

## ORIGINAL PAPER

## FLORA FROM FĂRĂGĂU AREA (MUREȘ COUNTY) AS POTENTIAL SOURCE OF MEDICINAL PLANTS

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**Abstract** The aim of this study was to identify a potential source of medicinal plant from Transylvanian Plain. Also, the paper provides information about the hayfields floral richness, a great scientific value for Romania and Europe. The study of the flora was carried out in several stages: 2005-2008, 2013, 2017-2018. In the studied area, 397 taxa were identified, distributed in 82 families with therapeutic potential, represented by 164 medical taxa, 37 of them being in the European Pharmacopoeia 8.5. The study reveals that most plants contain: volatile oils (13.41%), tannins (12.19%), flavonoids (9.75%), mucilages (8.53%) etc. This plants can be used in the treatment of various human disorders: disorders of the digestive system, respiratory system, skin disorders, muscular and skeletal systems, genitourinary system, in gynaecological disorders, cardiovascular, and central nervous sistem disorders. In the study plants protected by law at European and national level were identified: *Echium maculatum*, *Cephalaria radiata*, *Crambe tataria*, *Narcissus poeticus* ssp. *radiiflorus*, *Salvia nutans*, *Iris aphylla*, *Orchis morio*, *Orchis tridentata*, *Adonis vernalis*, *Dictamnus albus*, *Hammarbya paludosa* etc.

**Keywords:** Fărăgău, medicinal plants, human disease, Mureș County

## 1. Introduction

Fărăgău is one of the most attractive places in the Transylvanian Plain, a region widespread, with hills, valleys dug in the creeks, marshes and sarmatic sands, with eroded flanks and muddy streams, landslides that have sometimes battered the rivers, forming lakes. In Fărăgău, floristic and geobotanic investigations were carried out in order to declare the protected area "Lacurile Fărăgău - Glodeni" (ROSCI0100, Longitude 24.580755, Latitude 46.678636 and 244.8000 ha area) (**Fig. 1**). This protected area is considered by specialists to be the last natural lake in Transylvania (Cernei, 1995). The area

has a conservative interest due to its good representation both in terms of quality and quantity of habitat and flora species protected by national law and U.E Directives. In Flora României, vol. I-XIII, in Fărăgău only 17 species were cited (Săvulescu, 1952-1976). Here it is recorded for the first time in literature, *Trifolium ambiguum* Bieb. We mention that since its reporting in Flora R.P.R. vol. V (Săvulescu, 1957), there is no data on its presence. The main objective of this study was the inventory of vascular spontaneous flora, especially the medicinal one, and its complex

analysis. The paper presents the results of the researches carried out during 2005-2018.



**Fig. 1.** Lake Fărăgău

## 2. Materials and Methods

The inventory of vascular flora was based on information from botanical literature and field research. In general, the taxonomic concept of "Flora Europaea" (Tutin, 1991; Tutin et al., 1964-1980) was respected. The botanical nomenclature used complies with the rules of the "International Code of Botanical Nomenclature" (Code de Melbourne 2012) and the book of Sârbu I. et al. 2013. In the floral inventory, the adopted classification system was updated according to the most recent publications (Cristea, 2014; Oroian, 2000; Sârbu et al., 2013). Within each family, the genera have been put in alphabetical order, as well as the species.

The medicinal plants were grouped according to the dominant active principles for which they are used in traditional medicine, respectively in phytotherapy, adopting the grouping of plants after Eșianu and Laczkó (2016) as well as the most recent specialized publications (Istudor, 1998, 2001, 2005; Stănescu et al., 2002, 2004).

The identification and classification of the protected plants were made on the basis of the specialty literature (Bilz et al., 2011; Boșcaiu et

al., 1994; Mihăilescu et al., 2015; Oltean et al., 1994). All figures from this paper represent original photos.

## 3. Results and discussions

### 3.1 List of taxa identified

The floristic inventory includes 397 taxa, distributed in 82 families. The most representative families are: Asteraceae (52 taxa), Fabaceae (34 taxa), Lamiaceae (35 taxa), Poaceae (25 taxa), Scrophulariaceae (16 taxa), Apiaceae (17 taxa), Ranunculaceae (14 taxa).

The following taxa are identified: Equisetaceae: *Equisetum arvense*, *Equisetum maximum*; Dryopteridaceae: *Dryopteris filix-mas*, *Thelypteris palustris*; Pinaceae: *Picea abies*; Aristolochiaceae: *Asarum europaeum*, *Aristolochia clematitis*; Ranunculaceae: *Aconitum anthora*, *Adonis aestivalis*, *Adonis vernalis*, *Anemone nemorosa* L. subsp. *nemorosa*, *Anemone ranunculoides*, *Caltha palustris* L. subsp. *laeta*, *Consolida regalis*, *Helleborus purpurascens*, *Ranunculus acris*, *Ranunculus ficaria* subsp. *ficaria*, *Ranunculus polyanthemus*, *Ranunculus repens*, *Ranunculus sceleratus*, *Thalictrum minus*; Papaveraceae: *Chelidonium majus*, *Papaver rhoeas*; Caryophyllaceae: *Cerastium holosteoides*, *Dianthus armeria*, *Dianthus carthusianorum*, *Silene italica* subsp. *nemoralis*, *Silene latifolia*, *Silene otites*, *Silene vulgaris*, *Stellaria graminea*, *Stellaria holostea*; Chenopodiaceae: *Chenopodium album*, *Chenopodium hybridum*; Amaranthaceae: *Amaranthus retroflexus*; Polygonaceae: *Fallopia convolvulus*, *Reynoutria sachalinensis*, *Polygonum amphibium*, *Polygonum aviculare*, *Rumex acetosa*, *Rumex acetosella*, *Rumex crispus*, *Rumex sanguineus*; Betulaceae: *Carpinus betulus*, *Corylus avellana*; Moraceae: *Morus alba* (subspontan); Cannabaceae: *Humulus lupulus*; Urticaceae: *Urtica dioica*; Fagaceae: *Quercus robur*; Juglandaceae: *Juglans regia*;

Crassulaceae: *Sedum maximum*; Parnassiaceae: *Parnassia palustris*; Rosaceae: *Agrimonia eupatoria*, *Crataegus monogyna*, *Filipendula ulmaria*, *Filipendula vulgaris*, *Fragaria vesca*, *Fragaria viridis*, *Geum urbanum*, *Malus sylvestris*, *Potentilla anserina*, *Potentilla argentea*, *Potentilla arenaria*, *Potentilla recta*, *Prunus avium*, *Prunus spinosa*, *Prunus tenella*, *Pyrus pyraster*, *Rosa canina*, *Rosa gallica*, *Rubus caesius*, *Sanguisorba minor*; Fabaceae: \**Amorpha fruticosa*, *Anthyllis vulneraria*, *Astragalus austriacus*, *Astragalus glycyphyllos*, *Astragalus monspensulanus*, *Chamaecytisus albus*, *Chamaecytisus hirsutus*, *Cytisus leucotrichus*, *Chamaespartium sagittale*, *Coronilla varia*, *Dorycnium pentaphyllum* subsp. *herbaceum*, *Genista tinctoria* subsp. *tinctoria*, *Lathyrus palustris*, *Lathyrus tuberosus*, *Lotus corniculatus*, *Medicago falcata*, *Medicago lupulina*, *Medicago minima*, *Medicago sativa*, *Melilotus albus*, *Melilotus officinalis*, *Onobrychis viciifolia*, *Ononis arvensis*, *Robinia pseudacacia*, *Tetragonolobus maritimus* subsp. *siliquosum*, *Trifolium ambiguum*, *Trifolium arvense* subsp. *arvense*, *Trifolium campestre*, *Trifolium hybridum*, *Trifolium montanum*, *Trifolium pratense*, *Trifolium repens*, *Trifolium pannonicum*, *Vicia cracca*, *Vicia sepium*; Onagraceae: *Epilobium hirsutum*, *Epilobium palustre*, *Oenothera biennis*; Lythraceae: *Lythrum salicaria*; Haloragaceae: *Myriophyllum spicatum*; Aceraceae: *Acer campestre*, *Acer tataricum*; Rutaceae: *Dictamnus albus*; Oxalidaceae: *Oxalis corniculata*; Linaceae: *Linum catharticum*, *Linum flavum*, *Linum hirsutum*, *Linum perenne*; Geraniaceae: *Geranium palustre*, *Geranium pratense*; Polygalaceae: *Polygala comosa*, *Polygala major*; Celastraceae: *Euonymus europaeus*; Rhamnaceae: *Frangula alnus*; Euphorbiaceae: *Euphorbia cyparissias*; Elaeagnaceae: *Hippophaë rhamnoides*; Araliaceae: *Hedera helix*; Apiaceae: *Bupleurum falcatum*, *Carum carvi*, *Conium maculatum*, *Daucus carota* subsp. *carota*, *Eryngium campestre*, *Eryngium planum*, *Falcaria vulgaris*, *Ferulago sylvatica*, *Heracleum sphondylium* subsp. *sphondylium*, *Laser trilobum*, *Oenanthe aquatica*, *Oenanthe silaifolia*, *Pastinaca sativa* subsp. *urens*, *Peucedanum cervaria*, *Peucedanum oreoselinum*, *Pimpinella saxifraga*, *Sanicula europaea*, *Sium latifolium*; Hypericaceae: *Hypericum perforatum*; Cistaceae: *Helianthemum nummularium* subsp. *nummularium*; Brassicaceae: *Armoracia rusticana*, *Brassica elongata*, *Capsella bursa-pastoris*, *Crambe tataria*, *Erophila verna*, *Erysimum odoratum*, *Lepidium campestre*, *Raphanus raphanistrum*, *Rorippa amphibia*, *Rorippa pyrenaica*, *Sinapis arvensis*; Salicaceae: *Populus nigra*, *Populus tremula*, *Salix alba*, *Salix caprea*, *Salix cinerea*; Tiliaceae: *Tilia cordata*; Malvaceae: *Hibiscus trionum*, *Lavatera thuringiaca*, *Malva sylvestris*; Cornaceae: *Cornus sanguinea*; Santalaceae: *Thesium linophyllum*; Primulaceae: *Anagallis arvensis*, *Anagallis foemina*, *Lysimachia nummularia*, *Lysimachia vulgaris*, *Primula veris*; Gentianaceae: *Centaurium erythraea* (**Fig. 2**), *Gentiana cruciata* (**Fig. 3**); Apocynaceae: *Vinca herbacea*, *Vinca minor*; Asclepiadaceae: *Vincetoxicum hirundinaria*; Rubiaceae: *Asperula cynanchica*, *Cruciata glabra*, *Cruciata laevipes*, *Galium album*, *Galium aparine*, *Galium mollugo*, *Galium odoratum*, *Galium rivale*, *Galium rubioides*, *Galium uliginosum*, *Galium verum*; Oleaceae: *Ligustrum vulgare*; Caprifoliaceae: *Sambucus ebulus*, *Sambucus nigra*, *Viburnum opulus*; Valerianaceae: *Valeriana officinalis* subsp. *officinalis*; Dipsacaceae: *Cephalaria radiata*, *Dispacus fullonum*, *Dipsacus laciniatus*, *Knautia arvensis*, *Scabiosa ochroleuca*; Convolvulaceae: *Calystegia sepium*, *Convolvulus arvensis*; Cuscutaceae: *Cuscuta epithimum*, *Cuscuta europaea*; Solanaceae:

*Datura stramonium*, *Physalis alkekengi* (**Fig. 4**), *Solanum dulcamara*, *Solanum nigrum*; Boraginaceae: *Anchusa officinalis*, *Cerithe minor* subsp. *minor*, *Echium russicum*, *Echium vulgare*, *Myosotis scorpioides*, *Nonea pulla*, *Pulmonaria officinalis* subsp. *officinalis*, *Symphytum officinale*; Scrophulariaceae: *Digitalis grandiflora*, *Euphrasia rostkoviana*, *Euphrasia stricta*, *Linaria vulgaris*, *Melampyrum arvense*, *Melampyrum barbatum*, *Melampyrum bihariense*, *Melampyrum cristatum*, *Odontites verna* subsp. *verna*, *Rhinanthus rumelicus*, *Verbascum chaixii* subsp. *austriacum*, *Verbascum lychnitis*, *Veronica beccabunga*, *Veronica chamaedrys*, *Veronica orchidea*, *Veronica teucrium*; Orobanchaceae: *Orobanche alba*, *Orobanche lutea*; Plantaginaceae: *Plantago lanceolata*, *Plantago major*, *Plantago media*; Verbenaceae: *Verbena officinalis*; Lamiaceae: *Acinos arvensis*, *Ajuga chamaepitys*, *Ajuga genevensis*, *Ajuga laxmani*, *Ajuga reptans*, *Ajuga salicifolia*, *Clinopodium vulgare*, *Galeopsis speciosa*, *Galeopsis x tetrahit*, *Lamium album*, *Lamium purpureum*, *Leonurus cardiaca*, *Lycopus europaeus*, *Mentha arvensis*, *Mentha longifolia*, *Mentha x verticillata*, *Nepeta nuda* (*Nepeta pannonica*), *Origanum vulgare*, *Phlomis tuberosum* (**Fig. 5**), *Prunella grandiflora* (**Fig. 6**), *Prunella laciniata*, *Prunella vulgaris* (**Fig. 7**), *Salvia austriaca*, *Salvia nemorosa*, *Salvia nutans*, *Salvia pratensis*, *Salvia transsilvanica*, *Salvia verticillata*, *Scutellaria galericulata*, *Stachys germanica*, *Stachys officinalis*, *Stachys recta*, *Teucrium chamaedrys*, *Thymus glabrescens*, *Thymus pannonicus*, *Thymus pulegioides*; Campanulaceae: *Asyneuma canescens*, *Campanula bononiensis*, *Campanula glomerata*, *Campanula persicifolia*, *Campanula rapunculoides*, *Campanula sibirica*; Asteraceae: *Achillea millefolium*, *Achillea setacea*, *Anthemis tinctoria*, *Arctium lappa*, *Artemisia absinthium*, *Artemisia*

*campestris* subsp. *campestris*, *Artemisia pontica*, *Artemisia vulgaris*, *Aster linosyris*, *Bellis perennis*, *Bidens cernua*, *Bidens tripartita*, *Carduus acanthoides*, *Carlina vulgaris*, *Centaurea apiculata* subsp. *spinulosa*, *Centaurea biebersteinii*, *Centaurea cyanus*, *Centaurea rhenana*, *Cichorium intybus*, *Cirsium arvense*, *Cirsium canum*, *Conyza canadensis*, *Crepis biennis*, *Echinops sphaerocephalus*, *Erigeron acris*, *Eupatorium cannabinum*, *Galinsoga parviflora*, *Pilosella officinarum*, *Hieracium bauhini*, *Hieracium x sulphureum*, *Hypochoeris maculata*, *Hypochoeris radicata*, *Inula britannica*, *Inula ensifolia*, *Inula hirta*, *Jurinea mollis*, *Leontodon hispidus* subsp. *hispidus*, *Leucanthemum vulgare*, *Matricaria perforata*, *Matricaria recutita*, *Mycelis muralis*, *Scorzonera purpurea*, *Senecio jacobaea*, *Senecio paludosus*, *Sonchus arvensis*, *Sonchus palustris*, *Tanacetum vulgare*, *Taraxacum officinale*, *Tragopogon pratensis* subsp. *orientalis*, *Tussilago farfara*, *Xanthium strumarium*; Butomaceae: *Butomus umbellatus*; Alismataceae: *Alisma plantago-aquatica*; Juncaginaceae: *Triglochin palustre*; Najadaceae: *Najas marina*; Potamogetonaceae: *Potamogeton natans*; Alliaceae: *Allium albidum* subsp. *albidum*, *Allium paniculatum*, *Allium scorodoprasum* subsp. *scorodoprasum*; Amaryllidaceae: *Galanthus nivalis*, *Narcissus poeticus* ssp. *radiiflorus*; Iridaceae: *Iris aphylla*, *Iris pseudacorus*, *Iris ruthenica*; Liliaceae: *Anthericum ramosum*, *Asparagus officinalis*, *Convallaria majalis*, *Erythronium dens-canis*, *Muscari comosum*, *Muscari tenuiflorum*, *Ornithogalum pyramidale*, *Polygonatum latifolium*, *Polygonatum multiflorum*, *Polygonatum odoratum*, *Veratrum nigrum* (**Fig. 8**); Orchidaceae: *Epipactis palustris*; Hammarbya *paludosa*, *Orchis morio*, *Orchis tridentata* ssp. *tridentata*; Juncaceae: *Juncus conglomeratus*, *Juncus effusus*, *Juncus tenuis*, *Luzula campestris*; Cyperaceae: *Carex*

*caryophylla*, *Carex paniculata*, *Carex vulpina*, *Cyperus flavescens*, *Scirpus sylvaticus*; Typhaceae: *Typha angustifolia*, *Typha latifolia*; Poaceae: *Agrostis capillaris*, *Agrostis stolonifera*, *Alopecurus aequalis*, *Alopecurus pratensis*, *Anthoxanthum odoratum*, *Arrhenatherum elatius*, *Brachypodium pinnatum*, *Briza media*, *Bromus erectus* subsp. *erectus*, *Calamagrostis epigejos*, *Chrysopogon gryllus*, *Cynosurus cristatus*, *Dactylis glomerata* subsp. *glomerata*, *Deschampsia caespitosa*, *Echinochloa crus-galli*, *Festuca rupicola* subsp. *rupicola* f. *hirsuta*, *Festuca valesiaca*, *Glyceria maxima*, *Holcus lanatus*, *Lolium perenne*, *Phragmites australis*, *Poa palustris*, *Phleum phleoides*, *Setaria viridis*, *Stipa tirsia* (S. *stenophylla*), *Trisetum flavescens*, Lemnaceae: *Lemna minor*.

### 3.2 Medicinal plants identified in Fărăgău area and their uses in human disease

Of the 397 taxa identified 164 species are medicinal. Thus, it was observed that most plants contain: volatile oils (13.41%), tannins (12.19%), flavonoids (9.75%), mucilages (8.53%), coumarins (7.92%), saponins (7.31%), alkaloids (6.70%), iridoids (5.48%), phenolic glycosides (4.87%), organic acids, vitamins and provitamins 2.43%), anthraquinone derivatives (1.21%), cardiotonic glycosides (3.65%), bitter principles (2.43%), bitter-aromatic principles (4.26%), homoglycans, senevoline glycosides, deposite, fatty oils, allantoin, resins, sulfurized compounds and floroglucines (0.60% each). Thus, we mention medicinal herbs that contain these principles: homoglycans: *Arctium lappa* (radix); mucilage: *Hibiscus trionum* (herba), *Lavathera thuringiaca* (radix), *Malva sylvestris* (flos et folium), *Orchis morio*, *O. tridentata* (tuber), *Plantago* sp. (folium), *Tussilago farfara* (folium), *Verbascum* sp. (flos); **senevolic glycosides**: *Raphanus raphanistrum*

(radix); **phenolic glycosides**: *Filipendula ulmaria* (flos), *Populus* sp. (gemma), *Pyrus pyrastrer* (folium), *Salix* sp. (cortex), *Viburnum opulus* (cortex); **anthraquinone derivatives**: *Frangula alnus* (cortex), *Rumex crispus* (rhizoma); **naphthodianthrones**: *Hypericum perforatum* (herba); **cardiac glycosides**: *Convallaria majalis* (herba), *Digitalis grandiflora* (folium), *Erysimum odoratum* (herba), *Euonymus europaea* (cortex), *Helleborus purpurascens* (rhizoma et radix), *Leonurus cardiaca* (herba); **saponins**: *Anagallis* sp. (herba), *Bellis perennis* (flos), *Eryngium* sp. (herba), *Equisetum arvense* (herba), *Hedera helix* (herba), *Ononis arvensis* (radix), *Polygala* sp. (herba), *Primula veris* (rhizoma cum radicibus), *Ranunculus ficaria* (radix); **flavonoids**: *Bidens* sp. (herba), *Capsella bursa-pastoris* (herba), *Crataegus monogyna* (folium, fructus et flos), *Eupatorium cannabinum* (rhizoma et radix), *Filipendula ulmaria* (herba), *Linaria vulgaris* (herba), *Morus alba* (folium), *Pilosella officinarum* (herba), *Polygonum aviculare* (herba), *Prunus avium* (stipites), *Robinia pseudacacia* (flos), *Sambucus nigra* (flos), *Veronica* sp. (herba), *Vincetoxicum hirsutinaria* (radix); **anthocyanins**: *Centaurea cyanus* (flos), *Consolida regalis* (flos), *Papaver rhoeas* (flos), *Rosa gallica* (flos); **coumarins**: *Cruciata* sp. (herba), *Galium* sp. (herba), *Heracleum sphondylium* (radix, folium et fructus), *Medicago* sp. (herba), *Melilotus officinalis* (flos et herba), *Pastinaca sativa* (radix), *Pimpinella saxifraga* (radix); **tannins**: *Agrimonia eupatoria* (herba), *Anthyllis vulneraria* (flos), *Cornus sanguinea* (cortex), *Corylus avellana* (folium), *Epilobium hirsutum* (herba), *Erigeron acris* (summitates), *Fragaria vesca* (folium), *Geum urbanum* (rhizoma), *Juglans regia* (folium), *Lysimachia* sp. (herba), *Lythrum salicaria* (herba), *Polygonum aviculare* (herba), *Potentilla anserina* (herba), *P. argentea*, *P. recta* (rhizoma), *Prunus spinosa* (flos, fructus),

*Quercus robur* (cortex), *Salix* sp. (cortex); **depsides**: *Cichorium intybus* (herba et radix); **fatty oils**: *Oenothera biennis* (semen); **essential oils**: *Achillea millefolium* (flos), *Asarum europaeum* (rhizoma), *Carum carvi* (fructus), *Iris* sp. (rhizoma), *Matricaria recutita* (flos), *Mentha* sp. (folium), *Nepeta nuda* (summitates), *Origanum vulgare* (herba), *Peucedanum oreoselinum* (rhizoma), *Pimpinella saxifraga* (radix), *Thymus* sp. (herba), *Tilia cordata* (flos), *Valeriana officinalis* (radix), *Xanthium strumarium* (herba); **allantoin**: *Symphytum officinale* (radix); **resins**: *Humulus lupulus* (strobuli); **glycoresins**: *Calystegia sepium* (herba), *Convolvulus arvensis* (herba); **sulfur compounds**: *Armoracia rusticana* (radix); **iridoids**: *Ajuga* sp. (herba), *Euphrasia* sp. (herba), *Lamium album* (herba), *Sambucus ebulus* (radix, flos, fructus), *Stachys* sp. (herba), *Verbena officinalis* (herba); **alkaloids**: *Aconitum anthora* (tuber), *Chelidonium majus* (herba), *Conium maculatum* (fructus), *Datura stramonium* (folium), *Echium vulgare* (herba), *Galanthus nivalis* (bulbus), *Genista tinctoria* (herba), *Solanum dulcamara* (stipes), *Thalictrum minus* (herba), *Vinca* sp. (herba); **bitter compounds**: *Centaurium erythraea* (herba), *Euphorbia cyparissias* (herba), *Gentiana cruciata* (radix), *Taraxacum officinale* (radix et herba); **bitter-aromatic compounds**: *Artemisia* sp. (herba), *Teucrium chamaedrys* (herba), *Tanacetum corymbosum* (flos), *T. vulgare* (herba); **floroglucine**: *Dryopteris filix-mas* (rhizoma); **organic acids, vitamins and provitamins**: *Daucus carota* (radix), *Hippophae rhamnoides* (fructus), *Physalis alkekengi* (fructus), *Rosa canina* (fructus), *Urtica dioica* (fructus).

Of the 164 medicinal species included in the floral inventory, 37 species supply plant products included in the Romanian Pharmacopoeia and European Pharmacopoeia, the 8<sup>th</sup> edition: *Achillea millefolium*, *Oenothera*

*biennis*, *Agrimonia eupatoria*, *Origanum vulgare*, *Artemisia absinthium*, *Papaver rhoeas*, *Carum carvi*, *Plantago lanceolata*, *Centaurium erythraea*, *Polygonum multiflorum*, *Chelidonium majus*, *Polygonum aviculare*, *Crataegus monogyna*, *Primula veris*, *Datura stramonium*, *Prunella vulgaris*, *Equisetum arvense*, *Quercus robur*, *Filipendula ulmaria*, *Robinia psudacacia*, *Frangula alnus*, *Rosa canina*, *Hedera helix*, *Salix* sp., *Humulus lupulus*, *Sambucus nigra*, *Hypericum perforatum*, *Taraxacum officinale*, *Leonurus cardiaca*, *Tilia cordata*, *Lythrum salicaria*, *Valeriana officinalis*, *Malva sylvestris*, *Verbena officinalis*, *Matricaria recutita*, *Urtica dioica*, *Melilotus officinalis*.

Even if only partial, the data on Romania's medicinal flora clearly reveals two fundamental features of it, namely: a great taxonomic diversity and an exceptional therapeutic potential. Flora from Fărăgău area can be an important source of active ingredients for achieving herbal extracts used in various diseases. The most numerous herbs are used in disorders of the digestive system (27 taxa), respiratory system (15 taxa), skin disorders (9 taxa), muscular and skeletal systems (11 taxa), genitourinary system (9 taxa), in gynaecological disorders (4 taxa), cardiovascular (3 taxa), CNS disorders (4 taxa) (**Table 1**). The paper highlights the importance of herbs that can be used as remedies for human diseases. The medicinal plants generally have significant less adverse effects compared with synthesized substances and also people have a better tolerance to these plants than synthetic drugs.

### 3.3 Protected plants in Fărăgău area

The special interest manifested today in the world for natural medicine, where phytotherapy occupies a privileged place, can sometimes have negative repercussions for the

**Table 1.** Medicinal plant used in various disorders

<b>Phytotherapy for human disease</b>	<b>Disorders of various systems</b>	<b>Taxa</b>
<b>Phytotherapy for digestive system disorders</b>	Phytotherapy of mouth <ul style="list-style-type: none"> <li>▪ gingivitis</li> <li>▪ stomatitis</li> <li>▪ periodontitis</li> <li>▪ dental abscesses</li> <li>▪ tonsillitis</li> </ul>	<i>Achillea millefolium</i> , <i>Agrimonia eupatoria</i> , <i>Centaurium erythraea</i> , <i>Geum urbanum</i> , <i>Lysimachia nummularia</i> , <i>Lythrum salicaria</i> , <i>Matricaria chamomilla</i> , <i>Potentilla sp.</i> , <i>Quercus robur</i> , <i>Thymus sp.</i>
	Hyperacid gastritis and ulcer disease	<i>Equisetum arvense</i> , <i>Hypericum perforatum</i> , <i>Medicago sativa</i> , <i>Melilotus officinalis</i> , <i>Symphytum officinale</i>
	Gastric hypoacidity - dyspepsia, anorexia	<i>Artemisia vulgaris</i> , <i>Centaurium erythraea</i> , <i>Gentiana cruciata</i>
	Acute and chronic liver disease	<i>Achillea millefolium</i> , <i>Hypericum perforatum</i> , <i>Taraxacum officinalis</i> ;
	Functional disorders of the gallbladder and biliary tract	<i>Achillea millefolium</i> , <i>Agrimonia eupatoria</i> , <i>Cichorium intybus</i> , <i>Eupatorium cannabinum</i> , <i>Hypericum perforatum</i> , <i>Mentha longifolia</i> , <i>Pastinaca sativa</i> , <i>Taraxacum officinale</i>
	Phytotherapy in constipation	<i>Cichorium intybus</i> , <i>Convolvulus arvense</i> , <i>Rumex sp.</i>
	Phytotherapy in diarrhea	<i>Agrimonia eupatoria</i> , <i>Geum urbanum</i> , <i>Lythrum salicaria</i> , <i>Potentilla anserina</i> , <i>Quercus robur</i> , <i>Rosa canina</i>
	Vomiting - nausea	<i>Mentha longifolia</i>
	Abdominal colic	<i>Achillea millefolium</i> , <i>Matricaria chamomilla</i> , <i>Mentha longifolia</i> , <i>Potentilla anserine</i> , <i>Salix sp.</i>
	Flatulence (bloating)	<i>Carum carvi</i> , <i>Mentha longifolia</i>
	Helminthiasis - anthelmintic plant	<i>Achillea millefolium</i> , <i>Dryopteris filix-mas</i> , <i>Gentiana cruciata</i> , <i>Rosa canina</i> , <i>Tanacetum vulgare</i> , <i>Thymus sp.</i>
<b>Phytotherapy for cardiovascular system disorders</b>	Hearth failure	<i>Digitalis grandiflora</i>
	Cardiac neurosis	<i>Convallaria majalis</i> , <i>Crataegus monogyna</i>
	Angina pectoris	<i>Crataegus monogyna</i>
<b>Phytotherapy for respiratory system disorders</b>	Immuno-stimulatory plant	<i>Achillea millefolium</i> , <i>Equisetum arvense</i> , <i>Hypericum perforatum</i> , <i>Rosa canina</i>
	Central and peripheral antitussives	<i>Datura stramonium</i> , <i>Plantago sp.</i> , <i>Thymus sp.</i> , <i>Tussilago farfara</i> , <i>Verbascum lychnitis</i>
	Expectorant	<i>Eryngium planum</i> , <i>Hedera helix</i> , <i>Primula veris</i> , <i>Picea abies</i>
	Asthma	<i>Ajuga reptans</i> , <i>Datura stramonium</i> , <i>Origanum vulgare</i> , <i>Thymus sp.</i>
<b>Phytotherapy for genitourinary system disorders</b>	Diuretic / acvaretice	<i>Equisetum arvense</i> , <i>Hibiscus trionum</i> , <i>Lamium album</i> , <i>Ononis arvensis</i> , <i>Polygonum aviculare</i> , <i>Prunus avium</i> , <i>Taraxacum officinale</i> , <i>Urtica dioica</i>
	Urolithiasis	<i>Equisetum arvense</i> , <i>Rosa canina</i> , <i>Urtica dioica</i>

<b>Phytotherapy for gynecological disorders</b>	Menopausal Disorders	<i>Genista tinctoria</i> , <i>Medicago</i> sp.
	Dysmenorrhea	<i>Achillea millefolium</i> , <i>Artemisia vulgaris</i>
<b>Phytotherapy for skin disorders</b>	Acne	<i>Taraxacum officinale</i>
	Eczema	<i>Achillea millefolium</i> , <i>Taraxacum officinale</i>
	Dermatomycosis	<i>Achillea millefolium</i> , <i>Populus</i> sp., <i>Thymus</i> sp.
	Alopecia (hair loss)	<i>Urtica dioica</i>
	Wounds	<i>Equisetum arvense</i> , <i>Hypericum perforatum</i> , <i>Rosa canina</i> , <i>Populus</i> sp., <i>Plantago</i> sp., <i>Symphytum officinale</i>
	Light burns	<i>Hypericum</i> sp., <i>Populus</i> sp.
	Bruises	<i>Achillea millefolium</i> , <i>Symphytum officinale</i>
<b>Phytotherapy for locomotory system disorders</b>	Plant products with anti-inflammatory / analgesic anti-rheumatic and hyperemic action	<i>Filipendula ulmaria</i> , <i>Helleborus purpurascens</i> , <i>Hypericum perforatum</i> , <i>Rosa canina</i> , <i>Medicago sativa</i> , <i>Mentha longifolia</i> , <i>Picea abies</i> , <i>Salix alba</i> , <i>Taraxacum officinale</i> , <i>Urtica dioica</i>
<b>Phytotherapy for CNS system disorders</b>	Sleep disturbances; Nervousness. depression	<i>Humulus lupulus</i> , <i>Hypericum</i> sp., <i>Valeriana officinalis</i> , <i>Viburnum opulus</i>

conservation of some plant species in the spontaneous flora. This can happen in cases where the species vegetates in a restricted area and the natural regeneration capacity is low. As a result of this study, we bring novel information about floristic richness of hayfields, an invaluable scientific value for the Romania and Europe. In the follow we present some plants protected by law at European and national level: *Echium maculatum* (**Fig. 9**), *Cephalaria radiata* (**Fig. 10**), *Crambe tatarica* (**Fig. 11**), *Narcissus poeticus* ssp. *radiiflorus* (**Fig. 12**), *Salvia nutans* (**Fig. 13**), *Iris aphylla*, *Orchis morio* (**Fig. 14**), *Orchis tridentata*, *Adonis vernalis* (**Fig. 15**), *Dictamnus albus* (**Fig. 16**), *Hammarbya paludosa* etc.

## Conclusions

The work highlights the importance of medicinal plants in the Fărăgău area, which can be used as remedies for human diseases. The florist inventory includes 397 plant species, distributed in 82 families. The most represented

are the families: Asteraceae (52 taxa), Fabaceae (34 taxa), Lamiaceae (35 taxa), Poaceae (25 taxa), Scrophulariaceae (16 taxa), Apiaceae (17 taxa), Ranunculaceae (14 taxa) etc. The 164 species of medicinal plants were grouped according to the dominant active principles: volatile oils (13.41%), tannins (12.19%), flavonoids (9.75%), mucilages (8.53%), coumarins (7.92%), saponins (7.31%), alkaloids (6.70%), and iridoids (5.48%). Of the 164 medicinal species, 37 species are included in the Romanian Pharmacopoeia and the European Pharmacopoeia 2008. The identified medicinal plants can be used in the treatment of various human diseases. Also, a significant number of plants are protected by law at national and European level.

## Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.





**Fig. 2.** *Centaurium erythraea*



**Fig. 3.** *Gentiana cruciata*



**Fig. 4.** *Physalis alkekengi*



**Fig. 5.** *Phlomis tuberosa*



**Fig. 6.** *Prunella grandiflora*



**Fig. 7.** *Prunella vulgaris*



**Fig. 8.** *Veratrum nigrum*: a – general aspect, b – flowers, c - fruits



**Fig. 9.** *Echium maculatum*



**Fig. 10.** *Cephalaria radiata*



**Fig. 11.** *Crambe tataria*



**Fig. 12.** *Narcissus poeticus*  
ssp. *radiiflorus*



**Fig. 13.** *Salvia nutans*



**Fig. 14.** *Orchis morio*



**Fig. 15.** *Dictamnus albus*



**Fig. 16.** *Adonis vernalis*

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