

## MEDICINAL AND AROMATIC PLANTS OF AZERBAIJAN

### **Naiba Mehtiyeva**

*Institute of Botany, Azerbaijan National Academy of Sciences, Badamdar sh. 40,  
AZ1073, Baku, Azerbaijan*

### **Sevil Zeynalova**

*Institute of Botany, Azerbaijan National Academy of Sciences, Badamdar sh. 40,  
AZ1073, Baku, Azerbaijan*

**Keywords:** Azerbaijan, medicinal plants, aromatic plants, treatments, history, biological active substances.

### **Contents**

1. Introduction
  2. Historical perspective of the traditional medicine
  3. Medicinal and aromatic plants of Azerbaijan
  4. Preparation and applying of decoctions and infusions from medicinal plants
  5. Conclusion
  6. References
- Acknowledgement  
Glossary  
Bibliography  
Biographical Sketches

### **Summary**

Data on the biological active substances and therapeutical properties of more than 131 medicinal and aromatic (spicy-aromatic) plants widely distributed and frequently used in Azerbaijan are given in this chapter. The majority of the described species contain flavonoids (115 sp.), vitamin C (84 sp.), fatty oils (78 sp.), tannins (77 sp.), alkaloids (74 sp.) and essential oils (73 sp.). A prevalence of these biological active substances defines the broad spectrum of therapeutic actions of the described plants. So, significant number of species possess antibacterial (69 sp.), diuretic (60 sp.), wound healing (51 sp.), styptic (46 sp.) and expectorant (45 sp.) peculiarities. The majority of the species are used in curing of gastrointestinal (89 sp.), bronchopulmonary (61 sp.), dermatovenerologic (61 sp.), nephritic (55 sp.) and infectious (52 sp.) diseases, also for treatment of festering wounds, ulcers and scalds (55 sp.). 20 sp. are spicy-aromatic plants and widely used by local population.

### **1. Introduction**

To collect, systematize, summarize and analyse the data on medicinal plants from flora of Azerbaijan on the base of modern informative technologies the inventarization of Azerbaijan flora was carried out, more than 500 scientific literature sources [Medicinal plants of Azerbaijan, 1942; Makhlyuk 1967; Minaeva 1970; Medicinal plants in scientific and folk medicine, 1972; Gammerman et al., 1976; Shreter et al., 1979;

Aseeva et al., 1985; Ismailov, 1985; Plant resources of USSR, 1984-1991; Mashkovskiy, 1985-2008; Damirov et al., 1988; Ladinina et al., 1990; Alekperov, 1992; Plant resources of Russia and adjoining states, 1993; Plant resources of Russia and adjoining states, 1994; Plant resources of Russia and adjoining states, 1996; Aliyev, 1998; Kiseleva et al., 2002; Chobanov et al., 2004; Zeynalova, 2004; Serkerov, 2005; Mehtiyeva, 2006; Ibadullayeva and Djafarova, 2007; Mehtiyeva, 2007; Medical peculiarities of food plants, 2007; Plant resources of Russia, 2008; Mehtiyeva, 2008; Mehtiyeva, 2009; Mehtiyeva et al., 2009; Sahmurova et al., 2009; Zeynalova, 2009; Zeynalova et al., 2009; Novruzov, 2010; Serkerov et al., 2010 etc.] were analyzed, special field works were conducted, information on 26 parameters of each species of medicinal plants were gathered and “The electronic information-search base on medicinal plants from flora of Azerbaijan” [Mehtiyeva, 2006-2008] is created. As a result of analysis of the information of this database it was revealed that that from 4500 plant species distributed in Azerbaijan 1545 species belonging to 178 families and 740 genus or 34.3% of flora of Azerbaijan are medicinal plants.

According to the systematic classification majority of plants of the medicinal flora of Azerbaijan belong to *Magnoliophyta* (1461 species – 94.6%) and very less belong to *Polypodiophyta* and *Lychenophyta* (26 sp. - 1.7% for each), *Pinophyta* (18 sp. - 1.2%), *Equisetophyta* (6 sp. - 0.4%), *Gnetophyta* (3 sp. - 0.2%), *Bryophyta* and *Lycopodiophyta* (2 sp. - 0.13% for each), *Ginkophyta* (1 sp. - 0.06%).

*Magnoliopsida* class is represented mostly by species of *Asteraceae* Dumort. (160 sp.), *Fabaceae* Lindl. (102 sp.), *Lamiaceae* Lindl. (97 sp.), *Rosaceae* Juss. (82 sp.), *Apiaceae* Lindl. (72 sp.) and *Brassicaceae* Burnett (68 sp.) families. *Ranunculaceae* Juss. (46 sp.), *Caryophyllaceae* Juss. (39 sp.), *Chenopodiaceae* Vent. (38 sp.), *Scrophulariaceae* Juss. (31 sp.), *Polygonaceae* Juss. (30 sp.), *Boraginaceae* Juss. (30 sp.), *Euphorbiaceae* Juss. (25 sp.), *Malvaceae* Juss. (24 sp.), *Solanaceae* Juss. (19 sp.) and *Rubiaceae* Juss. (17 sp.) families took also main places. Medicinal plants from these families are more widely distributed in forest and meadow coenosis.

The leading families of *Liliopsida* class are *Poaceae* Barnhart (47 sp.) and *Orchidaceae* Juss. (28 sp.), also *Cyperaceae* Juss. (19 sp.), *Liliaceae* Juss. (15 sp.), *Alliaceae* J. Agardh (12 sp.), *Hyacinthaceae* Batsch and *Juncaceae* Juss. (11 sp. for each), *Iridaceae* Juss. (8 sp.) and *Amaryllidaceae* J. St.-Hil (7 sp.) are represented by numerous species.

On taxonomic view genera *Euphorbia* L. (21 sp.), *Salvia* L. (14 sp.), *Centaurea* L. (13 sp.), *Viola* L., *Galium* L., *Stachys* L., *Erysimum* L., *Allium* L. and *Artemisia* L. (12 sp. for each), *Potentilla* L. and *Rumex* L. (11 sp. for each), *Orchis* L. and *Chenopodium* L. (10 sp. for each) are distinguished by the number medicinal plants.

On life form medicinal plants distributed in Azerbaijan flora are trees (122 sp.), shrubs (115 sp.), subshrubs (13 sp.), dwarf shrub (11 sp.), dwarf subshrub (22 sp.), shrubs-liana (11 sp.), liana (1 sp.), perennial grasses (749 sp.), biennial grasses (86 sp.), annual grasses (354 sp.), also lichens (26 sp.), mosses (2 sp.), club-moss (1 sp.), ferns (26 sp.) and horse-tails (6 sp.).

The geographical relief has significant influence on the areals of medicinal plants. 937 sp. (60.6%) of medicinal plants are distributed in the middle mountain belt, 867 sp. (56.1%) – in lower mountain belt, 792 sp. (51.3%) – in mountain and foothills, 403 sp. (26.1%) – in high mountains, 248 sp. (16%) – in subalp and 76 sp. (4.9%) in alp mountain belts.

They are mostly weed (425 sp.), forest-shrub (250 sp.), mountain-meadow (241 sp.), also mountain-xerophytes (193 sp.), forest (162 sp.), rock-reef (132 sp.), mountain-steppe (123 sp.), high-steppe (107 sp.), desert (105 sp.), aquatic-marsh (82 sp.), psammophyte-actic (79 sp.) and roan-meadow (57 sp.) vegetation types.

Medicinal plants on classification on ecological groups are 399 sp. xeromesophytes, 324 sp. mesophytes, 323 sp. xerophytes, 260 sp. mesoxerophytes, 33 sp. hydrophytes and 13 sp. parasites. The rest species are transitional ecological groups.

On the distribution of medicinal plants in botanical-geographical regions of Azerbaijan Guba massif of Great Caucasus (590 sp.) and the mountain part of Nakhchivan (569 sp.) are more rich by these plants. The northern and central regions of Small Caucasus are represented by 455 and 444 sp. of medicinal plants, respectively, eastern and western regions of Great Caucasus – by 404 and 387 sp., respectively, mountain part of Lenkaran – by 356 sp., southern regions of Small Caucasus – by 332 sp., Kur-Araz and Lenkaran lowlands– by 328 and 310 sp., respectively, Kur and Nakhchivan plains – by 308 and 263 sp., respectively, Bozgir plateau – by 258 sp., Gobustan – 257 sp., Diabar – 233 sp., Absheron – 214 sp., Samur-Devechi lowland – by 206 sp., Alazan-Eyrichay valley – by 127 sp., Mugan of Lenkaran – by 52 sp. 184 sp. (11.9%) of medicinal plants are distributed in all regions of Azerbaijan.

78 sp. of medicinal plants are endemics of Caucasus, 5 sp. are Azerbaijan endemics. 45 sp. are relicts and 110 sp. are rare plants.

Medicinal plants of Azerbaijan are rich with significant biological active substances. 912 sp. (59%) of medicinal plants contains flavonoids, 593 sp. (38.4%) alkaloids, 518 sp. (33.5%) vitamin C, 454 sp. (29.4%) fatty and 466 sp. (30.1 %) essential oils, 452 sp. (29.3%) tannins, 321 sp. (20.8%) saponins, 297 sp. (19.2%) coumarins, 279 sp. (18.1%) steroids, 248 sp. (16.1%) anthocyanins, 230 sp. (14.9%) organic acids, 216 sp. (14%) carotinoids, 213 sp. (13.8%) triterpenoids, 201 sp. (13%) carotin, 138 sp. (8.9%) glycosides, 105 sp. (6.8%) resins, and form 8 to 90 sp. other biological active substances.

In whole, 112 sp. (72%) of medicinal plants are officinal species included in Pharmacopoeia. Besides, 1189 sp. (77%) of these plants are used in folk medicine, 259 sp. (16.8%) in homeopathy, 218 sp. (14.1%) scientific and 140 sp. (9.1%) in practical medicine, 707 sp. (45.8%) in experimental, 90 sp. (5.9%) in clinical trials, 158 sp. (10.2%) in Tibetan, 92 sp. (5.9%) for each in Chinese and Indian, 431 sp. (27.9%) in medieval Azerbaijanian medicine, 214 sp. (13.8%) in pharmacology, 147 sp. (9.5%) in veterinary.

On therapeutic peculiarities among medicinal plants of Azerbaijan 445 sp. (28.8%) have diuretic action, 361 sp. (23.4%) antibacterial, 326 sp. (21.3%) wound healing, 255 sp. (16.6%) softened, 249 sp. (16.1%) anti-inflammatory, 215 sp. (14%) anthelmintic, 199 sp. (12.9%) astringent, 172 sp. (11.1%) haemostatic, 163 sp. (10.9%) expectorant, 141 sp. (9.2%) for each sudorific and hypotensive, 138 sp. (8.9%) cholagogic, 134 sp. (8.7%) analgesic, 123 sp. (8%) anti-tumor, 118 sp. (7.6%) for each sedative and tonic, 114 növ (7.4%) for each febrifugal and styptic, 113 sp. (7.3%) antiseptic, 93 sp. (6%) protistosidal and 33 sp. (2.1%) antiviral. There are 168 (10.9%) sp. among medicinal plants. Majority of plants combine certain these properties.

The range of diseases cured by medicinal plants and assortments of plants used for diseases treatments are quite wide.

397 sp. (25.7%) of plants are used in curing of stomach diseased, 384 sp. (24.6%) – dermatological problems, 275 sp. (17.8%) – rheumatism, 231 sp. (15.1%) – festering wound and ulcers, 216 sp. (14.%) – intestinal, 214 sp. (13.9%) – heart, 204 sp. (13.2%) – bronchitis and bronchial asthma, 198 sp. (12.8%) – liver, 183 sp. (11.8%) – women's diseases, 173 sp. (11.2%) – pulmonary tuberculosis, 158 sp. (10.2%) – haemorrhoids, 153 sp. (10%) for each – kidney and podagra, 123 sp. (7.7%) – sharp respiratory infections, 118 sp. (7.6%) – eye diseases, 113 sp. (7.3%) – throat, 84 sp. (5.4%) – gall bladder, 81 sp. (5.3%) for each – neural and diabetes, 26 sp. (1.7%) – allergic diseases and 97 sp. (6.3%) – scalds.

As a result of inventarization of aromatic plants it was established that 640 species belonging to 311 genus and 80 families are distributed in flora of Azerbaijan [Zeynalova, 2009].

## **2. Historical Perspective of the Traditional Medicine**

In Azerbaijan adjoining with eastern and western countries, folk medicine with peculiar features has profound roots. A history of the use of medicinal plants or herbs, i.e. plants with healing properties has an ancient background in Azerbaijan and information on plant medicines handed down over the centuries. Even today, the preference of phytotherapy is not negated by the modern medicine.

Azerbaijan occupies a very favorable geographical location, since 9 from all over the world existing 11 climatic zones are found in this territory. This is a main reason of the unique biodiversity of the flora in Azerbaijan. Besides, Azerbaijan is a country at the crossroads of numerous cultures, religions and civilizations. So, ancient Azerbaijani medicine was influenced by various healing systems, such as Turkic, Iranian, Semitic and Greek medicine, and ancient inhabitants of Azerbaijan distinguished by their knowledge in the field of medicine [Alakbarli, 2006].

Some ancient Azeri folklore devoted to medicinal plants can be good evidence for it. For example, short folk verses named "bayati" contain information about healing properties of yarpiz (water mint), uzerrick (harmel), zoghal (cornel), yemishan (hawthorn) etc. Traditionally, no part of a medicinal plant was wasted; all parts (seeds, flowers, leaves, stems and roots) were used. But much investigation remains to be done

now as out of 726 medicinal herbs that were mentioned in early manuscripts, only 466 are known to grow in Azerbaijan today. Of these, 252 are not currently being used for any medicinal purpose, at all (Alakbarli, 2006)

### 3. Medicinal and Aromatic Plants of Azerbaijan

Tables 1-24 describe important and widely used medicinal and aromatic plants of Azerbaijan. The pictures of these plants can be seen in Figures 1-24 respectively. That is, Table x and Figure x belong to the same set of plants and so must be seen together.

Species / Family	Local used / Common name	Parts used / Ailments treated	Preparation / Administration	Chemical contents
<i>Cotinus coggygria</i> Scop. (Anacardiaceae Lindl.)	Saraghan Coggygria sumach, smoke tree	Leaves, cortex, branches Antiseptic, antioxidant, cholagogue, astringent, wound healing, anti-inflammatory Gastrointestinal and liver diseases, nephrolithiasis, tumors, vascular diseases, stomatitis, festering wound, scalds, rheumatism, dermatoses	Internal External	Vitamin C, glucosides, flavonoides, carotinoids, essential oil, steroids, tannins
<i>Rhus coriaria</i> L. (Anacardiaceae Lindl.)	Ashi sumakh Tannic sumac	Fruits, leaves Antivirus, astringent, anti-inflammatory, febrifugal Diseases of kidney, gallbladder, struma, diarrhea, rheumatism, hemorrhage, scalds, intoxication, festering wound and ulcer, inflammatory process of oral cavity	Internal External	Vitamin C, flavonoides, carotinoids, anthocyanins, essential oils, tannins
<i>Carum carvi</i> L. (Apiaceae Lindl.)	Adi zire Ordinary omum plant	Fruits, essential oils Antibacterial, anthelmintic, diuretic, laxative, expectorant, carminative, sedative Bronchitis, bronchial asthma, rachitis, tuberculosis, liver, neurosis, diseases of stomach, urinary and eye, dermatoses, tumors	Internal External	Flavonoides, essential and fatty oils, coumarins, steroids
<i>Daucus carota</i> L. (Apiaceae Lindl.)	Yabani kok Wild carrot	Grasses, fruits, roots Anthelmintic, spasmolytic, cholagogue, diuretic, anti-inflammatory Gastrointestinal, liver, cardiovascular and neural disorders, nephrolithiasis, malignant tumors	Internal	Flavonoides, essential and fatty oils, coumarins, carotinoids, alkaloids, steroids, aromatic compounds
<i>Foeniculum vulgare</i> Mill. (Apiaceae Lindl.)	Adi raziyana Ordinary fennel	Fruits, essential oils Antibacterial, estrogenic, diuretic, expectorant, carminative, febrifugal Bronchitis, bronchial asthma, diseases of kidney, urinary bladder, eye, struma, neurosis, festering wound and ulcer	Internal External	Flavonoides, essential and fatty oils, coumarins, steroids, phenol carboxylic acids,

				anthocyanins
<i>Arum elongatum</i> Stev. (Araceae Juss.)	Uzunsov danaayaghı  Prolate arum	Grasses, tuber Wound healing, sedative, hemostatic Bronchial asthma, pulmonary tuberculosis, allergy, stomach disorders, impotence, festering wound and ulcer	Internal External	Alkaloids, saponins

Table 1. Important and widely used medicinal and aromatic plants of Azerbaijan (See Figure 1)








Species / Family	Plant/tree/creeper/shrub as a whole	Leaves	Flowers	Fruits	Seeds
<i>Cotinus coggygria</i> Scop. (Anacardiaceae Lindl.)					
<i>Rhus coriaria</i> L. (Anacardiaceae Lindl.)					
<i>Carum carvi</i> L. (Apiaceae Lindl.)					
<i>Daucus carota</i> L. (Apiaceae Lindl.)					
<i>Foeniculum vulgare</i> Mill. (Apiaceae Lindl.)					
<i>Arum elongatum</i> Stev. (Araceae Juss.)					

Figure 1. Important and widely used medicinal and aromatic plants of Azerbaijan (see Table 1)

Species / Family	Local used / Common name	Parts used / Ailments treated	Preparation / Administration	Chemical contents
<i>Achillea filipendulina</i> Lam. (Asteraceae Dumort.)	Topulgayarpag boymaderen Spirea-leaved milfoil	Grasses, leaves, flowers Styptic, diuretic, anticonvulsive, wound healing, antivirus, antibacterial, antifungal Stomach and heart diseases, headache, festering wound, hemorrhage, hemorrhoids	Internal External	Alkaloids, essential oils, flavonoides, saponins, coumarins, vitamin E, carotin, carotinoids, terpenoids
<i>Achillea nobilis</i> L. (Asteraceae Dumort.)	Adi boymaderen Ordinary milfoil	Grasses, flowers, seeds Styptic, anticonvulsive, stimulant, tonic, wound healing, febrifugal, expectorant, Antitumor, antibacterial, antifungal, anthelmintic Diseases of stomach, lungs, liver, cardiovascular, tympanism, haemorrhoids, dentalgia	Internal External	Alkaloids, essential oils, flavonoides, tannins
<i>Achillea millefolium</i> L. (Asteraceae Dumort.)	Nejib boymaderen Noble milfoil	Grasses, flowers Anthelmintic, antioxidant, spasmolytic, wound healing, anti-inflammatory Women's diseases, stomatitis, nephrolithiasis, rheumatism	Internal External	Alkaloids, essential, gums, fatty oils, flavonoides, tannins, carotin, glucosides, vitamins C and K, lactones
<i>Anthemis candidissima</i> Willd. ex Spreng. (Asteraceae Dumort.)	Parlag sighir gozu Nitidous camomile	Grasses, leaves Styptic, wound healing, antitumor, anthelmintic Dysentery, metrorrhagia	Internal External	Sesquiterpenoides
<i>Arctium lappa</i> L. (Asteraceae Dumort.)	Iri atpitraghi Large burdock	Grasses, leaves, stems, fruits, roots Antibacterial Gallbladder, liver, urinary bladder and kidney diseases, gastric ulcer and duodenal ulcer, diabetes, arthritis, rheumatism, malignant tumours, atherosclerosis, podagra, intoxication, dermatoses	Internal External	Glucosides, alkaloids, flavonoides, essential oils, vitamin C, tannin and bitter substances, steroids, rubber

Table 2. Important and widely used medicinal and aromatic plants of Azerbaijan (See Figure 2)






Species / Family	Plant/tree/creeper/shrub as a whole	Leaves	Flowers	Fruits	Seeds
<i>Achillea filipendulina</i> Lam. (Asteraceae Dumort.)					
<i>Achillea nobilis</i> L. (Asteraceae Dumort.)					
<i>Achillea millefolium</i> L. (Asteraceae Dumort.)					
<i>Anthemis candidissima</i> Willd.ex Speng. (Asteraceae Dumort.)					
<i>Arctium lappa</i> L. (Asteraceae Dumort.)					

Figure 2. Important and widely used medicinal and aromatic plants of Azerbaijan (see Table 2)

Species / Family	Local used / Common name	Parts used / Ailments treated	Preparation / Administration	Chemical contents
<i>Artemisia absinthium</i> L. ( <i>Asteraceae</i> Dumort.)	Aci yovshan  Bitter wormwood	Grasses, roots, seeds Antibacterial, antihelmintic, cholagogue, sedative, fitonsid, anti-inflammatory, spasmolytic Diseases of liver and gallbladder, scalds, women's diseases, haemorrhoids	Internal External	Flavonoides, essential and fatty oils, coumarins, alkaloids, vitamin C, tannins, gums, Glucosides
<i>Cichorium intybus</i> L. ( <i>Asteraceae</i> Dumort.)	Birillik yovshan  Annual wormwood	Grasses, flowers, leaves, fruits, roots Sudorific, astringent, anticonvulsive, appetizing, anti-inflammatory Diabetess, diseases of liver and spleen, nephrolithiasis, jaundice, dermatoses	Internal External	Glucosides, flavonoides, essential and fatty oils, coumarins, vitamins C, B <sub>1</sub> and PP, carotinoids, bitter substances
<i>Helichrysum plicatum</i> DC. ( <i>Asteraceae</i> Dumort.)	Adi kasni  Ordinary chicory	Flowers Antibacterial, anthelmintic, antifungal, cholagogue, hemostatic, diuretic Jaundice, ascites, dermatoses and women's diseases, dentalgia	Internal External	Flavonoides, essential oils, vitamins C and K, carotin, bitter substances, gums, aromatic compounds
<i>Inula helenium</i> L. ( <i>Asteraceae</i> Dumort.)	Gatli guruchichek  Plaited everlasting	Grasses, flowers, leaves, fruits, roots and rhizome Antibacterial, anthelmintic, antiprotozoan, antifungal, histamine, expectorant, sedative, hemostatic, anti-inflammatory Pulmonary tuberculosis, bronchitis, bronchial asthma, diseases of gastrointestinal, liver, gall and urinary bladder, malaria, furuncles, festering wound and ulcer	Internal External	Saponins, flavonoides, essential oils, coumarins, steroids, Vitamins C, E, carotin, bitter substances, gums
<i>Matricaria recutita</i> L. ( <i>Asteraceae</i> Dumort.)	Uca andiz  Tall inula	Grasses, flowers, leaves, roots Cholagogue, astringent, laxative, sudorific, sedative, anti-inflammatory, expectorant, carminative antiseptic, antibacterial, antioxidant, radioprotective Gastrointestinal and women's diseases, rheumatism, dermatoses, headache, earache, stomatitis, haemorrhoids, angina, podagra	Internal External	Essential oils, coumarins, vitamin C, resin, flavonoides, lactones, tannin and bitter substances, phenolcarboxylic acids

Table 3. Important and widely used medicinal and aromatic plants of Azerbaijan (See Figure 3)




Species / Family	Plant/tree/creeper/shrub as a whole	Leaves	Flowers	Fruits	Seeds
<i>Artemisia absinthium</i> L. (Asteraceae Dumort.)					
<i>Cichorium intybus</i> L. (Asteraceae Dumort.)					
<i>Helichrysum plicatum</i> DC. (Asteraceae Dumort.)					
<i>Inula helenium</i> L. (Asteraceae Dumort.)					
<i>Matricaria recutita</i> L. (Asteraceae Dumort.)					

Figure 3. Important and widely used medicinal and aromatic plants of Azerbaijan (see Table 3)

-  
-  
-

TO ACCESS ALL THE 62 PAGES OF THIS CHAPTER,  
Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

### Bibliography

Alakbarli F.U. (2006) *Medical Manuscripts of Azerbaijan*. Heydar Aliyev Foundation, Baku , 220 p. [In this book the author reviews the medieval medical manuscripts of Azerbaijan, history of medicine in Azerbaijan, prevention of diseases and healthy way of life, folk medicine of medieval Azerbaijan, professional medicine in medieval Azerbaijan, medieval pharmacology.]

Alekperov F.U. (1992) *Comparative analysis of medicinal plants of medieval (XIII-XVIII centuries) and modern Azerbaijan*. Ornak, Baku, 85 p. [The book for the first time deals with the botanical research of drug plants used in medieval Azerbaijan, on the basis of XIII-XVIII centuries Azerbaijan manuscripts in the field of medicine and pharmacology. This work describes quantity and composition of plant species and carries out comparative biomorphological, systematic, ecological and geographical analysis of medicinal plants used in medieval and modern Azerbaijan.]

Aliyev N.I. (1998) *Medicinal plants of Azerbaijan and phytotherapy*. Elm, Baku, 343 p. [This book provides information on the brief history of medicinal plant use, phytotherapy, time of collection and the guidance for drying and extractions of plant materials, also numerous phytotherapeutic receipts used in curing of various diseases.]

Aseeva T.A., Blinova K.F., Yakovlev G.P. (1985), Nauka, Siberian branch, Novosibirsk, 160 p. [Method of the study of medicinal agents from Tibetan) *Medicinal plants of Tibetan medicine*. Novosibirsk medicine, their description and pictures of plants, also scientific equivalents for Tibetan names of medicinal plants are given in this book.]

Chobanov R.E., Aleskerova A.N., Dzhahmedova S.N., Safieva L.A. (2004) Experimental estimation of antiparasitic properties of essential oils of some *Artemisia* (Asteraceae) species of Azerbaijan flora. *Plant Resources*, Nauka, Saint-Petersburg, V.40, R.4, 94-98. [Antiparasites properties of essential oils from *Artemisia absinthium* L., *A. annua* L. and *A. scoparia* Waldst. Et Kit. are approved on experimental models of intestinal human parasites (*Hymenopolis nana*, *Lambli intestinalis*, *Syphacia obvelata*, *Trichocephalus muris*). By enteral injection of 0.01 ml/g 6% essential oil in ethanol solution (2 times per day during 3 days) to white mice the effectiveness of treatments of intestinal parasites has appeared in 70-90% animals.]

Damirov I.A., Prilipko L.I., Shukurov D.Z., Kerimov Yu.B. (1988) *Medicinal plants of Azerbaijan*. MAARIF, Baku, 320 p. [In this book the authors grouped the medicinal plants on their content of biological active substances. The brief description of 410 wild-growing and cultivated medicinal plant species authorized for application in scientific medicine is indicated. It also provides about results of investigations on medicinal plants worthy for use in practical medicine and being the object for procurements, as well as presented interest for cultivation.]

Gammerman A.F., Grom I.I. (1976) *Wild-growing medicinal plants of USSR*. Medicine, Moscow, 286 p. Description, geographical distribution in USSR, methods of procurements and drying of raw materials, pharmacological active substances, and medical value of 260 species of wild-growing medicinal plants authorized by Pharmacological committee for application in practical medicine are presented in this book.

İbadullayeva S.Dj. Djafarli İ.A. (2007) *Essential oils and aromatherapy*. Elm, Baku, 115 p. [Information on essential oils, the methods of their isolation, chemical composition, quality, maintenance, safety and used fields are given in the book.]

Ismailov N.M. (1985) Alkaloid-bearing plants of Azerbaijan (description of families, genres and species). Elm, Baku, V. II, 182 p. [This book provides brief characteristics, distribution on regions of Azerbaijan, geographical type, the growing conditions, ecological groups, contents and chemical composition of alkaloids of 305 alkaloid-bearing species. The use of some species in scientific and folk medicine is indicated.]

Kiseleva T.L., Svetaeva E.B. (2002) Nomenclature of productive plants and raw material for production of homeopathic medicinal remedies in Russia. Scientific-practical center of traditional medicine and homeopathy the Russian Federation Ministry of Health, Moscow, 122 p. [The total list of plants used in world practice (1063 sp.) as well as in Russia (706 sp.) for production of homeopathic medicinal agents authorized for medical application is given in this work. The sources of raw materials are indicated and their classification on origin (wild-growing, cultivated, imported) is presented for the first time.]

Ladinina E.A., Morozova R.S. (1990) *Phytotherapy*. Medicine, Leningrad, V. II, 303 p. Separate medicinal plants, their collection ways, guidance for their compilation are described in this book. Phytotherapy of atherosclerosis, hypertension and hypotension of neurosis, diseases of respiratory apparatus, kidney and urinary bladder, digestive disorders are considered.

Grossheim A.A. Ed. (1942) *Medicinal plants of Azerbaijan*. Azerbaijan Branch of Academy of Sciences, Baku, 202 p. [Recommendations on collection, drying and conservation, also brief botanical description, geographical distribution in regions of Azerbaijan, medical features and prescriptions for application of

210 wild-growing and cultivated medicinal plant species are given in this book. Plants are divided into officinal, non-official and public medicinal.]

*Medicinal plants in scientific and folk medicine* (1974), University of Saratov Publ. Saratov University Publishing House, Saratov, 382 p. [This book contains description of 160 wild-growing and cultivated medicinal plant species used in medical practice. Botanical description, their distribution, time and methods for procurements, used parts, active substances, influence on organism and diseases are given for each species.]

Kiseleva T.L. Ed. (2007) Medical peculiarities of food plants. Federal scientific clinical-experimental center of traditional methods of diagnostics and treatment, Moscow. 533 p. [This book reviews more than 130 important cultivated and wild-growing food plants of planet, mostly used in Russia. Botanical description, their origin and distribution, spectrum of biological active substances, indications and contraindications for application in traditional and medical practice are given for each species.]

Makhlyuk V.P. (1967) Medicinal plants in folk medicine. Privoljjsk Book Publishing House, Saratov, 558 p. [Author indicates in the book information on collection, drying, main methods of application, botanical description, distribution, habitats, applied parts, chemical composition and application in folk medicine more that 600 plant species, also about 150 medicinal plants.]

Mashkovskiy M.D. (1985) *Medicinal remedies*. Medicine, Moskow, 10<sup>th</sup> Ed., V. 1, 624 p.; V. 2, 575 p.; (1988), Medicine, Moskow, 11<sup>th</sup> Ed., P. 1, 624 p., P. 2, 573 p.; (1993), Medicine, Moscow, 12<sup>th</sup> Ed.; (2002), Medicine, Moskow, 14<sup>th</sup> Ed.; (2008), Novaya Volna, Moscow, 15<sup>th</sup> Ed., 1206 p. [New revised and supplemented edition contains information about more than 2000 domestic and foreign medicinal means (about 13.5 thousands names including synonyms) authorized in medical practice. Information on chemical structure, pharmacological properties, action mechanism, indications and contraindications for application, doses, side effects and other data necessary for the rational therapy are presented.]

Mehtiyeva N.P. (2006) Comparative analysis of computer database of medicinal plants from Lenkoran region of Azerbaijan. *News of Azerbaijan National Academy of Sciences. Biol. Sci. series*, Elm, Baku, 5-6, 23-35. [On the basis of computer databank on biodiversity of medicinal plants of Azerbaijan created by author the results of taxonomical, biomorphological, ecological-geographical analysis, the analysis on the contents of biological active substances, therapeutic groups and forms of application of 798 species from 478 genus and 130 families of medicinal plants from Lenkoran zone are presented in this article. Among these species 15 species are endemics of Caucasus, 8 – endemics of Azerbaijan, 12 - relic and 79 - rare and disappearing species.]

Mehtiyeva N.P. (2007) On creation of database of medicinal plants of Azerbaijan flora. Proceedings of 4<sup>th</sup> International Scientific Conference on “Biological diversity. Introduction of plants”, Nauka, Saint-Petersburg, p. 57-58. [Brief information on creation of computer data base including biodiversity of medicinal herbs of Azerbaijan flora (171 families, 729 genus, 1500 species, from them 77 species – endemics Caucasus, 15 species – endemics Azerbaijan, 22 species – relict, 130 rare and disappearing species ) is given in this article. Passport for each species inserted to the computer data base includes 26 parameters, which show complete botanical description, ecology, contents of biologically active substances, medicinal characteristics and color photos in natural coenosis.]

Mehtiyeva N.P. (2008) Biological activity and therapeutical properties of medicinal plants from Azerbaijan flora. Proc. of I Phytotherapeutic Congress of Russia. Federal scientific clinical-experimental center of traditional methods of diagnostics and treatment, Moscow, Russia, 276-284. [Taxonomical analysis, analysis on contents of biological active substances, therapeutical peculiarities and application forms of 1523 species comprised on the base of computer data bank of medicinal plants of Azerbaijan are presented. Prevalence of species containing flavonoids, alkaloids, essential oils, vitamin C and tannins possessing diuretic, antibacterial, wound healing, laxative and anthelmintic properties and applied against gastrointestinal and dermal diseases was established.]

Mehtiyeva N.P., Mustafaeva S.D., Zeynalova S.A. (2009) Resources of wild medicinal plants of the Samur-Divichi lowland (Azerbaijan). *Plant Resources*, Nauka, Saint-Petersburg, 45, 2, 37-47. [32 species of medicinal plants used in scientific, clinical and experimental medicine, homeopathic and veterinary science, and having significant sticks are revealed in the Samur-Divichi lowland of Azerbaijan. The operational stock of air-dry raw material of investigated species varies within the limits of 0.2-515 t.]

Mehtiyeva N.P. (2009) Medicinal plants from flora of Azerbaijan used in homeopathy. *Traditional Medicine*, Federal scientific clinical-experimental center of traditional methods of diagnostics and treatment, Moscow, 1(16), 12-20. [The taxonomical, biomorphological, ecological analysis, also analysis

on contents of biological active substances and therapeutical properties of 257 species applied in homeopathy are presented in the article. Among them 127 species are from principal families (Asteraceae, Rosaceae, Lamiaceae, Fabaceae, Ranunculaceae, Brassicaceae, Apiaceae, Cucurbitaceae, Scrophulariaceae, Solanaceae, Poaceae, Melanthiaceae, Liliaceae). The majority of (from 102 to 155 sp.) investigated species contain tannins, fatty and essential oils, alkaloids, vitamin C and flavonoids. Most part of (39.30-54.23%) investigated species possess diuretic, wound healing and anthelmintic properties.]

Minaeva V.G. (1970) *Medicinal plants of Siberia*. Nauka, Novosibirsk, 271 p. [Information on 200 main medicinal plants from Siberia: brief botanical characteristics, chemical composition, action, methods of collection and conservation, also field and methods of application are given in this book.]

Novruzov E.N. (2010) *Pigments of reproductive organs of plants and their significance*. Elm, Baku, 308 p. [The modern status, perspectives of investigations and application of plant pigments – antocyanins, flavonoids, carotenoids, betacyanins, possessing antioxidant, antiradiant, antiviral, anticarcinogenic properties, A and P vitamins activities of 400 plant species from flora of Azerbaijan are presented in this book. Issues on biology, chemotaxonomic and phylogenetic significance of pigments, also the reserve characteristics of industrially-valuable pigment-containing species, scientifically grounded ways of their rational use for production of carotenoids, antocyanins, flavonoids, concentrates and food coloring stuffs are elucidated.]

Plant resources of USSR. Flowering plants, their chemical composition, use. 1984, 1985, 1987, 1988, 1990, 1991, Nauka, Leningrad, V. 1-6 [Information on chemical composition and useful properties of 5302 species of wild-growing flowering plants from flora of USSR belonging to 918 genus and 131 families (Magnoliaceae - Limoniaceae, Paeoniaceae – Thymelaeaceae, Hydrangeaceae – Haloragaceae, Rutaceae – Elaeagnaceae, Caprifoliaceae – Plantaginaceae, Hippuridaceae – Lobeliaceae) is presented in this book. The description is composed on the base of generalization of voluminous local and foreign literature data.]

Plant resources of Russia and adjoining states. Flowering plants, their chemical composition, use. 1993, Nauka, Saint-Petersburg, V. 7, 352 p. [Information on chemical composition and useful properties of 1005 species of wild-growing flowering plants from flora of USSR belonging to 136 genera and 1 family (Asteraceae) is indicated in the book. The description is composed on the base of generalization of voluminous local and foreign literature data.]

Plant resources of Russia and adjoining states. Flowering plants, their chemical composition, use. 1994, Nauka, Saint-Petersburg, V. 8, 271 p. [Information on chemical composition and useful properties of 843 1005 species of wild-growing flowering plants from flora of USSR belonging to 219 genus and 28 families (Butomaceae – Typhaceae) is given in this book. The description is composed on the base of generalization of voluminous local and foreign literature data.]

Plant resources of Russia and adjoining states. Flowering plants, their chemical composition, use. Mir i Semya - 95, Sankt-Petersburg, 1996, V. 9 additions to V. 1-7, 571 p. [In the first part of book information on chemical composition and useful properties of 174 of wild-growing plants belonging to 52 genus and 28 families (Lycopodiaceae – Ephedraceae) is presented. The second part contains new information on species already included to the 1-7 volumes, also on uninvestigated earlier plants. The description is composed on the base of generalization of voluminous local and foreign literature data.]

Plant resources of Russia. Wildgrowing flowering plants, their component composition and biological activity. *Tovarishstvo Sci. Publ. KMK*, Sankt-Petersburg, 2008, V. 1, 421 p. [This book contains information on component composition and biological activity of 503 species of wild-growing flowering plants from flora of Russia belonging to 133 genus and 30 families (Magnoliaceae – Juglandaceae, Ulmaceae, Moraceae, Cannabaceae, Urticaceae). The description is composed on the base of generalization of voluminous local and foreign literature data.]

Sahmurova A.M., Zeynalova S.A., Mehdiyeva N.P., Mustafayeva S.J., Atakishiyeva Y. (2009) On antifungal effects of essential oils from *Pimpinella peregrina* L., *Daucus carota* L., *Achillea filipendulina* Lam. /*Journal of International Scientific Publication: Ecology & Safety*, Bulgaria. Volume 3, Part 1 p. 666-679. [Essential oil percentage of three widely distributed and having heavy stocks in flora of Azerbaijan species *Achillea filipendulina* Lam., *Pimpinella peregrina* L., *Daucus carota* L. have been investigated. Antifungal activity of essential oils is studied; the most active essential oils are in *A.filipendulina*, less - *P.peregrina*, weak - *D.carota*.]

Serkerov S.B. (2005) Terpenoids and fenolderivative plants of Asteraceae and Apiaceae families. Polygraphic Production, Baku, 311 p. [The monograph is devoted to investigations of terpenoids, in particular sesquiterpene lactones contained mainly in species from Asteraceae and Apiaceae families. Main methods of investigations applied for identification of structure of novel sesquiterpenoids are reflected. Intraspecific and interspecific biogenetic congener interconnection of sesquiterpene lactones isolated from species of *Artemisia* L. and *Ferula* L. genera are discussed, also literature data on various biological activities of group of plant substances are presented.]

Serkerov S.V., Mehtiyeva N.P., Mustafayeva S.D. (2010) New steroid compounds of *Achillea filipendulina* Lam. and *Eupatorium cannabinum* L. *Plant Resources*, Nauka, Saint-Petersburg, 46, 2, 99-105. [For the first time the steroid composition was studied in overground parts of *Achillea filipendulina* and *Eupatorium cannabinum*, which grow in Azerbaijan. Two substances were isolated from ethanol extracts by chromatography on the column based on  $Al_2O_3$  (neutral, III-IV degree of activity): I –  $C_{30}H_{50}O_2$ , from *A. filipendulina*; II-  $C_{28}H_{48}O$ , from *E. cannabinum*. According to chemical and spectral (IR-, NMR  $^1H$ ,  $^{13}C$ , Dept 135) data they correspond to 3 $\beta$ -acetoxy-24 $\alpha$ -methyl-cholest-20(21)-ene (substance I) and 24- $\alpha$ -methyl-cholest-20(21)-ene-3 $\beta$ -ol (substance II).]

Shreter A.I., Muravyeva D.A., Pakaln D.A., Yefimova F.B. (1979) Medicinal flora of Caucasus. Medicine, Moscow, 1365 p. [Authors of book describe 131 species of main and 47 species of supplementary wild-growing and cultivated medicinal plants from Northern Caucasus and Transcaucasia. Brief botanical description, typical habitats, regions of possible procurements, characteristic of raw material and qualifying standards, also information on chemical composition and medicinal application are given for each species.]

Zeynalova S.A. (2004) Essential oily plants and medical phytodesign. *Transactions of Institute of Botany*, Azerbaijan National Academy of Sciences, Elm, Baku, 427-430. [The availability of use of plant essential oils for the medical, preventive purposes and for sanitation of premises is shown in this work.]

Zeynalova S.A. (2009) Biodiversity of spicy-aromatic plants Fabaceae Lindl. family. Proceedings of Allrussian Conference on "problem and strategy of conservation of biodiversity of vegetation of Northern Asia". Offset, Novosibirsk, p. 86-87. [Fabaceae Lindl. family is represented in flora of Azerbaijan by 60 genus and 445 species, only 23 species of them have spicy-aromatic properties. Results of biomorphological, ecological-geographical analysis of spicy-aromatic plants of Fabaceae Lindl. are presented in this work, among them *Albizia julibrissin* Durazz. is endemic of Caucasus, also relict as well as rare and endangered species.]

Zeynalova S.A., Mehtiyeva N.P., Mustafayeva S.D., Ismailov E.I., Bakhshaliyeva K.F. (2009) Biological peculiarities of some medicinal and aromatic plant species, their anti-fungal activity. *Traditional Medicine*, Federal scientific clinical-experimental center of traditional methods of diagnostics and treatment, Moscow, 3(18), 40-47. [The summarized information on chemical composition, therapeutical features and application forms of *Phlomis pungens*, *Chenopodium botrys*, *Leucanthemum vulgare*, *Conyza canadensis*, *Anthemis rigescens* and *Eupatorium cannabinum* are presented in the article. Their areal, phytocenological peculiarities and resources in Guba region of Azerbaijan are indicated. As a result of investigations on anti-fungal activity of these plants and their aqueous extracts it was established that the aqueous extracts of *Chenopodium botrys* and *Eupatorium cannabinum* possess the highest fungistatic activity.]

Zeynalova S.A. (2009) Component composition of essential oil of *Teucrium polium* L. from flora of Azerbaijan. *J. Bulletin of Issik-kul University*, Karakol, № 24, 73-76. [Data on qualitative composition of essential oils from *Teucrium polium* L. wide-spread in flora of Azerbaijan is given in this article. Essential oil is isolated by hydrodistillation from air-dry above-ground parts of plants in flowering period (0,12%). Main components of essential oils are  $\alpha$ -pinen (50,1%) and linalool (6.77%). Water extract possesses anti-fungal activity concerning to test-culture *Trichoderma lignorum* and *Fusarium oxysporum*.]

## Biography Sketches

**Dr. Naiba Mehtiyeva** is the leading scientist at the Department of Plant Resources of the Institute of Botany, Azerbaijan National Academy of Sciences (ANAS), PhD and Associate Professor.

Her research area is the study of medicinal and essential oily wild-growing plants from flora of Azerbaijan. Thus, in 1988 she defended the PhD thesis on “Biological peculiarities and essential oily of species *Pimpinella* L. growing in Azerbaijan”. As a result of her investigations the species composition (12 sp.), ontogenesis, biology of blossoming, peculiarities of anatomical structure of fruits, quantitative contents of essential oils in different organs, their composition, antimicrobial activity, also toxicity thresholds were investigated. Essential oil samples as well as trial products aromatized by them were exposed in several exhibitions and competitions and were awarded with Diplomas. Dr. Mehtiyeva is the author of more than 90 scientific publications. The computer data bank on medicinal plants form flora of Azerbaijan comprising 1545 sp. of lower and higher plants is created by her. She is one of the compilers of new edition of “Red Book of Azerbaijan”. She is the member of Botanical Society of the Institute of Botany (ANAS), as well as the consultant on medicinal plants in GIZ.

**Dr. Sevil Zeynalova** is the leading scientist at the Department of Plant Resources of the Institute of Botany, Azerbaijan National Academy of Sciences (ANAS), PhD and Associate Professor.

Her research field is the study of spicy-aromatic plants from natural flora of Azerbaijan. In 1994 she defended the PhD thesis on “Bioecological peculiarities and essential oily of species from *Chaerophyllum* L. genus from flora of Azerbaijan”. The species composition of genus, phytoecological structure, and peculiarities of ontogenesis is studied, the carpological key for the identification of species of this genus on the base of morphological-anatomical structure is made, also content and chemical composition of essential oils, their antimicrobial properties and toxicity are investigated by her. The obtained essential oils are tested as aromatizers of alcohol-free drinks, caramels and chocolates liqueur stuffing, the results were affirmative.

Dr. Zeynalova is author of more than 70 scientific publications. The catalogue of aromatic plants from flora of Azerbaijan, consisting of 740 plant species is created by her. She is one of the compilers of new edition of “Red Book of Azerbaijan”. She is the member of Botanical Society of the Institute of Botany, ANAS, as well as the consultant on medicinal plants in GIZ.