SOME MEDICINAL PLANTS FROM WILD FLORA OF ROMANIA AND THE ECOLOGY

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Abstract**:** *The importance of ecological factors for medicinal species and their influence on active principles synthesis and the specific uptake of mineral elements from soil are presented. The biological and ecological characters, the medicinal importance, and the protection measurements for some species are given. Ecological knowledge of medicinal plants has a double significance: on the one hand provides information on resorts where medicinal plant species can be found to harvest and use of them, on the other hand provides information on conditions to be met by a possible location of their culture. Lately several medicinal species were introduced into culture in order to ensure the raw materials of vegetable drug industry. Placing them in culture presupposes knowledge of their ecology in natural habitats. By introducing the culture and ensure protection of wild flora species to harvesting abusive, irrational, especially of rare, endangered and protected. Vegetation of Romania is typical temperate continental with moderate temperate influence characteristic of central and Western Europe, specific continental to the Eastern Europe, the presence of the Carpathian Mountains has an impact on natural vegetation, and vegetation in the south has small Mediterranean influence. The therapeutic use of medicinal plants is due to active principles they contain. For the plant body these substances meet have a metabolic role, such as vitamins, enzymes, or the role of defense against biological agents (insects, fungi, even vertebrates) to chemical and physical stress (UV radiation), and in some cases still not precisely known functions of these substances for plants. As a result of research on medicinal plants has been established that the following factors influence ecology them: abiotic - temperature, air and soil humidity, rainfall, solar radiation, prevailing winds, orographic, edaphic , biotic - food and its abundance, intraspecific and interspecific relationships, parasites and predators, anthropogenic - grubbing, pollution of ecosystems, agricultural technology elements, etc..*

Key words: *medicinal plants, flora of Romania, ecological factors*

INTRODUCTION

Vegetation of Romania is typical temperate continental with moderate temperate influence characteristic of central and Western Europe, specific continental to the Eastern Europe, the presence of the Carpathian Mountains has an impact on natural vegetation, and vegetation in the south has small Mediterranean influence.

Romania vegetation is classified in areas of vegetation and vegetation levels. The areas of vegetation include the *Steppe zones* with herbaceous vegetation and shrubs isolated, the *silvosteppe zone* (oak forest zone and the steppe-like herbaceous vegetation, found in plains and low hills) and the *nemoral zone* widespread in the high plains of Muntenia and Oltenia and low plateaus with forest of heaven and flasks or oak in northern Moldova. These areas continue with floors of vegetation.

Floors of vegetation are located on altitude and include the *nemoral floor* (or deciduous forest) divided into *evergreen oak undergrowth* (300-600 (700) m) and *undergrowth of beech and mixed forests* (600-1200 m), *spruce floor* (or boreal) at altitudes of 1200-1700 m, *alpine floor* (with juniper trees) at altitudes of 1700-2000 m, and the *alpine floor* (over 2000 m), including primary grasslands (TĂMAŞ and all, 2006).

The interzonal vegetation is the vegetation of the Danube Delta, the water meadows, salty waters, sand, and peat.

Each plant species exhibit certain requirements to ecological factors. These requirements are expressed in scales for moisture, heat, light, soil acidity, trophicity and nitrogen.

ECOLOGICAL FACTORS AND MEDICINAL PLANTS

The therapeutic use of medicinal plants is due to active principles they contain. These principles are the substances of secondary metabolism, but their synthesis is dependent on the primary metabolism. For the plant body these substances meet have a metabolic role, such as vitamins, enzymes, or the role of defense against biological agents (insects, fungi, even vertebrates) to chemical and physical stress (UV radiation), and in some cases still not precisely known functions of these substances for plants (ALEXAN and all, 1991).

Synthesis of active principles is not always influenced by environmental factors as well as the synthesis of primary metabolites (carbohydrates, lipids, proteins). So for example, meal rich in vegetation is not an indication for the synthesis and accumulation of active ingredients, which is influenced differently by environmental factors. This finding requires analysis of active principles from medicinal plants growing in the environmental conditions. Must take into account the phytogeographic origin of the medicinal species. Thus, species of southern origin require higher temperatures than those of northern origin.

It was noted that the species producing volatile oil accumulates a larger amount of these oils in areas with higher temperatures, i.e. in the southern areas, with higher average daily temperatures. Like the species *Lavandula vera* (lavender), *Foeniculum vulgare* (fennel), *Coriandrum sativum* (coriander), etc.

Glycosides and alkaloids accumulate in plants up to a high intensity light, i.e. during the afternoon. If blueberry and cranberry leaf the content of flavonoid is about three times higher in plants, which vegetate, in bright light than those in shade.

Generally, the light intensity influences the synthesis of flavonoids and anthocyans.

Rainfall is more important to the flowering stage, after which soil moisture affects less synthesis and accumulation of active principles from medicinal plants.

Of nutrients N, P and K positively influence the synthesis and accumulation of glycosides, alkaloids, and essential oils.

Light can influence the synthesis of alkaloids in function the type of organic species. Thus, in the case of species *Scopolia carniolica*, a specie characteristic of deciduous forests, plants grown in direct light have a lower content than those grown in the shade.

Excessive high temperatures adversely affect both photosynthesis and synthesis of active principles, such high temperatures, and intense sweating results in dehydration of tissues.

Concentration of tannins and polyphenolic compounds generally increases in tissues attacked by animal parasites (insect larvae) or by fungi, in this case xenobiotic substances produced by parasites act as elicitive causing substances stimulating the synthesis of defense role against pests.

In case of *Origanum* species it was found that those of southern origin (Mediterranean) produce volatile oils in high concentrations of phenols (thymol, carvacrol), while in the northern species are reduced or absent.

Lower temperatures result in increases in concentration of Isoflavones (genistein, daidzein) about 2-3 times compared to plants grown under high temperatures.

To soil reaction (acid, alkaline or neutral) plant species may have a role of indicator plants, some calcicole other silicicole, while others are less influenced by this factor.

The roots of species leading to high concentrations selectively absorb some trace elements from soil. Given to the biological role of these elements and organo-mineral combinations involved, knowledge of species which accumulate different the mineral elements from the same ground on which grow several species, is an important factor in assessing their therapeutic value (e.g. I, Zn, Fe, Cu, Mn, Ni and others).

In addition to knowledge, the biology of each medicinal species is required the knowledge of ecological factors that can influence growth and development of species, the optimal conditions for cultivation (TĂMAŞ, 1999).

Biological characterization involves describing botanical species, systematic classification, where can be found and general data on its spread in a certain area, botanical characters differently from the other species closely related taxonomically or morphologically, scientific and popular names, duration of life and number of fructification.

Thus, plant species can be monocarp**,** those that have fruits once in their life, and then die. They can be *annual* (cycle of seed germination to the formation of new grains takes a year or less). Those annual may be *ephemeral* (life cycle takes several weeks), *summer annual* - a few months (e.g. peas, beans, corn, etc.) or can be *winter annual* (hibernate) that germinate in autumn and make fruits the following spring (e.g. winter wheat). The second category of those monocarp are represented by the *biennial* plants that have fruits on the second year after seed germination (e.g. cabbage, carrot, parsley, thimbles, cumin) and those that capitalizes *plurienenale* after many years of vegetation, but once in their lives and then die (e.g. species of agaves) (CIOCÎRLAN, 2000).

The *Polycarp* plants capitalize several times in their lives and are perennials. These may include *herbaceous* plants which ensures continuity and regeneration of vegetative and reproductive organs annually using specialized buds located on underground organs (such as bulbs, rhizomes or tubers), the vegetative buds located on stems, rhizomes or roots very close or even surface (mostly grasses), the fleshy stems for plants such as *succulents.*

Woody plants that have specialized tissues for protection represent the third category of Polycarp. Woody plants can be classified in *undergrowth,* with buds located at the base of the stem only partially lignified (e.g. lavender, hyssop, wormwood), *shrubs* with fully lignified stems, but branched from the base (e.g. rosehip, raspberry , blackthorn, currant, etc.) and *trees* showing strains as unbranched trunk branched at the base and top in the corona (CRĂCIUN and all, 1976).

After how plants ensure their perpetuation of the species can be classified into several biological forms **(bioforms)** that form after crossing the critical periods (frost, drought) **terofitele** (by seed), **hemicriptofite** (the buds that stand under the protection of leaves and snow), **geofite** (by strains metamorphosed underground - rhizomes, bulbs and tubers), **chamaefite** (through regeneration buds located on stems to 20-30 cm from soil surface). The **hydrophilic** (winters in wetlands or water butt), **fanerofite** (include woody plants with buds protected located on the stem above 25-30 cm) and **epiphytes** (plants that grow on stems of fanerofite) (ŞTEFĂNESCU, 2006).

An important feature of plants is the mineral nutrition. Mineral elements particularly have important biological implications for cell living matter, nutritional, metabolic, and pharmacological. These activities are components of protein, enzyme, and hormone. What herbs bring additional in comparisons with synthetic drugs is the necessary minerals intake in these living organisms. The man's vegetable nutrition these plants contribute to complete

necessary daily essential minerals.

It is therefore important to know the vegetable sources, which focuses some mineral elements. It is interesting that specific absorption of some elements by roots of plant species. It is not insignificant the accumulation of toxic elements by plants. They contribute to detoxify soil, but will not be used as medicinal herbs.

Analysis of these minerals in the plant body is achieved by techniques of atomic spectroscopy (ICP-MS) after digestion or calcinations of plant (MUNTEAN, 2007).

Such a comprehensive study was conducted by Antal D.S. (2005) for 56 species of plants harvested from Aninei Mountains. Thus, *lithium* accumulates in rhizomes of *Primula officinalis, Thymus serpyllum* grass, and *Taraxacum officinale, sodium* in chicory and comfrey root, *potassium* in celandine grass in *Lycoups europaeus* and mallow leaves. *Calcium* is concentrated in living nettle leaves (37 g/kg), the leaves of ash (36 g/kg) and horsetail (27 g/kg). A higher content of *chromium* was found in the grass of *Origanum vulgare* (3500 mg/kg), mallow leaves (2400 mg/kg), rhizomes of valerian. *Manganese* is accumulated in a concentration 10 times higher than the average in the leaves of birch, walnut, and cranberry (400-900 mg/kg). The high *iron* content was determined in primrose root (550 mg/kg) and valerian (510 mg/kg), *cobalt* in the high grass, *nickel* in the pansy grass (18 mg/kg), *copper* in the leaves of high mallow (24 mg/kg), the roots of comfrey (23 mg/kg) and Motherwort Grass (20 mg/kg).

Zinc is concentrated in pansy grass (225 mg/kg) and birch leaves (240 mg/kg).*Viola tricolor* accumulate high concentrations of cadmium (5000 mg/kg) as well as flowers of *Tilia tomentosa* (silver lime) (2800 mg/kg).

Iodine is concentrated in the roots of *valerian* (over 4000 mg/kg), roots of chicory (3250 mg/kg) (MUNTEAN, 2007).

To exemplify the importance the knowledge of medicinal species ecology, we selected a total of 4 species for which we present the biology, ecology, and medicinal importance of protective measures to be taken to conserve species and their genetic fund of spontaneous vegetation.

1. Arnica montana L., arnica, Asteraceae Family, Radiiflore Subfamily

It is herbaceous perennial specie with oblique rhizome. Has a basal rosette of leaves, a simple strain of about 60 cm which is catch a few leaves opposite, ovate-elliptical. Large terminal inflorescence 4-8 cm diameter with 12-20 marginal ligulae flowers, yellow and orange tubular central flowers numerous. Under-terminal flowers, opposite, are smaller. Frequent in Beech and spruce floor in meadows and pastures especially erected for *Nardus stricta* in the Apuseni Mountains in the north of Moldova. Mesophilic species, moderately acidophilus.

General Distribution: Europe, mountain

Flowers of arnica *(Arnicae flos)* contain a volatile oil of solid consistency, triterpene acids, flavonoids, carotenoids, poliine, sesquiterpenes (helenalina).Tinctures and creams containing extracts of arnica are shown as external inflammatory bruises, sprains, in phlebitis and varicose veins. In Romania is least used, most production is exported as well as the price quoted.

It is considered a vulnerable species. Medicinal value requires rational harvesting of spontaneous flora. Thus, it indicates only harvesting the terminal inflorescences and only from a part of the plant to ensure natural reproduction by seeds. The most important basins are the Apuseni Mountains, Gârda de Sus (Alba County), Poiana Horea (Cluj County), and Vatra Dornei (Suceava County). Annually are harvested about 20 tons of dried flowers. Persistence of species in spruce floor is conditional, however, keeping farm mountain meadows where particular are protected with fences. Overgrazing and soil plowing and excessive weight gain leading to species extinction. It is also recommended rotation-harvesting, underground parties harvesting interdiction (from which are prepared homeopathic tinctures), spreading the seeds on good land specific to species.

It can be cultivated only in mountain areas where the species is spread naturally. It have been tried to introduce in the culture a North American species, *A. chamissonis.*

2. Colchicum autumnale L., Crocus autumn, Liliaceae Family, Colchicoideae Subfamily

It is an herbaceous perennial species, without strain in air. The ground is composed of a bulbo-tuber pyriform, convex on one side, encased in brown membranous tunics. At the bottom, have roots that are more adventitious. Leaves in number of 3-4 of dark green color, with parallel ribs of 25-40 cm long and 3-3.5 cm wide. The leaves appear in early spring (at this point is called popular *"onion crow").* These give poisonings, which occur frequently in animals, being among the first leaves that appear in spring. They wither in July-August. Flowers appear in autumn, in 3-4 September at one plant. Fruits are septicide capsules, appear between leaves in May and is open on the three welding lines, but come away and the 3 carpel's each bring in free seeds, in June-July after fruit stalk bends and 120° for dissemination. From the above description result that the plant blooms in autumn and capitalizes in the following spring.

Common in evergreen oak floor until to spruce floor and in oak floor rarely. Vegetate in pastures and mesophilic-mezohidrofite hayfields. Supports the moist of soil but not the stagnant water. General distribution: Central Europe

From the autumn crocus are used the seeds *(Colchici semen).* They contain 0.3 to 1% alkaloids. Seeds are not used as such but only for industrial extraction of colchicine. This is used not only in medicine as an antigout agent (1 mg colchicine tablets), but also in genetic.

The autumn crocus seeds are one of the most expensive vegetable products (35 USD / kg). To obtain them the immature fruit is harvested when the capsules gets a yellow color before opening. Are dried, then unfold and threshing machine. On the other hand, the species are highly toxic to all animals. Especially leaves can pass in the feed and cause toxicity in grazing animals. Thereafter toxicity pass in animal products (milk, meat) become toxic to humans. Therefore, by plowing, try to eliminate the species from grassland.

This situation called for an attempt to introduce the culture, under protection, intended solely for seed production. Culture is advantageous because the plant is perennial its capsules may be harvested annually, requiring only maintenance.

3. Gentiana lutea L., Yellow Gentian, Gentianaceae Family

It is an herbaceous perennial species, robust, with strain up to 100 cm high. Present in the soil a short thick rhizome with many roots are still vertical, cylindrical, yellow-brown on the outside. Basal leaves arranged in rosette, the stems elliptical, opposite, large (30x7 cm) with arcuate ribs and the upper leaves are sessile.

It is rare, in the spruce floor until to the subalpine floor up the rocky places, in damp meadows, on limestone bedrock soils on steep slopes, but sunny. Is a mesophilic specie and is protected as natural monument.

General Distribution: Alpine-European. It became rare because of harvesting roots for medicinal purposes. The species are considered endangered.

From yellow gentian, roots are harvested, but only in plants from culture. The roots contain bitter substances; due to bitter substances stimulate stomach secretions and appetite. Also presents antipyretic and antimalarial action. It is used as a tonic bitter in tinctures, with bitterness index of 1:10000, and at the preparation of bitter aperitifs (bitter).

In Romania, law protects the specie so that it is illegal harvesting of spontaneous flora, but can be used the roots which are imported from crops and from wild flora. We attempt to introduce it in the culture (HELTMANN, 1960) in the Brasov County. It can be cultivated only in the spruce area in the ecological characteristics of the species. In addition, it is recommended to use other species *(G. asclepiadea, G. punctata)* with smaller roots and bitterness index of 1:5000.It may, however, that these two species become vulnerable by taking abuse, so we believe that the introduction of official species in culture would be the most suitable.

4. Angelica archangelica L., angelica, Apiaceae Family

Is herbaceous biennial specie. In the first year form only rosette of basal leaves. Underground presents the roots of about 10 cm long and 5 cm diameter, which start in the second year aerial stems and adventitious roots numerous soil. Aerial stem is robust, vigorous (8 cm in diameter and 200 cm high) with large leaves 3 times pinnate-sectors with a very large and swollen sheath. Flowers grouped in large umbel compound, spherical. Small flowers with five petals greenish white, and ellipsoidal fruits, flattened.

Currently, the wild flora species are rare, in the beech and spruce floor in wet places, the water bank or rocky places, keys, from 500-1500 m altitude.

From angelic are harvested for medicinal purposes the roots in the first year of vegetation (autumn) *(Angelicae radix)* and less fruit *(Angelicae fructus)*. The roots contain volatile oil (0.5%), coumarins, organic acids, carbohydrates.

Present tonic action, antispasmodic, digestive stimulant indicated in anorexia, dyspepsia, flatulence, enteritis, belching, intestinal colic. It is also used as a flavoring for soft drinks tonic-bitter flavor (including "appetizer Swedish"). Is often used the tincture 1:10 with 70° alcohol.

It is a protected species. Only be used roots from cultures (documented). It is rare because of wild flora and abusive collection for medicinal purposes. Culture is appropriate to establish on soils with adequate moisture, the floor beech resorts with sufficient precipitation

and no extreme heat in summer. Seeds rapidly lose germination, is indicated that the seeding to be made with recent seeds in the period from August to September.

Are recommended the alluvial soils, sandy, rich in organic matter and near the watershed. There are cultures in the county's Brasov and Suceava.

CONCLUSIONS

Herbs represented ever raw materials to treat various diseases, representing basic remedies or sometimes almost the only remedy in ancient times. In early medicine, diseases were treated mainly with plants and with plant material, were used animal materials (blood, powder horns, etc.) or others of mineral origin (powder, flint, clay, etc.).

As time passes, the medicine has developed, and chemistry, which led to the identification and extraction of chemicals from plant material. In the next step, development of chemistry and biochemistry has allowed obtaining synthetic substances identified in medicinal plants. So then were developed researches on production of antibiotics. In this situation, important natural remedies were diminish over time, they are not totally abandoned, but was kept mainly in folk medicine in the world economically less developed areas.

As a result of research on medicinal plants has been established that the following factors influence ecology them: abiotic - temperature, air and soil humidity, rainfall, solar radiation, prevailing winds, orographic (terrain and type of habitat), edaphic (soil structure and composition, pH, etc..), biotic - food and its abundance, intraspecific and interspecific relationships, parasites and predators, anthropogenic - grubbing, pollution of ecosystems, agricultural technology elements, etc..

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