O | 1,2,3 |
| <i>Lithospermum arvense</i> L. | Arch. | SM | L,N,P | 15.06 - 20.07 | F | T,O | 1 |
| <i>Lithospermum officinale</i> L. | Ap | - | L,B,N,P | 15.06 - 20.07 | R | S | 1 |
| <i>Lonicera tatarica</i> L. | Ag | - | N,P | 20.05 - 20.06 | R | S | 2 |
| <i>Lotus corniculatus</i> L. | Ap | M-A | P,B | 10.05 - 15.09 | C | O,S | 1,2 |
| <i>Lychnis flos-cuculi</i> L. | Ap | M-A | N,P | 10.05 - 25.06 | D | S | 1 |
| <i>Lycium barbarum</i> L. | Ep | AR | L,N,P | 20.05 - 20.08 | R | S | 2 |
| <i>Lycopodium clavatum</i> L. | Ap | NC | L | - | R | O | 2 |
| <i>Lysimachia nummularia</i> L. | Ap | M-A | L,B,N,P | 15.06 - 20.07 | D | O,S | 2 |
| <i>Lythrum salicaria</i> L. | Ap | M-A | N,P | 10.07 - 30.09 | D | S | 1 |
| <i>Malus sylvestris</i> Mill. | Ap | - | B,N,P | 05.05 - 25.05 | R | O | 1 |
| <i>Malva alcea</i> L. | Ag | AR | N,P | 10.07 - 20.08 | D | O,S | 1 |
| <i>Malva neglecta</i> Wallr. | Arch. | SM | N,P | 15.06 - 01.09 | D | O | 2 |
| <i>Malva sylvestris</i> L. | Arch. | AR | L,N,P | 10.06 - 20.08 | F | O | 1 |
| <i>Matricaria maritima</i> L. ssp. <i>inodora</i> | Arch. | SM | N,P | 10.05 - 20.09 | C | T,O | 1,2 |
| <i>Medicago falcata</i> L. | Ap | TG | N,P | 10.06 - 15.09 | C | O,S | 2,3 |
| <i>Medicago lupulina</i> L. | Ap | - | N,P | 10.06 - 15.08 | C | T,O | 1,2 |
| <i>Medicago sativa</i> L. | Ag | - | N,P | 10.06 - 15.08 | C | O | 2,3 |
| <i>Medicago x varia</i> Martyn | Ag | AR | N,P | 10.06 - 15.08 | F | O | 2,3 |
| <i>Melampyrum arvense</i> L. | Ap | F-B | N,P | 15.06 - 25.07 | R | O | 2,3 |
| <i>Melampyrum nemorosum</i> L. | Ap | - | N,P | 15.06 - 15.08 | D | O | 1,2 |
| <i>Melampyrum pratense</i> L. | Ap | VP | N,P | 15.06 - 15.08 | D | O | 1,2 |
| <i>Melandrium album</i> (Mill.) Garcke | Arch. | AR | N,P | 20.05 - 30.09 | C | O | 1 |
| <i>Melilotus alba</i> Medik. | Ap | AR | N,P | 10.06 - 15.08 | C | O,S | 2,3 |
| <i>Melilotus officinalis</i> (L.) Pall. | Ap | AR | N,P | 01.06 - 20.07 | C | O,S | 2,3 |
| <i>Mentha arvensis</i> L. | Ap | - | L,N,P | 20.07 - 20.09 | D | O | 1 |

| A | B | C | D | E | F | G | H |
|--|-------|-----|---------|---------------|---|-------|-------|
| <i>Mentha longifolia</i> L. | Ap | M-A | N,P | 01.08 - 20.09 | D | O | 2 |
| <i>Mentha verticillata</i> L. | Ap | - | N,P | 20.07 - 20.09 | D | O | 1 |
| <i>Myosotis arvensis</i> (L.) Hill. | Arch. | SM | N,P | 10.05 - 20.07 | C | T,O | 1 |
| <i>Myosotis palustris</i> (L.) L.em Rchb. | Ap | M-A | N,P | 10.05 - 20.07 | D | O,S | 1,2 |
| <i>Myosotis ramosissima</i> Rochel | Ap | KG | N,P | 15.05 - 20.06 | R | O | 1 |
| <i>Myosotis sparsiflora</i> Pohl | Ap | - | N,P | 01.06 - 01.07 | R | S | 2 |
| <i>Myosoton aquaticum</i> (L.) Moench. | Ap | M-A | N,P | 20.05 - 15.07 | D | S | 1,2 |
| <i>Nepeta cataria</i> L. | Arch. | AR | L,N,P | 05.07 - 10.08 | R | O | 1 |
| <i>Nigella arvensis</i> L. | Arch. | - | N,P | 10.07 - 25.08 | R | T,O | 1 |
| <i>Oenothera biennis</i> L.s.s. | Ap | AR | L,N,P | 15.06 - 20.08 | F | O | 1,2 |
| <i>Oenothera casimiri</i> Rostański | Ap | - | N,P | 15.06 - 20.08 | D | O | 1,2 |
| <i>Oenothera parviflora</i> L. | Ep | - | N,P | 15.06 - 20.08 | R | O | 1,2 |
| <i>Onobrychis arenaria</i> (Kit.) DC | Ap | F-B | N,P | 15.06 - 15.07 | R | S | 1 |
| <i>Onobrychis vicifolia</i> Scop. | Ag | F-B | N,P | 15.06 - 15.07 | D | O,S | 1 |
| <i>Ononis spinosa</i> L. | Ap | F-B | L | - | R | O | 2 |
| <i>Onopordum acanthium</i> L. | Arch. | AR | N,P | 15.06 - 20.07 | D | O | 1 |
| <i>Origanum vulgare</i> L. | Ap | TG | L,B,N,P | 01.07 - 15.08 | F | O,S | 1,2 |
| <i>Oxalis acetosella</i> L. | Ap | - | L | - | D | O | 1,2 |
| <i>Padus avium</i> Mill. | Ap | Q-F | L,B,N,P | 20.04 - 20.05 | D | O | 1 |
| <i>Padus serotina</i> (Ehrh.) Borkh. | Ag | - | L | - | F | O | 1 |
| <i>Papaver argemone</i> L. | Arch. | SM | P | 20.05 - 30.06 | D | O | 1,2,3 |
| <i>Papaver rhoeas</i> L. | Arch. | SM | L,B,P | 20.05 - 10.07 | F | O | 1,2,3 |
| <i>Pastinaca sativa</i> L. | Arch. | M-A | L,B,N,P | 01.07 - 10.08 | C | T,O,S | 1,2 |
| <i>Petasites hybridus</i> (L.) P.Gaernt., B.Mey. & Scherb. | Ap | AR | L,N,P | 15.04 - 15.05 | R | S | 2 |
| <i>Peucedanum oreoselinum</i> (L.) Moench | Ap | TG | L | - | D | O,S | 1,2 |
| <i>Pimpinella saxifraga</i> L. | Ap | - | L,N,P | 15.06 - 30.09 | C | O,S | 1,2 |
| <i>Plantago arenaria</i> Waldst. and Kit. | Ap | KG | L | - | D | T | 1,2 |
| <i>Plantago lanceolata</i> L. | Ap | M-A | L,P | 15.05 - 10.09 | C | O,S | 1 |
| <i>Plantago major</i> L. | Ap | M-A | L,P | 20.05 - 15.08 | C | O,S | 1,2,3 |
| <i>Polygonum aviculare</i> L. | Ap | SM | L,N,P,B | 10.05 - 30.10 | C | O | 1,2,3 |
| <i>Polygonum bistorta</i> L. | Ap | M-A | L,B,N,P | 10.05 - 20.06 | D | S | 1 |
| <i>Polygonum hydropiper</i> L. | Ap | - | L,B,N,P | 10.06 - 15.07 | D | O | 1 |
| <i>Polygonum persicaria</i> L. | Ap | SM | B | - | D | O | 1,2 |
| <i>Populus tremula</i> L. | Ap | EP | L | - | F | O | 1 |
| <i>Potentilla anserina</i> L. | Ap | M-A | L,P | 10.05 - 20.07 | F | O | 1,2,3 |
| <i>Potentilla arenaria</i> Borkh. | Ap | F-B | P | 10.05 - 15.08 | F | O,S | 2,3 |
| <i>Potentilla argentea</i> L.s.s. | Ap | AR | P | 10.06 - 15.07 | F | O,S | 1,2 |
| <i>Potentilla collina</i> Wibel s.s. | Ap | KG | P | 10.06 - 15.07 | D | O | 1,2 |
| <i>Potentilla erecta</i> (L.) Rausch | Ap | NC | L,B,N | 05.05 - 15.09 | D | O | 1 |
| <i>Potentilla recta</i> L. | Ap | - | P | 10.06 - 15.07 | D | O | 1 |
| <i>Potentilla reptans</i> L. | Ap | M-A | P | 05.05 - 10.09 | F | T,O | 2,3 |
| <i>Potentilla rupestris</i> L. | Ap | - | P | 15.05 - 15.07 | R | O | 1 |
| <i>Potentilla supina</i> L. | Ap | IN | P | 10.06 - 20.08 | R | O | 1,2 |
| <i>Primula veris</i> L. | Ap | F-B | L,B,N,P | 10.04 - 20.05 | R | O | 1 |
| <i>Prunella vulgaris</i> L. | Ap | M-A | N,P | 10.05 - 20.08 | F | O,S | 1 |
| <i>Prunus spinosa</i> L. | Ap | RP | L,N,P | 20.04 - 05.05 | F | O,S | 1,2,3 |
| <i>Pteridium aquilinum</i> (L.) Kuhn | Ap | - | B | - | F | O,S | 2,3 |
| <i>Pulmonaria obscura</i> Dumort. | Ap | Q-F | N,P | 20.04 - 20.05 | R | O,S | 1,2 |
| <i>Pyrus communis</i> L. | Ap | - | L,N,P | 01.05 - 20.05 | D | O,S | 1 |
| <i>Quercus robur</i> L. | Ap | - | L,B | - | D | O | 1 |

| A | B | C | D | E | F | G | H |
|--|-------|-----|---------|---------------|---|-------|-------|
| <i>Ramunculus acris</i> L. | Ap | M-A | P | 10.05 - 20.07 | F | O,S | 1 |
| <i>Ramunculus bulbosus</i> L. | Ap | F-B | P | 15.05 - 10.06 | D | S | 1 |
| <i>Ramunculus flammula</i> L. | Ap | SCH | P | 15.05 - 10.08 | R | O | 1 |
| <i>Ramunculus lanuginosus</i> L. | Ap | Q-F | P | 10.05 - 10.07 | R | O | 1 |
| <i>Ramunculus polyanthemos</i> L. | Ap | Q-F | P | 10.06 - 10.08 | R | O | 1 |
| <i>Ramunculus repens</i> L. | Ap | M-A | P | 10.06 - 10.08 | F | T,O | 1 |
| <i>Ramunculus sardous</i> Crantz | Ap | M-A | P | 10.05 - 20.07 | D | O | 1 |
| <i>Raphanus raphanistrum</i> L. | Arch. | - | P | 10.06 - 10.10 | D | T,O | 1 |
| <i>Reseda lutea</i> L. | Ap | AR | B,N,P | 20.05 - 20.07 | F | O | 1,2 |
| <i>Rhamnus cathartica</i> L. | Ap | RP | L,B,N,P | 10.05 - 10.06 | D | O | 1 |
| <i>Ribes nigrum</i> L. | Ap | AG | L,N,P | 20.04 - 15.05 | D | O | 1 |
| <i>Ribes uva-crispa</i> L. | Ap | - | N,P | 10.04 - 01.05 | R | T,O | 1 |
| <i>Robinia pseudoacacia</i> L. | Ag | - | L,B,N,P | 10.06 - 25.06 | D | O | 1 |
| <i>Rorippa austriaca</i> (Crantz) Besser | Ap | M-A | N,P | 01.06 - 25.06 | D | O,S | 2,3 |
| <i>Rorippa palustris</i> (L.) Besser | Ap | BAT | N,P | 10.05 - 20.07 | D | O | 1,2 |
| <i>Rorippa sylvestris</i> (L.) Besser | Ap | M-A | N,P | 01.06 - 01.08 | D | O | 1,2 |
| <i>Rosa canina</i> L. | Ap | RP | L,P | 15.05 - 15.06 | D | O,S | 2 |
| <i>Rosa jundzilli</i> Beser | Ap | - | P | 15.05 - 15.06 | R | S | 2 |
| <i>Rosa majalis</i> Herrm. | Ap | - | P | 15.05 - 15.06 | R | O | 2 |
| <i>Rosa multiflora</i> Thunb. | Ag | - | P | 20.05 - 10.06 | D | O | 2,3 |
| <i>Rosa rugosa</i> Thunb. | Ag | - | P | 15.05 - 25.06 | F | O,S | 2,3 |
| <i>Rosa tomentosa</i> SM. | Ap | RP | P | 10.06 - 10.07 | R | S | 2 |
| <i>Rubus caesius</i> L. | Ap | AR | B,N,P | 25.05 - 10.07 | C | T,O,S | 2,3 |
| <i>Rubus idaeus</i> L. | Ap | EP | L,N,P | 20.05 - 10.07 | F | O,S | 2,3 |
| <i>Rubus laciniatus</i> Willd | Ag | - | N,P | 20.05 - 10.07 | R | T | 2 |
| <i>Rubus plicatus</i> Weihe & Ness | Ap | RP | L,N,P | 20.05 - 10.07 | D | T,O | 2,3 |
| <i>Rudbeckia laciniata</i> L. | Ag | AR | N,P | 20.07 - 01.09 | R | O | 1 |
| <i>Rumex acetosa</i> L. | Ap | M-A | P | 10.05 - 20.07 | C | O | 1,2,3 |
| <i>Rumex acetosella</i> L. | Ap | KG | B,P | 01.05 - 10.07 | C | O | 1,2 |
| <i>Rumex confertus</i> Willd. | Ag | - | P | 10.07 - 20.09 | F | O,S | 2,3 |
| <i>Rumex crispus</i> L. | Ap | - | L,P | 15.06 - 30.07 | F | O | 1 |
| <i>Rumex obtusifolius</i> L. | Ap | AR | L,P | 15.06 - 15.07 | D | O | 1,2 |
| <i>Salix alba</i> L. | Ap | SAL | B,N,P | 10.04 - 10.05 | D | O | 1,2 |
| <i>Salix cinerea</i> L. | Ap | AG | N,P | 20.03 - 20.04 | F | O,S | 1,2 |
| <i>Salix pentandra</i> L. | Ap | AG | N,P | 20.04 - 20.05 | D | O | 1,2 |
| <i>Salix purpurea</i> L. | Ap | SAL | L,N,P | 15.03 - 20.04 | D | O | 1,2 |
| <i>Salvia nemorosa</i> L. | Ap | F-B | N,P | 20.06 - 05.08 | R | S | 2,3 |
| <i>Salvia pratensis</i> L. | Ap | - | N,P | 20.06 - 05.08 | D | S | 1,2 |
| <i>Salvia verticillata</i> L. | Ap | F-B | N,P | 15.06 - 20.07 | D | S | 1,2 |
| <i>Sambucus nigra</i> L. | Ap | EP | L,B,P | 20.05 - 20.06 | F | O,S | 2,3 |
| <i>Sanguisorba officinalis</i> L. | Ap | M-A | L,N,P | 20.06 - 20.08 | D | O | 1,2 |
| <i>Saponaria officinalis</i> L. | Ap | AR | L,N,P | 10.06 - 20.07 | F | O,S | 1,2 |
| <i>Sarothamnus scoparius</i> L. | Ap | RP | L,B,N,P | 15.05 - 15.06 | D | O,S | 2,3 |
| <i>Scabiosa ochroleuca</i> L. | Ap | F-B | N,P | 01.06 - 17.07 | D | S | 1 |
| <i>Scleranthus annuus</i> L. | Arch. | SM | B | - | D | O | 1,2 |
| <i>Sedum acre</i> L. | Ap | KG | L,N,P | 15.05 - 20.07 | F | T,O | 1,2,3 |
| <i>Sedum maximum</i> (L.) Hoffm. | Ap | - | L,N,P | 10.07 - 20.09 | F | O | 2 |
| <i>Sedum reflexum</i> L. | Ap | KG | L,N,P | 15.05 - 20.07 | R | O | 2 |
| <i>Sedum sexangulare</i> L. | Ap | KG | L,N,P | 15.05 - 30.07 | D | T,O | 1,2,3 |
| <i>Senecio jacobaea</i> L. | Ap | - | L,N,P | 01.07 - 30.08 | F | O | 1 |
| <i>Senecio vulgaris</i> L. | Arch. | SM | L | - | F | T,O | 1,2 |

| A | B | C | D | E | F | G | H |
|---|-------|-----|---------|---------------|---|-------|-------|
| <i>Serratula tinctoria</i> L. | Ap | M-A | B | - | R | O | 1 |
| <i>Sinapis arvensis</i> L. | Arch. | SM | N,P | 15.05 - 15.10 | F | O | 1 |
| <i>Sisymbrium altissimum</i> L. | Ep | SM | N,P | 10.06 - 30.07 | D | T,O | 1 |
| <i>Sisymbrium loeselii</i> L. | Ep | SM | N,P | 01.06 - 20.07 | F | T,O,S | 1,2,3 |
| <i>Sisymbrium wolgensis</i> M. Bieb. ex E. Fourn. | Ep | - | N,P | 01.06 - 20.07 | D | O,S | 2,3 |
| <i>Solidago gigantea</i> Aiton | Ag | AR | L,B,N,P | 20.07 - 15.10 | C | O,S | 2,3 |
| <i>Solidago virgaurea</i> L. | Ap | - | L,B,N,P | 28.07 - 10.10 | F | O,S | 1,2 |
| <i>Sorbus aucuparia</i> L. | Ap | - | L,B,N,P | 10.05 - 30.05 | F | O | 1 |
| <i>Stachys annua</i> L. | Arch. | SM | N,P | 10.06 - 20.09 | R | S | 1 |
| <i>Stachys palustris</i> L. | Ap | M-A | N,P | 10.06 - 20.09 | D | O | 1 |
| <i>Stachys recta</i> L. | Ap | F-B | N,P | 10.06 - 20.09 | R | S | 1 |
| <i>Stachys sylvatica</i> L. | Ap | Q-F | N,P | 10.06 - 20.09 | R | O | 1 |
| <i>Symphoricarpos albus</i> (L.) S. F. Blake | Ag | - | N,P | 10.05 - 10.06 | D | O | 2 |
| <i>Symphytum officinale</i> L. | Ap | - | L,B,N,P | 15.05 - 20.08 | R | O | 1 |
| <i>Tanacetum vulgare</i> L. | Ap | AR | L,B,P | 20.07 - 01.10 | C | O,S | 1,2,3 |
| <i>Taraxacum officinale</i> F.H.Wigg. | Ap | M-A | L,B,N,P | 05.05 - 25.05 | C | O,S | 1 |
| <i>Teucrium chamaedrys</i> L. | Ap | F-B | L,N,P | 15.05 - 20.06 | R | O | 1,2 |
| <i>Thalictrum aquilegifolium</i> L. | Ap | BA | P | 01.06 - 30.06 | R | O,S | 2 |
| <i>Thalictrum flavum</i> L. | Ap | M-A | L,P | 20.06 - 20.07 | R | S | 2 |
| <i>Thalictrum lucidum</i> L. | Ap | - | P | 15.06 - 15.07 | R | S | 2 |
| <i>Thalictrum minus</i> L. | Ap | TG | L,P | 15.06 - 30.06 | D | O,S | 1,2 |
| <i>Thalictrum simplex</i> L. | Ap | F-B | P | 10.06 - 10.07 | R | S | 2 |
| <i>Thymus marschallianus</i> Willd. | Ap | F-B | N,P | 10.06 - 10.07 | R | S | 2 |
| <i>Thymus pulegioides</i> L. | Ap | - | N,P | 10.06 - 10.07 | F | O,S | 2 |
| <i>Thymus serpyllum</i> L. | Ap | KG | L,N,P | 10.06 - 10.07 | F | O,S | 2 |
| <i>Tilia cordata</i> Mill. | Ap | Q-F | L,N,P | 05.07 - 25.07 | F | O | 1 |
| <i>Tilia platyphyllos</i> Scop. | Ap | Q-F | N,P | 20.06 - 25.07 | D | O | 1 |
| <i>Trifolium arvense</i> L. | Ap | KG | N,P | 01.06 - 30.07 | F | O,S | 1,2,3 |
| <i>Trifolium campestre</i> Schreb. | Ap | KG | N,P | 01.06 - 30.07 | D | O | 1,2 |
| <i>Trifolium dubium</i> Sibth. | Ap | M-A | N,P | 01.06 - 30.07 | D | O | 1 |
| <i>Trifolium fragiferum</i> L. | Ap | M-A | N,P | 01.06 - 30.07 | R | T,O | 1,2 |
| <i>Trifolium hybridum</i> L. | Ap | M-A | N,P | 01.06 - 30.07 | D | O | 1,2 |
| <i>Trifolium medium</i> L. | Ap | TG | N,P | 01.06 - 30.07 | F | O,S | 2,3 |
| <i>Trifolium montanum</i> L. | Ap | M-A | N,P | 01.06 - 30.07 | D | S | 1 |
| <i>Trifolium pratense</i> L. | Ap | M-A | L,N,P | 01.06 - 30.07 | F | O,S | 1,2 |
| <i>Trifolium repens</i> L. | Ap | M-A | B,N,P | 20.05 - 30.08 | C | T,O,S | 1,2,3 |
| <i>Tussilago farfara</i> L. | Ap | AIR | L,N,P | 01.04 - 25.04 | F | O,S | 2,3 |
| <i>Urtica dioica</i> L. | Ap | AR | B,L | - | C | T,O,S | 1,2,3 |
| <i>Vaccinium myrtillus</i> L. | Ap | VP | L,N,P | 10.05 - 30.05 | D | O | 2 |
| <i>Vaccinium vitis-idaea</i> L. | Ap | VP | L,N,P | 10.05 - 30.05 | D | O | 2 |
| <i>Valeriana officinalis</i> L. | Ap | M-A | L | - | D | O,S | 1 |
| <i>Verbascum densiflorum</i> Bertol. | Ap | AR | L,B,P | 10.06 - 05.09 | D | O | 1 |
| <i>Verbascum lychnitis</i> L. | Ap | TG | P | 10.06 - 05.09 | R | T,O | 1,2 |
| <i>Verbascum nigrum</i> L. | Ap | EP | P | 05.07 - 10.08 | D | O | 1 |
| <i>Verbascum phlomoides</i> L. | Ap | AR | L,P | 10.06 - 05.09 | F | O | 1 |
| <i>Verbascum phoeniceum</i> L. | Ap | F-B | P | 20.05 - 30.06 | D | O,S | 1 |
| <i>Veronica officinalis</i> L. | Arch. | NC | L,N,P | 10.06 - 30.07 | D | O | 2,3 |
| <i>Viburnum opulus</i> L. | Ap | RP | L,N,P,B | 10.05 - 10.06 | D | O,S | 1,2 |
| <i>Vicia angustifolia</i> L. | Ap | SM | N,P | 10.05 - 15.08 | F | T,O | 1 |
| <i>Vicia cassubica</i> L. | Ap | Q-F | N,P | 20.06 - 20.07 | R | S | 2 |

| A | B | C | D | E | F | G | H |
|--|-------|-----|-------|---------------|---|-------|-------|
| <i>Vicia cracca</i> L. | Ap | M-A | N,P | 10.06 - 20.08 | C | T,O,S | 1,2 |
| <i>Vicia dumetorum</i> L. | Ap | TG | N,P | 05.06 - 20.08 | R | S | 2 |
| <i>Vicia grandiflora</i> Scop. | Ag | - | N,P | 10.05 - 20.06 | D | T,O | 1,2 |
| <i>Vicia hirsuta</i> (L.) S.F.Gray | Arch. | SM | N,P | 10.05 - 15.07 | F | T,O | 1,2 |
| <i>Vicia sativa</i> L. | Arch. | SM | N,P | 10.06 - 25.07 | D | O | 1 |
| <i>Vicia sepium</i> L. | Ap | TG | N,P | 10.05 - 30.07 | D | O,S | 1 |
| <i>Vicia sylvatica</i> L. | Ap | TG | N,P | 10.06 - 15.07 | R | O | 2 |
| <i>Vicia tenuifolia</i> Roth | Ap | SM | N,P | 10.06 - 15.07 | R | O,S | 2 |
| <i>Vicia tetrasperma</i> (L.) Schreb. | Arch. | SM | N,P | 10.05 - 15.08 | F | T,O | 1,2 |
| <i>Vicia villosa</i> Roth. | Arch. | SM | N,P | 10.06 - 15.07 | F | O,S | 1,2 |
| <i>Vinca minor</i> L. | Ap | - | L,N,P | 15.04 - 20.05 | R | O,S | 2 |
| <i>Vincetoxicum hirundinaria</i> Medik. | Ap | F-B | L | - | R | S | 2,3 |
| <i>Viola arvensis</i> Murray | Arch. | SM | N,P | 10.05 - 30.09 | C | T,O | 1,2,3 |
| <i>Viola canina</i> L. | Ap | NC | N,P | 10.05 - 10.06 | F | O | 2 |
| <i>Viola hirta</i> L. | Ap | TG | N,P | 10.04 - 20.05 | D | O | 2 |
| <i>Viola mirabilis</i> L. | Ap | - | N,P | 10.04 - 20.05 | R | O | 2 |
| <i>Viola odorata</i> L. | Ap | AR | L,N,P | 20.03 - 15.05 | D | O | 2 |
| <i>Viola reichenbachiana</i> Jord. ex Boreau | Ap | Q-F | N,P | 05.04 - 30.05 | F | O | 1,2 |
| <i>Viola riviniana</i> Rehb. | Ap | - | N,P | 10.04 - 20.05 | F | O | 1,2 |
| <i>Viola tricolor</i> L.s.s. | Ap | - | L,N,P | 20.05 - 15.09 | D | O | 1,2 |
| <i>Viscum album</i> L. | Ap | - | L | - | R | O | 1 |

Explanations: **A** species; **B** historical and geographical groups: Ap apophytes, Arch archaeophytes, Ep epecophytes, Ag agriophytes; **C** phytosociological unit: AG *Alnetea glutinosae*, AR *Artemisietea vulgaris*, AIR *Agropyretea intermedio repentis*, BA *Betulo Adenostyletea*, BAT *Bidentetea tripartiti*, EP *Epilobietea angustifolii*, F B *Festuco Brometea*, IN *Isoëto Nanojuncetea*, KG *Koelerio glaucae Corynephoretea canescentis*, M A *Molinio Arrhenatheretea*, NC *Nardo Callunetea*, Q F *Quercus Fagetea*, RP *Rhamno Prunetea*, SAL *Salicetea purpureae*, SCH *Scheuchzerio Carcetea nigrae*, SM *Stellarietea mediae*, TG *Trifolio Geranietea sanguinei*, VP *Vaccinio Piceetea*; **D** usage form: L medicinal species, B dye plants, N nectariferous, P polleniferous; **E** average time of blooming; F frequency*: R rare (1 10 stations), D in disperse (11 30), F frequent (31 50), C common (more than 51); **G** location of stations: T railway tracks, O their edges, S slopes of trenches and railway embankments; **H** degree of density: 1 single, 2 loose patches, 3 dense patches. * take into account 10 km squares.

both along operated railways and those completely or partly withdrawn from operation. The great majority of them are apophytes (284 species 76%) typical for phytocenoses from *Molinio-Arrhenatheretea*, *Artemisietea vulgaris*, *Stellarietea mediae*, *Festuco-Brometea*, *Quercus-Fagetea* classes (Fig. 2). Despite the anthropogenic habitats, alien species were mainly represented by archeophytes (45 species 12%), and less frequently by agriophytes (28 species 8%) and epecophytes (16 species 4%). Most of the analysed species occurred on trench and railway embankment slopes, where the soil is slightly modified or natural.

Herbaceous plants used in unconventional treatments or as raw materials by official pharmacology were represented by 162 taxons (43% of examined species). That proves the share of medicinal taxons both in natural and anthropogenic floristic objects.

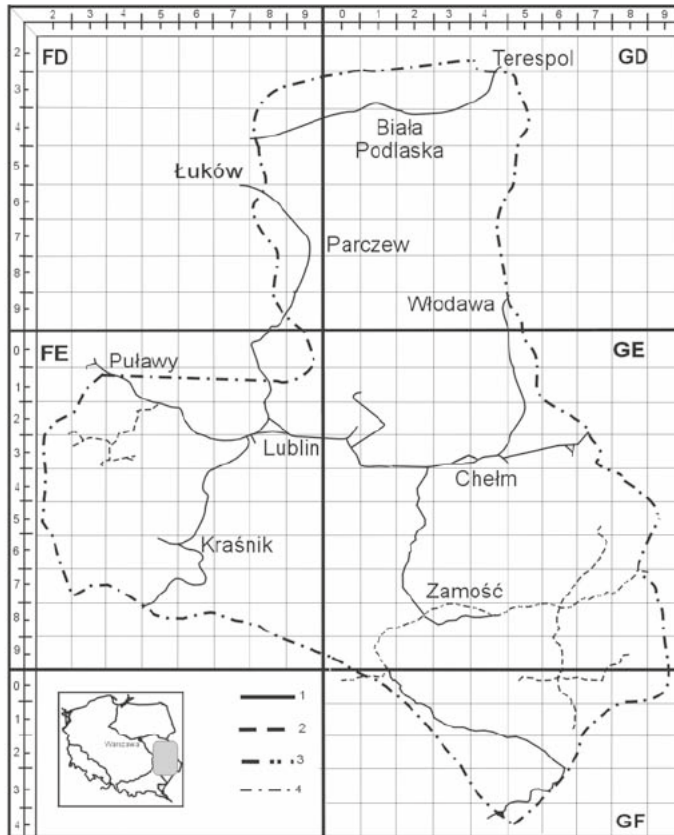


Fig. 1. Study area on the background of ATPOL net squares. 1 – normal, 2 – narrow, 3 – wide gauge railway lines, 4 – border of study area

The most numerous and least frequent, rated as common, were *Achillea millefolium*, *Aegopodium podagraria*, *Arctium tomentosum*, *Artemisia absinthium*, *A. vulgaris*, *Chamomilla recutita*, *Chelidonium majus*, *Daucus carota*, *Equisetum arvense*, *Hypericum perforatum*, *Pimpinella saxifraga*, *Plantago lanceolata*, *Polygonum aviculare*, *Rubus caesius*, *Rumex acetosa*, *Taraxacum officinale*.

By reason of increasing demand for pharmaceutical raw materials, there are possibilities to obtain the herbaceous taxons from habitats wherever railways are no longer operated. It mainly relates to a narrow gauge railway situated in Lublin and Volhynia Uplands, as well as the railway connecting Lublin with Łuków (Fig.1).

An interesting group was made up of species which provide pollinating entomofauna with nectar and pollen – the only source of protein. Especially valuable flow plants found in the studied area were taxons characterised by high density, such as *Astragalus cicer*, *Berteroa incana*, *Bunias orientalis*, *Cardaria draba*, *Cirsium arvense*, *Linaria vulgaris*, *Lathyrus sylvestris*, *Medicago falcata*, *M. sativa*, *Prunus spinosa*, *Rubus caesius*, *R. idaeus*.

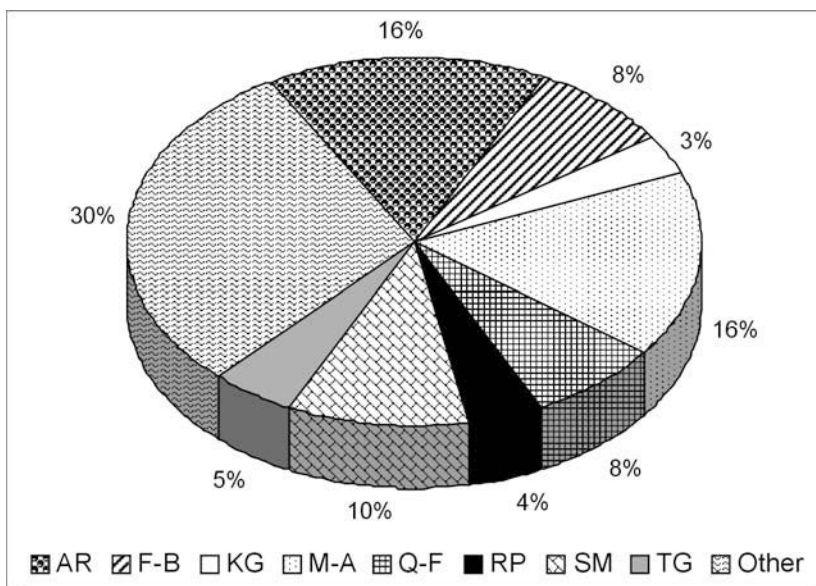


Fig. 2. Number of species in particular syntaxonomical units (explanations like in Tab. 1).

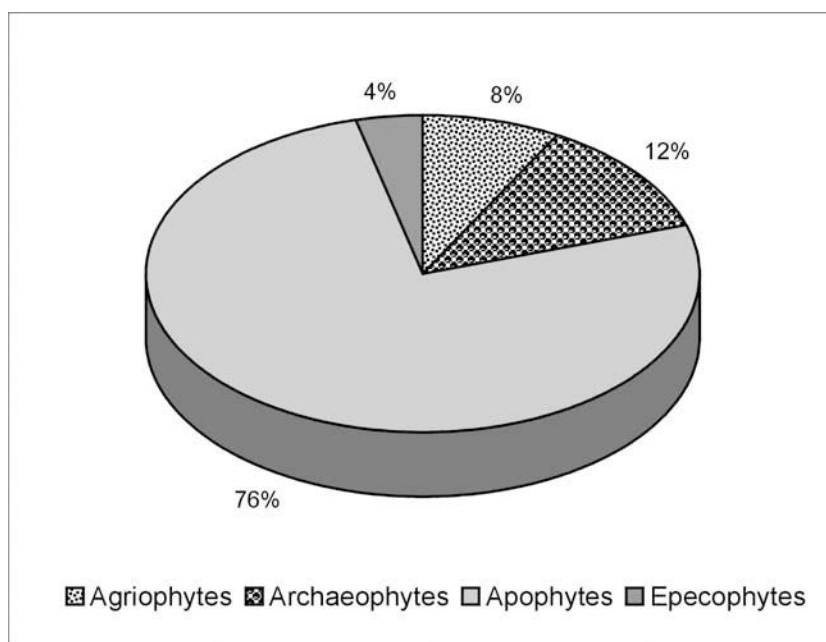


Fig. 3. Share of species in historical and geographical groups.

In the early spring, when the *Apoidea* food demand is very high, the *Lamium sp.*, *Salix sp.*, *Viola sp.* and *Anemone nemorosa* or *Tussilago farfara* were in bloom. Among the species which can provide the nectar and pollen in the time of flow gaps, recently common in many parts of Poland, were among others *Anchusa officinalis*, *Astragalus cicer*, *Berteroa incana*, *Lychnis flos-cuculi*, *Lycium barbarum*, *Polygonum bistorta*, *Reseda lutea*, *Sarothamnus scoparius*. Such taxons as *Helianthus tuberosus*, *Hieracium umbellatum*, and *Solidago gigantea*, *S. virgaurea*, blooming from the end of summer till autumn, are very precious, too. The abundance of these flows determines the survival rate of entomofauna during winter and strongly influences their ability for pollination every next spring. The most important feature of beekeeping value of plants is honey and pollen potential. It is worth to obtain species most intensely visited by insects for the detailed study of nectar and pollen abundance and select the most valuable for apiaries.

CONCLUSIONS

1. The spontaneous flora of railway areas of central-eastern part of Poland comprises 376 usable species (78 - dye plants, 162 medicinal, 324 nectariferous or polleniferous).

2. The majority of taxons are distributed in disperse (128 species 34%) or occur rarely (96 species 26%). The common or frequent species constitute 40% of usable flora of the studied area.

3. Medicinal and melliferous plants occur most frequently on slopes of trenches and railway embankments in nearly natural habitats and create loose or dense patches.

4. Nectariferous and polleniferous taxons provide *Apoidea* with food from the early spring to the late summer.

5. The floristic diversity of the usable taxons makes it possible to utilize the resources mainly from railway habitats along railways which have been withdrawn from operation. It is highly reasonable to protect natural gene richness of medical and flow plants.

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Rośliny użytkowe we florze spontanicznej terenów kolejowych środkowowschodniej Polski

Streszczenie

Szeroki wachlarz warunków ekologicznych występujących na siedliskach antropogenicznych umożliwia wnikanie i rozprzestrzenianie się gatunków mających duże znaczenie użytkowe. We florze spontanicznej terenów kolejowych środkowowschodniej Polski odnotowano dotychczas 950 gatunków roślin naczyniowych i wyodrębniono wśród nich 373 gatunki użytkowe (78 rośliny barwierskie, 162 lecznicze, 324 pożytkowe). Większość z nich występuje w rozproszeniu (128 34 %) bądź rzadko (96 26 %). Taksony pospolite i częste stanowią 40% analizowanej flory. Rośliny lecznicze i miódodajne lokalizują się najczęściej na zboczach wkopów i nasypów kolejowych, gdzie siedliska są słabo przekształcone. Występują pojedynczo lub w luźnym zwarciu, rzadko tworzą zwarte płyty. Analiza ich statusu geograficznego potwierdziła zdecydowaną przewagę gatunków rodzimych (apofitów) nad nowymi przybyszami (antropofitami). Pod względem synekologicznym reprezentują one głównie zbiorowiska z klasy *Molinio-Arrhenatheretea*, *Artemisietea vulgaris*, *Stellarietea mediae*, *Festuco-Brometea*, *Quercu-Fagetea*. Różnorodność gatunkowa roślin użytkowych daje możliwość wykorzystania ich zasobów na odcinkach wyłączonych z eksploatacji oraz zabezpieczenia żywych zasobów populacyjnych roślin leczniczych i pożytkowych.