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Medicinal & Aromatic Plants

Review Article

Highlighting the Compounds with Pharmacological Activity from Some Medicinal Plants from the Area of Romania

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ABSTRACT

The effect of medicinal plants is due to the chemicals contained in them, called active principles. Unlike drugs, which often contain a single chemical in large quantities, herbs contain a mixture of many active ingredients that act synergistically to produce a therapeutic effect. Medicinal plants also contain a wide variety of minerals and vitamins. The articles on medicinal plants did not specify all the chemicals contained by the plants, only those in the largest quantities and with proven therapeutic effect. Each chemical has an effect due to its chemical structure and can act in several directions, which is why there are so many beneficial medical effects attributed to medicinal plants. The review paper presents a specialized theoretical study related to the chemical composition of medicinal plants in Romania. The research results are structured in the form of a theoretical-informative scientific guide, which includes, in addition to the literary and scientific name of medicinal plants, and a description of the main biochemical compounds detected in each species.

Keywords: Medicinal plants; Active principles; Therapeutic effect; Biochemical compounds

INTRODUCTION

Among the spontaneous plants, the healing ones have attracted people's attention since the beginning of their existence on Earth. From this beginning until today, the long road of phytotherapy has gone through many stages, creating currents, schools and natural therapeutic systems, specific to geographical areas or ancient cultures and civilizations. Unfortunately, much of the treasure accumulated through tradition or writing has been irretrievably lost. The interest for medicinal organisms has increased with the improvement of the techniques of extraction and processing of active products and especially of the demonstration of their efficiency in the fight against serious human diseases. Today's phytotherapy, aromatherapy and natural therapy acquire new valences compared to the past. In addition, today's methods, therapeutic systems and medicines are increasingly addressing the patient and not the disease; the old conceptions of a holistic therapy that addresses the human body as a whole and not the affected organ are beginning to be updated. Conjugated botanical, biochemical and pharmacological research has materialized with truly remarkable results; many diseases now have a natural remedy, and future research expects new sources of raw materials with superior biological parameters to obtain new drugs.

LITERATURE REVIEW

In this paper we propose a specialized theoretical study related to the chemical composition of medicinal plants. The proposed information specifies both the organs of the plant where the compounds were found (leaf, stem, bark, root, rhizome, flower, fruit) and the main classes of chemical compounds (minerals, vitamins, alkaloids, acids, saponins, sterols, pigments).

Acer negundo L. The leaves contain: carbohydrates (fructose, glucose, sucrose, raffinose), phenolic acids (elleagic acid, gallic acid), sterols (β-sitosterol, daucosterol), complex lipids (cerebrosides), triterpenes (taraxerol acetate), ureides (allantoin) and allantoic acid, carotenoids, flavonoid pigments-anthocyanins (cyanidine and pelargonidine) and flavones (mircetin, quercetin, isoquercetin, kaempferol, methylated flavonols, dihydroflavonols, apigenin and luteolin, pro-methylidine flavones, and flavone methylides). The seeds contain: 20.76-21.55% fatty oil, sterols, triterpenes, carotenoids, flavones, catechin tannins, proanthocyanins,

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polyphenolic acids, reducing compounds, oases, amino acids, polyholosides. Fatty oil contains: 32.44% linoleic acid, 8.39% γ-linolenic acid, 0.75% α-linolenic acid, 16.73% oleic acid, 3.94% palmitic acid, 1.48% stearic acid [1].

Actaea spicata L. The aerial organs of this plant contain: isoquinoline alkaloids: magnoflorin, corituberin, triterpene glycosides, saponosides, organic acids: trans-aconitic acid, phenyl propane derivatives: actin, acteoside, verbascozide [2].

Adonis vernalis L. For medicinal purposes, aerial organs are used which contain: proteins (14%), pentosans, resins, phytosterols, nitrogen bases (choline, thymine), aconitic acid, phytosterols, phenolic acids (chlorogenic acid, caffeic acid), amides (asparagine), organic acids (citric acid), carbohydrates (rhamnose, pentosans), fatty acids (linoleic acid, oleic acid, palmitic acid), glycosides (strofantidine $C_{23}H_{32}O_6$), polyalcohols (adonitol), alkaloids (berberine), glycosides: cimar ($C_{30}H_{44}O_9$). The air organs also contain cardiotonic heterosides: adonitoxygenin, adonitoxoside, acetyl-adonitoxoside, adonitoxin, adonitoxol, adoniverdinase, adonivernozide, cymaroside, strophanthoside, vernadigin. Among the steroid substances were identified: strophatogenin, fukujusone, lineola, isolineolone, 12-benzoyl-lineolone and 12-nicitenoyl-lineolone. Flavonoid pigments are represented by: adonivernite, quercitrin, 8-hexithyl-luteolin-monoxyloside, luteolinxyloside, orientin-2- β-D-xylopyranoside. The organs of this plant contain dimethyl 2,6-p-benzoquinone ($C_8H_8C_2$) which is a p-benzoquinone dye. Researchers have identified in Adonis leiosepala C-glycosylflavonoids such as: orientin 2"-O-xyloside [3].

Aesculus hippocastanum L. The main components extracted from seeds are: starch (30-60%), proteins (8-11%), lipids (5%), glycerides, triterpene saponins (5-26%) such as aescin, tannins, acid tigarin, coumarins (esculoside and fraxoside), triterpenes (baringtogenol C and D), coumarins (angelic acid, esculin, esculetin, fraxetin, fraxin), glycosides (aesculetin), triterpenes (barringtogenol), alkaloids (escin), aliphatic compounds (tiglic acid). Among the fatty acids, the presence of linoleic acid, palmitic acid and stearic acid was identified. The main sterols identified in chestnut seeds are: stigmasterol, α-spinasterol and β-sitosterol. Researchers have identified the presence of triterpene saponins: escin Ia, Ib, IIb, IIa, IIb, IIIa, IV, V, VI and isoescin Ia, Ib, V, cryptoescigenin, which were found to have anti-inflammatory activity, and in experiments with mice found to inhibit the transfer of glucose from the stomach to the small intestine and intensify intestinal transit. The seeds contain 25 flavonoid compounds, of which may be mentioned: kampferol-3-arabinoside, kampferol-3- glucosido-xylosido-glucoside, quercetol-3-xylosido-glucosido-3'-glucoside, quercetol-3- 3'-diglucoside, quercetol -3,4'-diglucoside, quercetol-3-rhamnoside, quercetol-4'glucoside and kampferol-3-rhamnoside and proanthocyanidins such as epicatechin, epicatechin- (2 β7,4 β8) -epicatechin. Researchers have determined in the chemical composition of the chestnut shell the following compounds: 3-hexenol 9.2%, 2-heptanol 5.2%, 2-heptanone 4.7%, benzyl alcohol 4.1%, 2-methylbutanal 3.7%, 2-phenylethanol 3.5%, isovaleraldehyde 3.3% and 2-octanol 3.3%. The presence of the following substances was also identified in chestnut seeds: nonanal 5.3%, 3-hexenol 5.2%, nonanoic acid 4.6%, benzyl alcohol 3.9% and 2-heptanol 3.2% [2]. Chestnut flowers contain: tannin, adenosine, rutin, choline, as well as the following pigments: flavones (myricetin, isoquercetin, quercetin and /or kampferol), flavonols (kampferol 3-arabinoside, kampferol-3-glucoside, galangine, ramnocitrine), flavonitins methylates, glycosides of acylated flavonols and proanthocyanidins. Carotenes are β-carotene, β-cryptoxanthin, lutein and violaxanthin. The analyzes performed by Researchers on the volatile oil extracted from the chestnut flowers showed the presence of the following components: α; -pines 21.8%, β-pines 17.2%, camphene 11.3%, limonene 6.1%, 1, 8-cineole 5.8%, decanol 7.2% and nonanal 4.3%. The bark of the chestnut branches contains: tannin (epicatechin), sesquiterpenes (allantoin), alkaloids (scopoline, escin), coumarins and coumarin glycosides (esculetin, fraxetin, fraxin, scopoletin), pigments (leukocyanidin, leucodelfinidine, quit) [4].

Ailanthus altissima (Miller) Swingle The aerial organs of the plant contain: tannins (12%), lignins, cellulose, hemicelluloses, rhamnose, mucilages, proteins (27.5%), oleoresins, beta-sitostrol, quinones, ceryl alcohol, elaidic acid, gallic acid, ceryl palmitate, dihydroxycoumarins (scopoletin) and lactones (ailantiin) in a proportion of 4.9%. Among the flavonoid pigments identified in ash plants are: quercetin, isoquercetin, isoquercitrin and fisetin. Among the diterpenes, the presence of: ailanthione, quassiin, shinjulactone A and amarolid in the bark, ailanthone in the fruit and ailantinol B and C in the leaves were highlighted. Among the lactones were identified: ailantiin and neoquassin. Researchers have identified in this species two new quassinoids: ailantinol A and B, and other authors have identified 6 pregnan derivatives, 2 cholestan, 2 hopan, 1 lupan and 1 gamaceran derivative. The bark of the branches contains: cellulose, flobafen, benzoquinones, saponins, ceryl palmitate, diterpenes (ailantinone, amarolide, acetylamarolid, shinjulactone C, quassiin) and alkaloids: canthin-6-one-3-oxide, canthin-6-one ($C_{14}H_8N_2$). Fruits contain diterpenes (ailanton), and seeds protein (27%), lipids (55–59%), ailanton. Researchers have identified the presence of two new sterols in the chloroform extracts from the seeds: ailantusterol A [stigmast-5,20 (21) -dien-3- beta-ol] and ailantusterol B [stigmast5-en-3- beta-21-diol] [5].

Asarum europaeum L. The roots contain alkaloids (azarone, trans-azarone), allantoin, volatile oil (trans-isoheugenol, trans-isoelemicin, pinene, bornyl acetate, azaraldehyde, diazarone) [6].

Atriplex hortensis L. The main components identified by Researchers in the leaves of this species are: water (90-92%), carbohydrates (0.1%), cellulose (0.60-1.38%), proteins (2.9-3.9%), substances minerals (1.73-2.29%) and free oxalic acid (0.57% dry matter). The color of the leaves is given by the presence of chlorophyll pigments (28.06-33.02 mg/100 g and carotenoids (3.64-3.22 mg/100 g) [7].

Cerasus avium (L.) Moench Fruits contain 0.90% protein, 0.36% lipids, 15.10% carbohydrates, of which 6.10% glucose, 5.50% fructose, 0.22% sucrose and 0.36% pectin. Organic acids are represented by: malic acid 0.94%, citric acid 0.01%, chlorogenic acid 6.10 mg/100 g, ferulic acid 0.30 mg/100 g, caffeic acid 7.00 mg/100 g, p-coumaric acid 7.60 mg/100 g and oxalic acid 7.20 mg /100 g [4]. Cherries contain quite a lot of vitamins. Thus, a content of 15.00 mg ascorbic acid, 0.97 mg nicotinamide, 0.27 mg tocopherol, 0.19 mg pantothenic acid, 0.06 mg pyridoxine, 0.04 mg riboflavin was determined in 100 g of fruit. 0.03 mg thiamine, as well as small amounts of biotin and folic acid. The mineral content is relatively low: 0.49%. 229 mg of potassium, 20.0 mg of phosphorus, 17 mg of calcium, 11 mg of magnesium, 3.0 mg of fluorine, 2.7 mg of sodium and 0.15 mg of zinc were determined in 100 g of tissue. The anthocyanin content of the fruit varied between 82 and 297 mg/100 g in the case of dark-colored varieties and between 2 and 41 mg/100 g - in the fruit of 11 light-colored varieties and hybrids. All dark-colored varieties contained higher amounts of cyanidin-3-rutinoside and cyanidin-3-glucoside and lower amounts of pelargonidin-3-rutinoside [5]. For medicinal purposes, the fruit stalk is used for its content in flavonoid substances. The main components of the peduncles are: tannins, catechins, saponins, proanthocyanidols and minerals (potassium salts). Flavones are represented by quercetol, genistein, dihydrovogonin and naringenol [8].

Chelidonium majus L. The plants contain: 3-4% alkaloids in the underground organs; 0.35-1.30% in the aerial plant parts and 1.5% in the fruit pericarp (as chelidonic acid salts). The dominant alkaloids are benzophenentridine: chelidonine (tertiary base), chelerythrine and sanguinarine (red quaternary bases); other monomeric benzophenanthridine alkaloids (α-homochelidonine, oxychelidonine, methoxychelidonine, hydroxychelidonine, oxysanguinarine) or dimers (chelidimerine - only in the roots of plants growing in America), protoberberinic alkaloids (galberine, culberetra); protopine (protopine, α-, β- allocriptopine); aporphins (magnoflorin - root only); sparteine in small amounts in the grass; esters of hydroxycinnamic acid, hydroxy acids (malic, threonic, glyceric), 1-4% chelidonic acid, saponosides, carotenoids, resinous substances, volatile oil (in traces), flavonoids, tannins, nicotinic acid, nicotinamide. Latex contains proteolytic enzymes, resinous substances and yellow, orange or red alkaloids. The rhizome and roots (Chelidonii radix / rhizoma) contain 2.4-3.4% alkaloids, of which chelidonine (1.2%) and chelerythrine (1.0%) are highlighted [9].

Clematis vitalba L. Phenolic acids (caffeic, chlorogenic), sterols (campesterol, β-sitosterol, stigmasterolglycoside), hydrocarbons (nonacosan, triacontan), alcohols (ceryl, mircilic), pyrones (anemonine, protoanemonine), flavonic compounds (clematin), aliphatic compounds (ginnol), fatty acids (melisic), triterpene saponins (vitalbozide) and caulosapogenin [10].

Convallaria majalis L. aerial organs of this species contain: 0.2-0.4% cardiotonic heterosides (~40 compounds), which come from approx. 12 aglycones, the majority being: strofantigenol (glucoconvaloside, convalozide, convaltoxoside, desglucocheirotoxol, cheirotoxol), strofantidol (glucoconvalatoxolozide, convalatoxolozide, convalatoxol) bipindogenol (lokundiozide). Sterolic saponosides: convalaroside (convalamarogenol heteroside), convalamarozide, covalagenol A and B. The pigments identified in the leaves of this plant are: kampferol, kampferol-3-galactodiramnoside, kampgerolglycoside, kampferol-3-galactoramnosine, 3-3-galactodiramnoside, isoramnoside-3-galactoramnozide, isoramnetin3-glucoside, quercetin, quercetin-3-galactoside, quercetin-3-galactodiramnoside, quercetin-3-galactoramnozide, petunidine, lycetene, phytocene, myrcetin, and xanthophylls. The presence of the following substances was highlighted in the flower tissues: organic acids (citric acid, malic acid), amides (asparagine), phenolic acids (caffeic acid, ferulic acid, chlorogenic acid) and volatile oil. Analysis of the rhizome and roots of this species revealed the presence of two glycosides: convallamarine ($C_{22}H_{44}O_{12}$) and convallarin ($C_{34}H_{62}O_{11}$), bitter-tasting substances [11].

Cornus mas L. leaves contain ellagic acid, gallic acid, morronoside, secologanin. The presence of α-amyrin, β-amyrin, astragaline, sterols (β-sitosterol, campesterol, stigmasterol) was identified in the volatile oils, as well as the following pigments: isoquercitrin, quercetin, hyperoside, kampferol, quercetin, quercetin-3-O-β-Dsophoroside and procyanidins and vitamins (routine). The presence of ellagic acid, gallic acid, ursolic acid and rutin was identified in the flowers. Fruits contain volatile oils (α-amyrin, β-amyrin), sterols (β-sitosterol, campesterol, stigmasterol) and pigments. Of these, the following were identified: cyanine, cyanidin-3-O-α-L-galactoside, cyanidin-3-O-β-D-robinobiozide, cyanidin-3-O-β-D-rutinoside, pelargonidine-3-O-α-Lgalactoside, pelargonidin-3-O-β-D-robinobiozide, pelargonidin-3-O-β-D-sophorozide and pelargonin [12].

Corydalis solida (L.) Clairv. Researchers point out that in the tuberous roots of this species are found more than 50 alkaloids, which have at least 12 different structures. Among them are: aporphyrin alkaloids (bulbocapnine); protopin derivatives (coricavin, protopine, coricavidin, coricavamine and cryptopine); protoberberine tertiary and quaternary bases (tetrahydropalmatine, stylopine, coptysine, palmitin); tetrahydroprotoberberins (coridalin, isocoribulbine, coribulbine and corisamine). In the aerial organs were identified 0.4-0.8% alkaloids: bulbocapnine, protopine, stylopine, capnoidin, domesticin, isoboldin, corisamine, allocriptopine ($C_{21}H_{23}O_5N$), ambinine, buleianine, conspermine, coresmin, corgoin, coridalidzine, corinoxidine, coritoxin, cryptocavin, cryptopine, epicorinoxidine, gorchacoin, govanine, lienkonine, N-formylchoridamine, ochotensimine, ochotensin, ochobirin, palmatine, tetrahydrocoptisin, acetylchoridamine, 6-oxoacetylchorinoline, acetaminophen, acetol, isocyl, isocylin, isocylin, isocylin, 12-hydroxycorinoline, 12-formyloxycorinoline [13].

Corylus avellana L. leaves contain: allantoin, phenolic compounds. Fruits: lipids (62%), proteins (14%), carbohydrates (14%), amino acids (arginine, leucine, valine, isoleucine, phenylalanine, tyrosine, threonine, lysine, histidine, tryptophan, cysteine, methionine). The following vitamin content was determined in 100 g of hazelnuts: tocopherol (28 mg), ascorbic acid (3 mg), nicotinic acid (1.35 mg), pantothenic acid (1.15 mg), pyridoxine (0.45 mg), thiamine (0.39 mg). The following minerals were determined in 100 g of fruit: potassium (636 mg), phosphorus (333 mg), calcium (226 mg), magnesium (156 mg), chlorine (10 mg), magnesium (4.2 mg), iron (3.8 mg), boron (2.15 mg), sodium (2.0 mg), zinc (1.9 mg), copper (1.3 mg) [14].

Cotinus coggygria Scop. The researchers identified 42 components in the volatile oil extracted from the precious flowers. Of these, the share is held by limonene (48.5%), (Z) -β-ocimen (27.9%) and (E) -β-ocimen (9.7%). The analysis of the volatile oil, extracted by hydrodistillation from the expensive flowers revealed the presence of the following substances: 23.90% α-limonene, 21.0% β-trans ocimen, 12.73% alloocimen, 8.58% terpinolen, 6.87% β-cis-ocimen, 3.38% β-pinene. In smaller quantities, the presence of the following compounds was determined: 3.38% β-pinene, 2.29% camphene, 0.97% myrcene, 0.59% pelargon aldehyde, 0.55% linalool, 0.47% β- caryophyllen, 0.44% tricycrene, 0.22% γ-terpine, 0.07% α-terpineol, 0.07% viridifloren, 0.04% terpine-4-ol and 0.03% α-farnesen. Volatile oil extracted from leaves of the prickly pear is rich in pine and camphor [15].

Crataegus monogyna Jack. leaves contain: catechol, epicatechol, triterpenes (2-α-hydroxy oleanolic acid, acantholic acid, neotegolic acid, crategolic acid, ursolic acid) and phenolic acids (caffeic acid, chlorogenic acid), amines (ethylamine, dimethylamine, trimethylamine, aromatic amines, choline, choline, acetylcholine), aminopurines (adenine, guanine), coumarins (esculetoside), β-sitosterol, uric acid. The characteristic color of the leaves is given by the presence of the following pigments: apigenin, quercetin, quercetin-3-O-rhamnogalactoside, kampferol, isoorientin, isoorientin rhamnoside, isoquercitin, isoscaftozide, neoscaftozide, ramovinoxide-2, procyanidin, proanthocyanidin, rutin, scaptooside, spireoside, vicenin-1, vicenin-2, vicenin-3, vitexin, vitexin-ramnoside, vitexin-2-ramnoside, vitexin-2-O-ramnoside. The flowers contain: tannins, triterpenes (oleanolic acid, maslinic acid, ursolic acid), coumarins (aesculin), amines (ethyl amine, dimethyl amine, isoamyl amine) and aminopurines. The flowers of Crataegus monogyna contain the following pigments: apigenin, quercetin, kampferol, kampferol-3-neohesperoside, isoorientin ramnozil, isoscaftozide, neoscaftozide, isovitexin, isovitexin-ramnoside, orientin, pro-chromin, B2, orientin-chromid routine, scaphtoside, sexangularetin, sexularetin, spireoside, viceni-1, vicenin-2, vicenin-3, vitexin, vitexin-rhamnoside, vitexin-2-rhamnoside, vitexin-2-O-rhamnoside [16].

Daphne mezereum L. analyzes revealed the presence of substances that in high concentration are toxic: diterpenes (daphnetoxin, hydroxidafnetoxin, meserein), dicumarines (daphnoretin), coumarins (umbelliferone), resins (daphnin), sterols (β-sitoster) [17].

Dryopteris filix-mas (L.) Schott The chemical components identified in the rhizome are as follows: glucose, starch (10%), waxes, lipids (5-6%), resins, catechin tannins (philicitanic or aspidatonic acid), fluoroglycine and volatile oil, which contains eucalipatol esters with saturated fatty acids. The rhizomes also contain fluoroglucinol derivatives, such as: aspidinol, albaspidine, tetraalbaspidine, pentaalbaspidine, hexaalbaspidine, aspidine, desaspidin, tridesaspidine, margaspidine, paraspidin, pseudospidin, triaspidin, tridesaspidone, phyllic acid, and phyllic acid. The presence of triterpenes was also identified: hopen, fernen, benzene radical compounds: aspidin, aspidinol, desaspidin, albaspidin, phenylpropanoid compounds such as flavaspidic acid, cyclic ketones: floaspidinol and protocatechuic acid [2]. Researchers mention that the following compounds are also present in the rhizomes: hopadienflobafene, floraspina, floraspirone, floroglucin, floropirone and trisflavaspidic acid [18].

Equisetum arvense L. The substances identified in the strains of this species are: carbohydrates (4.4%), cellulose (1%), proteins (1%), lipids (0.2-3.2%), glucosides, tannins, acid tannic, gallic acid, mineral substances (15-20%). Saponins: eqisetonin. Alkaloids: eqisetin, palustrin, palustrinin, nicotine. Sterols: β-sitosterol, campesterol, isofucosterol. Vitamins: ascorbic acid (0.02-0.7%), niacin, riboflavin, thiamine. Acids: malic acid, oxalic acid, vanillic acid, caffeic acid, ferulic acid, p-coumaric acid, p-hydroxybenzoic acid, aconitic acid, protocathechic acid. The pigments in the aerial organs of this plant are represented by: protogenkwanin 4'-O-glucoside, 6-chloroapigenin, luteolin 5-glucoside (galuteolin), kampferol 7-glucoside (equisetrin), equisporol-3-glucoside (equisporozide), kampferol, kampferol-7-diglucoside, dihydrocampferol, isoquercitrin, dihydroquercetin, naringenin, luteolin, luteolin-5-glucoside, gossipitrin, galuteolin, equisetrin, β-carotene, rhodoxanthine [19].

Euonymus europaeus L. The bark of the shrub contains cardiotonic glycosides: evatroside (digitoxygenol glucoarabinozide), evatromonoside (digitoxygenol arabinozide), evobiozide and evonomoside, alkaloids (especially evonine), which are polymers of evonic alkyl pyrimide (evon). The presence of triterpenes (citrullol) and resins containing: atropurol, euonisterol, homoeuonisterol was found. The aerial tissues of plants contain: cerotic acid, malic acid, citric acid, euonic acid, tartaric acid, tannin, phytosterols and galactitol [20].

Fragaria vesca L. Fruits contain: carbohydrates, mucilages, pectins, citric acid, malic acid, salicylic acid. The volatile substances mainly contain: (S)-2-methylbutanoic acid, benzyl alcohol, 2,5-dimethyl-4-hydroxy-2H-furan-3-one, benzoic acid and E-cinnamic acid [21].

Fraxinus excelsior L. The leaflets contain coumarins, of which fraxoside (8-O-glucosyl fraxetol), fraxetol and isofraxetol have been identified. The presence of the following substances was also determined: flavonosides (rutoside), 1% pentacyclic triterpenes (ursolic acid), iridoids (excelsiozide), mannitol, inositol, tannins, organic acids (malic, α-aminiadypic), volatile oil [22].

Galanthus nivalis L. The bulbs of this species contain: 0.2-1.6% alkaloids (galantamine, hipeastrin, licorine, tazetin, narcyclasin, narwedine, pretazetin-in bulbs, hemantamine, nivalidine-in flowers) and lectins. The alkaloid spectrum is dependent on the pedoclimatic conditions and the chemovariety [23].

Galium odoratum (L.) Scop. The air organs contain: tannic acid, tannin, malic acid, citric acid, nicotinic acid, nicotinic acid amide, anthracene derivatives and naphthalene derivatives. Plants of this species contain iridoid glucosides, such as asperuloside (0.043%), scandoside and monotropein ($C_{16}H_{22}O_{11}$). Among the active components can be mentioned - coumarins: melilotoside in the fresh plant (0.17-1.3%) and coumarin glycosides. Researchers [5] have sought to vary the content of asperuloside in Galium verum, a substance that has a mild laxative effect. The highest content was determined in the complete development phase of the flowers when they contain the highest amount of iridoid-type monoterpenic glycosides [24].

Geum urbanum L. The main components identified in the rhizomes of this plant are: tannins: 10-24% gallic (galloyl-glucose) and catechin (D-catechol) tannins, gallic acid and ellagic acid in the free state, geoside (eugenol glycoside with vicianosis, which by acid hydrolysis releases eugenol, glucose and arabinose). Other constituents: caffeic acid, volatile oil, mucilages, oases, resins, bitter principles and 0.3% volatile oil [25].

Gleditsia triacanthos L. Pods contain: carbohydrates, cellulose (12.7%), lipids (4.6%), proteins (23.1%), catechins, epicatechin-3-glucoside, tannin, flavones (acramerin), isoflavones (olmelin, irigenol, dihydro-4-methoxy-isoflavone), leucoanthocyanidins (gleditsin) and flavonols (quercetin-diglucoside, fisetin, fustine, dihydrorobinetin), purine alkaloids (triacanthine), saponosides and sapogenols. The presence of flavanols (robinetin, fisetin), flavanones and flavanonols (fustine) was identified in the wood tissue. The presence of alkaloids such as tyramine, hypoxizine, triacanthine, triacantoside, flavone (acramerin) and isoflavone (olmelin) was also determined in the leaves. The flowers contain alkaloids in a concentration of 0.2%. The seeds contain: mannose, galactose, manogalactans, lipids (0.8-3.0%), vitamins (tocopherol), flobafen, fatty acids (tetrahydroxystearic acid, dihydroxystearic acid), acetic acid [26].

Hedera helix L. The leaves contain 5-8% triterpene saponins called hederasaponins (AI). These are bidesmosides of hederagenol (hederacoside A or α-hederin, hederacoside C), oleanolic acid (hederasaponin B) and baiogenol (saponin K10). The main saponosides are hederasaponins B, C and saponin K10. hederasaponin C predominates (5-7% of the total saponoside). Other constituents: flavonosides, polyines (falcarinol, falcarinone, 11,12-dehydrophalcarinol), polyphenolic acids, sterols. Fruits and stems also contain saponosides [27].

Humulus lupulus L. The main components identified in the inflorescences are: terpenes (myrcene, humulene, cannabis), bitter principles such as floroglucin (humulone, isohumulone, lupulone), esters (bornyl valerianate, esters of myrcenol and humulone), condensed tannins (2-4%), amines (dimethylamine, diethylamine, ethylamine, ethylmethylamine, isopentylamine, methylamine), amides (asparagine, glutamine), piperidine, ketones, acids. The presence of flavonoid pigments has been identified in hop flowers: rutin, quercitrin, astragalin, xantohumol, isoxantohumol, leukocyanidin, leucodelfinidine and cartamone [3,16]. The volatile oil content of the flowers varies between 0.3 and 1.2%, the maximum value being determined a few days after their maturity. Researchers analyzed the volatile oils extracted from hop flowers, in which they identified 31 components. The highest weight was determined for the following components: α-humulene (30.78%), β-caryophyllene (13.14%), myrcene (8.39%), methyl 4-decanoate (5.32%), geranyl isobutyrate (3.53%), methyl 9-decanoate (2.79%), methyl decanoate (2.51%), δ-cadien (2.30%) and 2-methylbutyl 2-methylpropionate (1.35%)). Concentrations of less than 1.0% were determined from the following components: 2-undecanone, methyl octanoate, methyl 8-methylnonanoate, methyl undecanoate, methyl nonanoate, copaene, methyl 6-methyloctanoate, nonanal, geraniol, methyl 7-methyloctanoate, methyl 3 -nonenoate, limonene, methyl heptanoate, 2-dodecanone, hexyl isobutyrate, linalool, 3-methylbutyl isobutyrate, 2-methylbutyl pentanoate, 2-methylbutyl propanoate, α-ocimen and α-pinene. The resin dissolved in volatile oil contains 15-30% prenyl-acyl fluoroglucinolic derivatives: humulone (α-lupulinic acid) and lupulone (β-lupulinic acid), compounds responsible for the bitter taste characteristic of hops. By preservation or during processing, these derivatives are easily isomerized, transforming into isohumulone, cohumulone, adhumulone, colupulone, etc. [9]. The following substances have been identified in hop fruits: carbohydrates, lipids (2.9%), proteins (11-24%), tannins (2-4%), resins, sesquiterpenes (ledol, globulol, alloaromadendren), estrogen hormones (estrone - $C_{18}H_{22}O_2$), flobafen. The following components were also identified: fluoroglycine derivatives-humulone, posthumulone, isoprehumulone, humulenol, humulinol, humulinone, prehumulon, isocohumulen, 4-deoxyhumulone, deoxicohumulone, cohumulone, colupulone, lupus, lupus, adlupone, lupus, which gives the characteristic bitter taste. Of these components, the weight is held by humulone and colupulone. Amino acids: α-alanine, β-alanine, asparagic acid, histidine, leucine, lysine, proline, serine, threonine, tryptophan, tyrosine. Vitamins: ascorbic acid, niacin, riboflavin, rutin, thiamine. Pigments: β-carotene, kampferol, kampferol-3-rutinoside, kampferol3-rhamnoside, myrcene, mircetin, quercetin-3-glucoside, quercetin-3-rhamnoglycoside, quercetin-3-rhamnoside, aromadendrin, astragalin. Acids: cerotic acid, chlorogenic acid, ferulic acid, γ-aminobutyric acid, p-coumaric acid. The following components were identified in the volatile oil extracted from the fruits: α-cadien, α-cdinol, α-caryophyllene, α-cadien, α-coracalen, α-cubeben, α-eudesmol, α-guaien, α-humulene, α -muurolen, α-pinen, α-selinen, α-terpineol, α-ylangen, β-cariofilen, β-cubeben, β-eudesmol, β-pinen, β-selinen, biciclogermacren, δ-cadien, δ-cadinol, δ -guaien, δ-selinen, γ-cadien, γ-calocoren, γ-elemen, γ-eudesmol, γ-ionone, γ-muurolen, geraniol, germacren D, linalol, limonen, nerol, nerolidol [28].

Jasminum officinale L. Among the compounds identified in the flowers are: lactones (5-hydroxyjasmonic acid-lactone, 6-cis-butenylcaprolactone, δ-jasmonic acid-lactone and jasmincetolactone), benzyl alcohol, salicylic acid, resins. The flowers contain volatile oil and a pyridine alkaloid, jasmine, supposed to be an artifact. Some researchers stated that the volatile oil extracted from the flowers of this species contains mainly: benzyl acetate (27.50%), phytol (12.50%), linalool (10.0%), benzyl benzoate (9.5%), geranylinalool (5.0%), isofitol (5.0%), jasmon (4.0%), benzyl alcohol (3.5%), α-farnesen (2.0%) and eugenol (1.5%). Other researchers have found that the volatile oil extracted from the flowers of this species contains the following substances: myrtle (26.91%), napinone (16.0%), myrtle (11.54%), ethyl palmitate (6.42%), cismirtanal (6.01%), methyl palmitate (3.96%), felandran (3.02%), trimethyl tetradeca (2.12%), hexahydro farnesyl acetone (1.96%), methyl eicosan (0.9%)), nonanol (1.04%), hexenyl benzoate (0.83%), dimethyl nonadecane (0.7%), cis-jasmon (0.64%), ethyl myristate (0.56%) and methyl myristate (0.54%) [29].

Juglans nigra L. The leaves contain: ellagic tannins, vitamin C, chlorophyll pigments, flavonic glycosides, organic acids, phenolic acids (p-coumaric acid, caffeic acid), mineral salts, volatile oils, naphthoquinones (juglon, hydrojuglone) volatile (limonene, 1,8-cineole, pinene, linalool, borneol, carvone, bornyl acetate, p-cement, juglon). Among the flavonoid pigments, the following were identified: flavones (mircetin, quercetin and kampferol), flavonol glucosides: hyperine (quercetin-3-galactoside), dihydroflavonols, 5-O-methylflavonols, flavanones and proanthocyanidins. Walnut fruits contain: protein (9.8%), lipids (5.2%), tannins (14.9%), ellagic acid, pigments (myricetin, sakuranetin), vitamins (niacin, riboflavin). Seeds of this plant contain: carbohydrates (14-15%), lipids (59-61%), proteins (20-21%), tannin (14.7%), vitamins (niacin, riboflavin, thiamine) [30].

Leonurus cardiaca L. The aerial organs of plants contain: tannins (2-9%), catechins, resins, saponins, phenolic glycosides (caffeic acid-4-rutinoside), pyrogalol, organic acids (citric acid, malic acid), triterpenes oleanolic, ursolic acid). Alkaloids (0.3%): stahydrin, betonicine, turmeric, leonurin, leonuridine and leonurinine. Vitamins: ascorbic acid (4.2 mg/100 g), rutin, tocopherols. Volatile oils: caryophyllene (40-200 ppm), α-humulene (35-173 ppm), α-, β-pinene, limonene, diterpenes (marubin). Pigments: apigenin glucosides, kampferol glucosides, isoquercitrine, quercetin, quercetrin. Iridoid compounds: ajugol, ajugoside, galiridozide and leonurid. Other organic compounds identified in this species are: bufenolide, genkwain, leocardine, and leonuridine. Volatile oils, tannins and gums have been identified in the composition of flowers [31].

Lycopus europaeus L. Plants contain 0.24% alkaloids, carbohydrates (galactose, glucose), vitamins (ascorbic acid), coumarins, antioxidant polyphenols (rosmarinic acid), triterpenes (ursolic acid) and resins. Volatile compounds: δ-cadinen, caryophyllene, caryophyllene oxide, germacren D, trans-βfarnesen. Organic acids: caffeic acid, chlorogenic acid, ferulic acid, synaptic acid. Flavonoid pigments: apigenin-7-monoglycoside, luteolin-7-monoglycoside [32].

Morus alba L. Mulberry leaves contain: carbohydrates (glucose, fructose, sucrose, cellulose), lipids (6.8-7.4%), proteins (14-28%), tannins, vitamins (ascorbic acid, folic acid), nitrogenous bases (adenine), volatile compounds (butylamine, propionic acid, isobutyric acid, aldehydes, ketones), pigments (chlorophyll, beta-carotene, quercetin, quercitrin, isoquercitrine, xanthophyll), flavonic glycosides (astragalin, rutin) beta-sitosterol, campesterol), coumarins (scopolin), alkaloids (trigonellin), malic acid, citric acid, minerals (8-20%). Mulberry fruits contain 87.5% water, 1.5% protein, 0.49% lipids, 8.3% carbohydrates, 13 mg/100 g ascorbic acid, riboflavin, thiamine and 0.8 mg/100 g niacin. The fruits contain anthocyanin pigments: cyanidin-3-rutinoside and cyanidin-3-glucoside. Along with these pigments can be found petunidin 3-glucoside, petunidin 3-rutinoside, isoquercetin, as well as beta-carotene. Mulberry fruits contain cyanidin 3-glucosides, delphinidin, O-methylated anthocyanidins, mircetin, quercetin, morin and/or kampferol, 2'-oxygenated flavonols, dihydroflavonols, apigenin and/or luteolin, 2'-oxygenated flavones, flavanones, Cl- glycosylflavonoids, isoflavones, proanthocyanidins calcones, aurons and isoprenylated flavonoids [33].

Polygonum aviculare L. Among the phenolic glucosides, the presence of raponticin has been identified, along with: tannins, organic acids, ascorbic acid and flavonoids. In the stems, leaves, sepals and seeds the following pigments: cyanidin 3-glucoside, cyanidin 3-galactoside, cyanidin 3-arabinoside, cyanidin 3-rutinoside, cyanidin 3-arabinosylglucoside, cyanidin and peonoidine 3-arabinoside-5-glucose, 5-diglucoside. The aerial organs also contain octa-O-substituted flavonols such as: digicitrin (3,5,6,7,8,4',5'-heptaMe) and exoticin (3,5,6,7,8,3',4',5'-octaMe) and flavones such as: meliternin. The following pigments have also been identified in the plants of this species: elleagic acid, dolphinidine, glycosides of acylated anthocyanidins, mircetin, quercetin and kampferol, glycosides of flavonols: quercetin 3-arabinoside (avicularin), dihydroflavonols, apigenin and calcene, and luteol. Other researchers have determined the composition of the volatile oil extracted from Polygonum minus and found that the weight is held by the following components: dodecanal (33.60%), decanal (26.60%), sesquiterpenes (4.22%), 1-dodecanal (4 .00%), 1-decanol (2.58%), beta-caryophyllene (2.33%), caryophyllene oxide (1.80%), trans-beta-bergamotene (1.61%), caryophyllene oxide (1.80%), trans-beta-bergamotene (1.61), tetradecanal (1.56%), dodecanoic acid (1.50%), alfacucumen (1.46% and 1-nonanol (1.40%). Roots of such plants contain 3-ol flavans in form of ent-catechin, ent-epicatechin, ent-catechin 3-O-gallate [34].

Polygonum hydropiper L. The aerial organs contain the following substances: glucose, fructose, tannin (3.5%), mucilages, rutin, sterols (β-sitosterol glucoside sitosterol), acids (malic, melisic, caprionic, ellagic, formic, gallic acid, valerian). The pigments in the aerial organs of this species are represented by flavonoid substances: rutinoside, hyperoside, quercitrozide, ramnazine, kampferol, quercetin, quercitrine, quercetin-7-glucoside, isoramnetin, persicarin. The volatile oils contain: 1,4-cineole, α-pinene, β-pinene, borneol, bornyl acetate, camphor, carvone, cinnamic alcohol, fencone, p-cimole, felandren, polygone, terpineol. The seeds contain: sesquiterpenes (isodrimeninol, isopolygodial) [35].

Polypodium vulgare L. The chemical components identified in the rhizome of this plant are: glucose (2.1%), fructose (2.1%), sucrose (15%), starch (6.3%), rhamnose, resins, lipids, tannins, mucilages, catechins (2.5–3.7%), sterols (β-sitosterol), methyl salicylate, fluoroglucine, fluoroglucinol derivatives (phyllin), minerals. Saponins: 26-O-methylpolipodosaponin, polypodosaponin, glycyrrhizin (0.6%). Triterpenes: cycloartenol, 31-norcycloartenol, epoxyhypan, fernene, hopen, cyclolaudenol and lophenol. Acids: malic, benzoic, butyric, caffeic, salicylic, glucocafeic, citriclauric, isovaleric, lauric, stearic acid. Flavan 3 pigment was determined in the leaves of this species [36].

Primula veris L. The roots contain: triterpene saponins (primic acid A, B and C), 8 neutral saponosides, 5 acid saponins, heterosides (primveroside, primulaveroside), phenolic glycosides (gluco-quinacetophenone-o-methylated), glycosides of acetic acid (primulaverina, primverina). In the flowers are found: elleagic acid, saponins and flavonoid pigments (delphinidin, cyanidin and/or petunidine, methylated anthocyanidins, mircetin, quercetin and kampferol, methylated flavonols, oxygenated flavonols, dihydroflavonols: apigenin and luteolin, fluteolin, -flavone, 5-hydroxy-6-methylflavone, 3', 4'-dihydroxyflavone, 5,8,2'-trihydroxy-flavone), flavanone, C-glycosylflavonoids, deoxyphlavonoids, proanthocyanidins, malvidin 3-galactoside (primain), rosin -3,5-diglucoside, flavones: 5-hydroxy-flavone, primetin). In the exudates are found: mono-O-substituted flavones such as: primaetin and primetin [37].

Prunus domestica L. Plum leaves and bark contain cyanogenetic glucosides such as: prunasine. Plums contain 0.60% protein, 0.17% lipids and 14.50% carbohydrates, of which: 2.74% glucose, 2.06% fructose and 2.78% sucrose. In plums were also determined: 0.76% pectin, 0.23% cellulose, 3.10% sorbitol, 0.30% lignin, 6.0 mg / 100 g β-sitosterol as well as small amounts of serotonin, tyramine and tryptamine. The total acidity of the fruit is determined by the presence of malic acid (1.22%), citric acid (0.03%), oxalic acid (0.01%), caffeic acid (20 mg/100 g), chlorogenic acid (9, 0 mg/100 g), p-coumaric acid (2.4 mg/100 g) and ferulic acid (0.9 mg/100 g). Vitamins are mainly ascorbic acid (5.4 mg/100 g). Plums also contain the following amounts of vitamins, per 100g of fruit: 0.80 mg tocopherol, 0.44 mg nicotinamide, 0.18 mg pantothenic acid, 0.07 mg thiamine and 0.04 mg riboflavin. The content of plums in mineral substances varies between 0.40 and 0.60%. In 100 g of fruit were determined: 221.00 mg potassium, 18.00 mg phosphorus, 14.00 mg calcium, 10.00 mg magnesium, 1.70 mg sodium, 1.50 mg chlorine, 0.44 mg iron, 0.34 mg boron and 0.09 mg copper. The color of plums is due to the presence of anthocyanins: cyanidin 3-glucoside, cyanidin 3-rutinoside, peonoidine 3-glucoside and peonoidine 3-rutinoside [38].

Quercus robur L. Ritidoma of the species Quercus robur contains: catechin monomer tannins (catechol, epicatehol, galocatechol); ellagic tannins (castalgin, pedunculagin, vesvalagin, 2,3-(S)-hexahydroxy-diphenoyl-glucose); flavano-elagotanins (acutisimin A and B, eugenigrandine, guajavacin B, stenophyllanin C); tannin galic; di- and oligomeric proanthocyanins (procyanidin B3 and galocatechin (4,8) -catechin are predominant); flavone (cvercetol), triterpene. The presence of the following substances was also highlighted: starch, pectins, resins, saponins (10%), resins, β-sitosterol, mesoinositol, triterpenes (friedelin, friedelinol, friedelanone), pentacyclitols (viburnitol) [39].

Robinia pseudoacacia L. The components identified in the wood and barks of this plant are: lignins, pentosanes, cellulose, pyrocatechin tannins (2-7%), resins, phytosterols, volatile oils, cyanogenetic glycosides (amygdalin), phenyl-propenic glycosides (syringin), xanthone. The wood from this species contains the following pigments: flavans 3,4-diols such as robinetinidol-4-alpha-ol, trihydroxyflavan-3,4-diol, flavones: apigenin, butein, butyne, dihydrorobinetin, flavonic glycosides: fustine, flavanone: naringenin, licuiritigenin, flavanols: quercetin, taxifolin, fisetin, robinetin 2.0%, calcones: dihydroxicalcon, trihydroxicalcon, butein, robtin (1.5%), leucoanthocyanins: leucorobinitidine. The leaves contain: glucose, rhamnose, xylose, proteins (17.0-25.5%), lipids (3.0-3.3%), indigo glucosides (indican), linarin. Leaves have been identified in the leaves as flavonic glucosides such as: apigenin 7-bioside, apigenin-7-rhamnoglycoside, apigenin-7-trioside, robinetin, dihydrorobinetin, acacetol, acaciine and acacetin trioside containing glucose, rhamnose and xylose, flavonols such as camphorol-containing robinin with robinosis at position 3 and rhamnose at position 7 and carotenes. Analysis of the volatile oil extracted from Robinia plants allowed the author to identify 22 components. The share was held by delta-3-caren (54.60%) and linalool (21.00%). The following components were identified in smaller amounts: 2-aminobenzaldehyde, (Z) -beta-farnesen, (Z, Z) -alpha-farnesen, 2-phenylethanol, alpha-pinene, ethyl octanoate, methyl anthranilate, 2-phenylethyl acetate, ethyl hexanoate, geraniol, (E)-nerolidol, methyl benzoate, alpha-thujone, benzaldehyde, pentadecane, 1-octenol-3, p-cimen, beta-caryophyllene, alpha-terpineol and alpha-thujene. The flowers contain: flavonosides (robinin, acacia), polyphenolcarboxylic acids (caffeic acid, chlorogenic acid), volatile oil (alpha-terpineol, farnesol, linalool, nerol, 2-aminobenzaldehyde), sterols. Lectins were isolated from the bark of the stem [40].

Rubus idaeus L. The main chemical components determined by Researchers in raspberry fruits are: proteins (1.2%), lipids (0.30%) and carbohydrates (6.0-9.3%) of which glucose is 1, 80%, fructose 2.04% and sucrose 0.22%. The following substances were also determined in the fruits of this species: pectin (0.40%), xylose (13 mg/100 g) and sorbitol (8.5 mg /100 g). The total acidity of raspberries is determined by the presence of citric acid (1.52%), malic acid (0.40%), as well as oxalic, chlorogenic, quinic, ferulic, caffeic, p-coumaric, protocatechuic and p- hydroxybenzoic acid. The vitamin content of 100 g of grapes varies as follows: 25.00 mg ascorbic acid, 1.4 mg tocopherol, 0.30 mg pantothenic acid, 0.30 mg nicotinamide, 0.07 mg pyridoxine, 0.05 mg riboflavin and 0, 02 mg thiamine. The content in mineral substances varies between 0.37 and 0.38%. The following amounts of mineral elements were determined in 100 g of grapes: 170 mg potassium, 44 mg phosphorus, 40 mg calcium, 30 mg magnesium, 1.2 mg sodium and 1.0 mg iron [16,35]. Raspberry fruits contain anthocyanin pigments, the most important of which are: cyanidin 3-rutinoside-5-glucoside, cyanidin 3-sophoroside, cyanidin 3-rutinoside and cyanidin 3-glucoside [41]. Cyanidin 3-sambubiozide, cyanidin 3,5-diglucoside, cyanidin 3-xylosilrutinoside and pelargonidine 3-glucosyl rutinoside were also identified. Researchers identified 5 cyanidin glucosides and 4 pelargonidine glucosides in the fruits of this species. Among the carotenoid pigments, raspberries contain alpha and beta-carotene. Volatile substances in raspberries include: 5-methyl-furfural, beta-phenylmethylalcohol, furfural, geraniol, isoamyl alcohol, valerian acid. During maturation some compounds such as trans-beta-ocimen and cis-3-hexenyl acetate decrease quantitatively, while alpha-pinene, camphene, beta-myrcene and limonene have a quantitative accumulation. Raspberry leaves contain: lipids (1.7%), protein (11.3%), tannin (10.0-12.0%), vitamins (thiamine, riboflavin, niacin), organic acids (1-2%), O-phthalic acid, gallic acid, ellagic acid, hydrolyzable tannins (blood), benzoic acid, benzaldehyde, alpha-furfurancarbonic acid, monoterpenes (teaspiran). Volatile substances: 1-penten-3-ol, cis-hexen-3-ol, damascene, beta-ionone, dihydro-beta-ionone, farnesol, ethanol, ethyl acetate, cis hexene. The pigments identified in the plant tissues are: quercetin3-beta-glucuronide, campferol 3-beta-glucuronide, cyanidin-3-monoglycoside, cyanidin 3-sophoroside, cyanidin-3-rutinoside, cyanidin 3-glucoside, cyanidin 3-glucosylrutinozide, -beta-glucuronide [42].

Sagittaria sagittifolia L. The leaves contain: amino acids (alignment, arginine, aspartic acid, glutamic acid, glycine, histidine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, valine and tyrosine), sterols (daucosterol), diterpenes (isoabienol, sagittariol, deoxy sagittariol). The following substances have been identified in tubers: isoabienol, sagittarioside A and B, trifolion A, B, C and D [43].

Sambucus nigra L. Leaves: soluble carbohydrates, pectins (0.2%), lipids (4.8%), resins (4.3%), phenolic acids (behenic, caffeic, ferulic, shikimic), choline and tannin (0.4-3.0%), sterols (campesterol, sitosterol, stigmasterol), volatile oils, flavonoid pigments (anthocyanins and flavones), vitamins (ascorbic acid, riboflavin, rutin, thyanine), alkaloids (coniine), triterpenes (betulin, cycloartenol, ursolic acid, oleanolic acid), hydrocarbons (hentriacontan, heptacozan, hexacozan, heneicozan, nonacozan, octacozan, pentacozan, triacontan). Flowers: aliphatic amines (which determine the characteristic odor), flavonoid pygmies: anthocyanins (chrysanthemum), flavones (astragalin, rutinoside, hyperoside, isoquercitrine), flavonols (campferol, quercetin, isoramnetin-3-glucoside, acoramino) phenolic (caffeic, ferulic, chlorogenic), glycosides of triterpene acids (ursolic acid and oleanolic acid), cyanogenetic glycosides (sambunigrozide), triterpenes (alpha-amyrin, beta-amyrin, cycloartenol). Fruits contain: carbohydrates (4.7-5.8%), protein (2.5%), antirhinin, vitamins (biotin, niacin, nicotinic acid), malic acid (0.9-1.9%), ursolic acid, valerian acid. The fruits also contain carotenoid pigments: beta-carotene, flavoxanthin, lutein and neoxanthin. The characteristic aroma of the fruits is due to the presence of the compounds dihydroedulan and beta-damascenone [44].

Solanum dulcamara L.: The aerial organs of this species contain: carbohydrates (glucose, galactose, xylose, rhamnose), lipids (cholesterol), steroidal sapogenins (diosgenin, tigogenin, yamogenin) and pigments (lycopene, licoxanthin). The following substances were also identified: sterols (brassicasterol, beta-sitosterol, stigmasterol, campesterol, isofucosterol, gramisterol, obtusifoliol and lophenol) and alkaloids (alpha-soladulcine, alpha-solamarine, beta-solamarine, beta-soladulcine, gamma-soladulcine, gamma-solamarine, solanidine, solasolin, solamargin, soladulcine, tomatidine, solacein and soladulcamaridine) [45].

Stellaria media (L.) Vill.: The main components of this plant are: lipids (0.2-4.8%), proteins (1.2-1.1%), carbohydrates, mucilages (7-12%) and minerals. Vitamins: ascorbic acid (375 mg / 100 g), niacin (0.51 mg / 100 g), riboflavin (0.14 mg /100 g), thiamine (0.02 mg/100 g), choline and tocopherols. Pigments: carotenes (beta-carotene), isoflavones (genistein). Fatty acids: gamma-linolenic acid, linoleic acid, oleic acid, palmitic acid, stearic acid [46].

Syringa vulgaris L. The bark of this species contains carbohydrates, mannit, starch, resins, phenyl-propenic glycosides (syringin) and bitter substances (syringopicrin). The researchers identified in the volatile oil extracted from lilac flowers the following components: lilac aldehyde C (22.13%), lilac aldehyde B (12.56%), tricose (7.33%), methoxyanisole (6.82%), alpha-pinene (4.72%), geranyl acetone (3.65%), ocimen (3.47%), elemicin (3.37%), methyl heptenone (3.02%), isoelemicin (2.79%)), beta-farnesen (1.96%), heptacozan (1.89%), pentacozan (1.76%), methylheugenol (1.68%), beta-terpine (1.34%), benzaldehyde (1 36%), hexahydropharnesyl acetone (1.34%), bourbon (1.18%), citral (1.13%), benzylester (1.1%), beta-cubeben (1.02%), tetramethylheptadecane (0 , 74%), cedar (0.69%), methylenugenol (0.61%), nerolidol (0.56%), myrtenal (0.54%) and linalool (0.38%) [47].

Tilia cordata Miller The main chemical components in the flowers of this plant are: total dry matter (23.77%), carbohydrates, galotanins, catechins (proto-catechic acid and ellagic acid), volatile oils, mucilages, furanocoumarins (frangoside, esculoside), saponins (tiliadin), aliphatic compounds (docozan) and mineral substances (2.48%). Among the mineral elements determined in linden flowers can be mentioned: potassium (400.5 mg / 100 g), calcium (400.4 mg / 100 g), magnesium 68.6 mg / 100 g), sodium (5.47 mg / 100 g), iron (2.30 mg / 100 g) and zinc (0.92 mg / 100 g). Phenolic acids: caffeic acid, p-coumaric acid, chlorogenic acid [48]. Mucilages form by hydrolysis D-galacturonic acid, methylpentose and hexoses. Lime flowers contain the following pigments: kampferol-3-glucoside-7-couaroil, campferol-3-glucoside (astragalin), kampferol-3-rhamnoside, kampferol-3,7-diramnoside (kampferitroside), kampferol-3-glucoside-7 -ramnozide, quercetol-3- ramnoside (quercitrozide), quercetol-3-glucoside (isoquercitrozide), afzelin. Researchers identified 40 components in volatile oils extracted from linden flowers [49]. The highest amounts were p-cement (13.20%), carvacrol (10.20%), thymol (6.55%), terpinen-4-ol (5.90%), gamma-terpinen (5.40%), nonanal (3.50%), cis-sabin hydrate (2.90%), pentanal (2.25%), linalool (2.20%) and myrcene (2.20%). The following substances were also determined in small amounts: alpha-terpine, phenylacetaldehyde, hexanal, heptanal, alpha-terpineol, 1,8-cineole, limonene, alpha-pinene, 2-methylbutanoic acid, nonanoic acid, 1,2,4, 6-tetramethylpentadecan-2-one, terpinolen, p-cimen-8-ol, dacanal, beta-caryophyllene, 6-methyl-5-heopten-2-one, alpha-thujene, caryophyllene oxide, benzaldehyde, camphen, 3-methylbutanol , (E, E)-2,4-decadienal, dibutyl phthalide, anisaldehyde, 1-hexenal-3, (Z)-3-hexenylphenylacetate, (E, Z)-2,6-nonadienal, octanal and pentadecane. The lime leaves contain, depending on the maturation phase: 63.7-74.6% water, 130.1-244.9 mg / 100 g chlorophyll pigments, 14.4-27.4 mg/100 g carotenoid pigments, ascorbic acid, 2.9-3.3% lipids, triterpenes (beta-amyrin), flobafenes, linarin, 1.8-3.2% minerals, of which calcium (332.6-400.4 mg / 100 g), potassium (288.5-400.5 mg / 100 g) and magnesium (68.6-92.1 mg / 100 g). Lime wood contains: sucrose, sterols (beta-sitosterol, stigmasterol), triterpenes (taraxerol), linoleic acid, linolenic acid, oleic acid, palmitic acid, squalene [50].

Valeriana officinalis L. The main substances identified in the rhizomes are: carbohydrates (fructose 0.9%), lipids (2.3%), proteins (8.6%), tannins, resins, gums, choline, triterpene ketones (beta-ionone). Vitamins: ascorbic acid, niacin, riboflavin, thiamine. Pigments: beta-carotene. Sterols: beta-sitosterol, beta-sitosterol-stearate. Phenolic acids: caffeic, benzoic, chlorogenic, salicylic. Alkaloids: actinidine, valerian, valerian, valerenone, valerianol, valerianolic acid, valerianone, valerosidate, actinidine. Iridoids: valepotriate (0.5-1.7%), valtrate (0.4-1.8%), acevaltrate, isovaltrate, acevaltrate, dihydrovaltrate and homovaltrate. Monoterpenes: alpha-fenchen, beta-felandren, beta-pinene, camphene, valtrate (0.4-1.8%), didrovaltrate, gamma-terpene [51]. Monoterpenic alcohols: borneol and sesquiterpene alcohols: ledol. Sesquiterpenes: faurinone, alloaromadendren, alpha-valen, betavalen, beta-bisabolen, beta-element, caryophyllene, cadinen, maliol, valerenic acid, hydroxyvalerenic acid, valerenolic acid [52]. Volatile oils represent a maximum of 2.0% of the dry matter. Some researchers analyzed valerian roots and identified a number of 23 components in the extracted volatile oil. The following components were present: camphene 11.2%, kessil alcohol 10.0%, valeranone 9.0%, valeranal 8.6%, alpha-pinene 7.0%, elemol 6.8%, kesil acetate 4, 0%, beta-caryophyllene 2.3%, bornyl acetate 2.2%, 1,8-cineole 2.0% and limonene 2.0%, of the total components [53]. A concentration of less than 1.00% was determined for the following components: beta-pinen, sabinen, gamma-terpinen, alpha-tujen, alpha-fellandren, dihydro-beta-ionone, beta-terpinen, terpinolen, p-cimen, alpha-terpinen, eugenyl 3-methylbutyrate and isoeugenyl 3-methylbutyrate. The presence of the following components has been identified in valerian plants: pigments (beta-carotene, kampferol, myrcene, quercetin), fatty acids (oleic acid, linoleic acid, palmitic acid), acids (caffeic acid, capronic acid, p-coumaric acid), valeroportati (valepotriate, acetoxyvalepotriate), monoterpenes (acevaltrate), sesquiterpenes (alpha-curcumen, epikessanol, eremophilen, valerenol, kessan). The analysis of volatile oils extracted from valerian leaves showed the existence of 12 components: bornyl acetate (44.17%), camphen (32.08%), alpha-pinene (7.41%), beta-pinene (4.39%), limonene (1.73%), beta-thujol (1.7%), p-cimen (0.82%), borneol (0.76%), aristolene-1,9-diene (0.38%), beta-gurjunen (0.34%), beta-caryophyllene (0.1%) and valeranone (0.1%) of the total components [54]. Other researchers have analyzed the volatile oils extracted from valerian flowers and found that the share is held by isovelerated lavandulyl (21.16%), p-cresyl methyl ether (20.54%) (Z)-3-hexenyl acetate (8.12%), 1,2-dimethoxy-4-methylbenzene (4.66%), (E, E)-alpha-farnesen (2.79%), lavandulyl 2-methylbutyrate (2.41%) and pentadecane (2,06%). Less than 2.0% was found for the following components: 1-octanol, methyl benzoate, (E)-2-hexenyl acetate, octyl acetate, hexenyl acetate, 1-hexanol, isovalerate isoamyl, lavandulol, dodecane, limonene, (E)-beta-farnesen, (Z)-3-hexenol, benzaldehyde, (Z, E)-alpha-farnesen, hexanal, (E)-2-hexenol, lavandulyl valerate, linalool, methyl eugenol, myrcene, nonanal, alpha-pinene and beta-pinene. And other authors have identified in the valerian plants the presence of valeracetate, a new guava type sesquiterpene. Terpenoid combinations with iridoid nucleus, called valepotriats (valtratum, acevaltratum and dihydrovaltratum), have also been highlighted in the roots. These substances are important because they confer the sedative effect of extracts from this plant [55].

Viburnum lantana L. Researchers [3] identified in the leaf extract the following compounds: luteolin, apigenin, crisoeriol 7-O-beta-glucoside; apigenin 7-O-alpha-ramnoside (1-6) glucoside and amentoflavone (biflavones). Only flavonol derivatives were identified in the flower extract: kaempferol and quercetin 3-O-beta-galactoside; 3-O-beta-glucoside; 3-O-α-rhamnoszide (1-6) beta-glucoside; 3-O-alpha-rhamnoside (1>2) beta-glucoside [56].

Viburnum opulus L. The main chemical components identified in the bark of the branches are: carbohydrates, pectins, proteins (8.6%), tannins (catechins, epicatechins), hydroquinone, resins, glucosides, acids (chlorogenic acid, citric acid, and malic acid), anthocyanins, coumarins (scopoletin, esculetin), triterpenes (alpha- and beta-amyrin) and baldrianic acid. The presence of phenolic glycosides (arbutin), alkaloids (scopoline) has been determined in plants. The presence of flavonols (astragalin) was determined in the flowers, and in the fruits were identified: saponins (paeoniside), pigments (quercetin-glycoside), pectins (5.0%), tannins (3.0%), sterols (beta-sitosterol), phenolic acids (chlorogenic acid, cinnamic acid), triterpenes (ursolic acid) and aliphatic acids (valerian acid) [57].

Vinca minor L. In the aerial tissues of these species the presence of carbohydrates, amino acids, tannins, beta-phytosterol, pyrocatechol, caffeic acid, p-hydroxybenzoic acid, ursolic acid and minerals has been identified. The analyzes performed indicated the presence of about 40 alkaloids (0.15-1.0%), which are based on indole structures. The most common of these is vincamine (0.05-0.1%), an eburnane alkaloid. The following the alkaloids were also the identified: chebracamine, 1,2-dehydroaspidospermin, desacetylacamylamine, dimethoxyburnamonine, eburnamine, eburnamenine, eburnamonine, epipleiocarpamine-N4-oxide, epivincamine, ind N-methylchebrancamine'-methamide-beta-amine, 11-methoxyburnamonine, methoximinovincin, 16-methoxyvincadiformin, minovina, minovincin, minovincinin, perivncin, picrinin, reserpine, vinactin, vincadiformin, vincadine, vincamidine, vincaminorein, vincaminorine, vincaminorine, vincaminorine, vincaminorin, vincaminorine, vincaminorine vinomine, vinorine, vinoxin, and vintisine [58]. Among the pigments, the presence of flavones was identified: kampferol-diglycoside, kampferol-3-ramnoglycosyl-7-galactoside, kampferol-3-ramnoglycosyl-7-glucoside, quercetol-3-rutinosyl-7-glucoside, quercetol-3-ramnoglycosyl carotenoid pigments. The leaves of this plant contain the following free amino acids: aslanin, asparagine, arginine, aspartic acid, glutamic acid, glycine, histidine, isoleucine, leucine, lysine, phenylalanine, proline, serine, threonine, tyrosine and valine [59].

Viola odorata L. The main components identified are: triterpene saponins, mucilages, ascorbic acid (260 mg/100 g), methyl salicylate and phenyl-propenic glycosides such as violutoside. Violin roots contain: methyl salicylate, saponins (0.1-2.5%) and triacetoamines. The leaves contain: kampferol, quercetin, salicylic acid, synaptic acid, enanthic acid, ferulic acid, dihydroxycoumarins (scopoletin), triterpenes (fridelin), hexenol, heptenol. In flowers were identified: malic acid, sesquiterpenes (zingiberene), phenolic aldehydes (piperonal, vanillin), tetraterpenoids (auroxanthin, flavonxanthin, violaxanthin), alkaloids (viola-emetine) [60]. The flowers contain carotenoid pigments: beta-carotene, eloxanthin, lycopine, zeaxanthin, lutein. The flavonoid pigments in flowers are represented by: delfinidin, cyanidin and pelargonidine, mircetin, quercetin and kampferol, apigenin and luteolin, violantine, proanthocyanidins, violaquercetrin, violarutine, violin, vicenin 2, vitexin-mono-C-glucoside and sap. The blue-violet flowers contain delfinidin 3-rhamnoglucoside acylated with p-coumaric acid (violin), peonidine 3-glucoside (oxycoccyanin), peonidin-3,5-diglucoside (peonine) [61]. Flavonols are quercetin-3-rutinoside. Some researchers have analyzed the volatile oils in the leaves of violins in which they identified a number of 22 components. Of these, the share was held by linoleic acid (29.00%) and (E, Z)-2,6-nonadienal (12.00%). They were followed in the order of concentrations: hexadecanoic acid (8.50%), 2,6,11-trimethyldodecane (5.00%), 1-dodecanol (4.50%), (Z)-3-hexanol (4.10%), 2,4-dimethyldodecane (2.80%), 2,7,11-trimethyldodecane (2.80%), 2,5-heptadienol (2.00%), (E)-2-hexanol (2 00%), 1-hexadecene (1.80%), benzyl alcohol (1.50%), 1-octodecene (1.30%), (Z)-3-hexenyl formed (1.20%), 3, 4-dimethylheptane (1.00%), 2,6-dimethyloctane (1.00%). A proportion of less than 1.0% of the total volatile oils was determined for the following components: 1-eicosen, butyl acetate, 2-hexenal, 7-octen-4-ol, 3-pentadecenal, 5,10-pentadecadienol [62].

Viscum album L. Mistletoe leaves contain as active principle glycosides of hydroquinone such as arbutoside and its derivatives: pyroside, caffeoyl-2-arbutoside, vacciniin, etc. In the leaves were also identified: carbohydrates, hydroquinone, sterol saponosides (ursolic acid), phenolic glycosides (arbutin). Phenolic acids: gallic acid, quinic acid, caffeic acid and phenolic glucosides: 2-O-caffeyl-arbutin. Catechins: epicatechin, galocatechins. Pigments: isoquercitrine, hyperoside, beta-carotene, quercetin, avicularin. The main components identified in the tissues of this plant are: proteins (11.9%), lipids (2.3%), amino acids, resins, saponins, terpenes, alkaloids, glycosides and glycoproteins (lectins), gentisic acid (2,5- dihydroxybenzene, lignin (syrinagresinol). Phenolic acids: caffeic, syringic, vanillic, synaptic, shikimic ferulic acid, protocathecic Amines: choline, acetylcholine, histamine, tyramine Pigments: quercetol, quercetin-3-arabinoside, quercetin 1, quercide, alpha-carotene and xanthophyll Triterpenes: betulinic acid, betulin, alpha- and beta-amyrin Lignan derivatives: syringine, syringoside, sirarinarezinol, syringarezinol-mono-Oglucoside, siringenin-4'-O-glucoside, viscine, viscotoxin, The resins contain: ceryl alcohol, lupeol, oleanolic acid and beta-amyrin [63].

The research results are structured in the form of a theoretical-informative scientific guide, which includes, in addition to the literary and scientific name of medicinal plants, and a description of the main biochemical compounds detected in each species.

DISCUSSION AND CONCLUSION

Generalizing the information presented, we consider that the elaboration of such a guide of chemical compounds of medicinal plants is necessary, current and important for the following reasons: in the local literature there is information on the chemical composition of medicinal plants; Another reason that led us to develop this guide is the fact that there are currently many sources of information (websites, popular publications, magazines, newspapers, brochures, etc.), which provide unverified and invalid data from the point of view of scientific view, which could mislead applicants for truthful information. In this order of ideas, we consider welcome the appearance of this specialized theoretical-informative guide, which will be useful to specialists in the field, scientific researchers, pupils and students of specialized institutions, as well as to all those interested in this field.

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