

Natural potentials of the medicinal plants from the Orchidaceae family with mucus as the main ingredients from Zlatar mountain

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Abstract:

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The spontaneous medicinal flora of Zlatar Mountain was studied in the aim of realizing the possibilities of its sustainable use for the needs of the pharmaceutical industry. The special attention was paid to genera *Orchis*, *Ophrys*, *Platanthera*, *Gimnadenia*, etc. from the orchid family (Orchidaceae) of which salep is made (Tuber salep). Salep is a typical mucous drug (contains over 50% of mucus), which is very beneficial and useful. The primary role of salep is to heal and strengthen the organism and urge the sexual and every other biological ability. Orchids of which salep is made (*Orchis coriophora*, *Orchis laxiflora*, *Orchis morio*, *Orchis mascula*, *Orchis pallens*, *Orchis purpurea*, *Orchis simia*, *Orchis tridentata* and *Orchis ustulata*) are to be found on numerous habitats of Zlatar (in the bright forests, clearing areas and on forest meadows).

Key words: Tuber salep, *Orchis*, drug, Pharmacopoeia, production of the orchids

Introduction

Species from Orchidaceae family (order Asparagales) are spread over the whole planet. There are about 22000 to 26000 species, classified in about 880 genera (Stevens, 2001). The main development orchids reached in the tropic areas (particularly in the tropic forests), where they live as epiphytes or lianas. In the mild and cold zones they are quite sparse, and they usually grow on the lime base (Pavićević et al., 1968; Sarić, ed., 1986; Obratov & Matović 1993a; Matović et al., 2005).

Because of the unusually beautiful, impressive and fragrant flowers, numerous species are grown as decorative plants in the form of the numerous strains and hybrids. As economically important plants, orchids have proportional small

role. The most important of them is *Vanilla planifolia* Jacks., originating from Mexico. Some species from the orchid family (Orchidaceae), are used in medicine because of the abundant content of mucus in the tuber (genus *Orchis*, *Ophrys*, *Platantera*, *Gimnadenia*, etc). Genus *Orchis* consists of about 75 species which grow in Europe, mild part of Asia, in North Africa, on the Canary Islands and in North America. Endangerment of many plant species, their ecology as well as measures for their protection have already proposed (Matović, 1985, 1986, 1993; Matović et al., 1994, 2005; Matović & Tatić, 1999; Nikolić et al., 2006).

Material and methods

The greatest part of the data was collected by personal investigation in Zlatar, starting from the very foot at the banks of Lim, Mileševka and Uvac, to the greatest peaks of the mountain. This research has been performed since 2006. The spontaneous medicinal flora of Zlatar as the natural healing factors in the forest ecosystems was studied in the aim of perceiving the possibilities of its sustainable use for the needs of the health tourism. The orchids of which salep is made are to be found on the numerous forest habitats of Zlatar. The optimal conditions the orchids have in the bright forests, clearing areas and forest meadows.

The plant species from the orchid family (Orchidaceae) which are the subject of the research in this paper were determined by the keys of the modern flora: "Pharmacopoea serbica" (1881-1926), "Lekovito bilje u Srbiji" (Petrović, 1883), "Parmacopoea jugoslavica" (1933-1984), "Flora Europaea" (Tutin et al., 1964-1980), "Flora SR Srbije" (Josifović et al., 1970-1977), "Flora of Serbia" (Sarić 1986), "Lekovite biljke Srbije" (Sarić, ed., 1989), Obratov (1992).

Results and discussion

There are 13 species of orchids in flora of Serbia (Sarić, 1989), and 9 of them from the genus *Orchis* are present in the Zlatar Mountain: 1. *Orchis coriophora* L. 1753, 2. *Orchis laxiflora* Lam. 1779, 3. *Orchis morio* L. 1753, 4. *Orchis mascula* L. 1755, *Orchis pallens* L. 1771, 6. *Orchis purpurea* Hudson 1762, 7. *Orchis simia* Lam. 1779, 8. *Orchis tridentata* Scop. 1772, and 9. *Orchis ustulata* L. 1753 (Diklić in Josifović, 1976; Obratov & Matović 1992, 1993b,c; Matović & Mihajlović, 1993; Matović et al., 1993).

Orchids from Zlatar Mountain are extremely beautiful, colourful, small, but long-lasting herbaceous plants. Their leaves are green, succulent, whole across the rib and have parallel nerves. Flower stalk is straight and in the upper part it carries a bunch of unusually beautiful, irregular flowers, which vary in colours, and to the greater extent they vary in form and size. The orchids blossom from spring to the mid summer, which depends upon the altitude.

The orchids sometimes have several rootlets and two tubers which are most often egg-shaped, after which the whole genus was named, which was derived from the Greek word **orchis** = egg, because of the appearance of the tuberlets. The egg out of which the overground stem grows in the spring is bigger, but rugged, soft and dark. The egg which is

smaller, but succulent, solid, firm, whole, young and bright is placed next to it. As summer goes by, the young egg becomes bigger, and the old one deteriorates and disappears. The healing power of the orchid is placed in the egg-shaped tubers of which salep is made (Tuber salep).



Fig. 1. *Orchis morio*, Zlatar Mt. (author: M. Matović, 2010)

The tubers are of different form and size. Some of them are egg-shaped, whereas the others are paw and fork shaped. Round tubers are of the smaller walnuts' size. The demand for them and their prices are higher than of the fork sized ones, although their healing value is the same.

Round tubers have the following orchid species from Zlatar Mountain: *Orchis mascula*, *Orchis morio*, *Orchis tridentata* and *Orchis purpurea*. They all have red or purple flowers. According to round tubers they are similar to some other orchids: *Orchis militaris* and *Orchis mascula* ssp. *signifera*. This group of the orchids is accompanied with the other similar species with the **egg-shaped tubers** from which salep is made. There are following species of such orchids: *Platanthera bifolia* which have the white, fragrant flowers and oval leaves and *Ophrys sphegodes* with the vertically elliptic to wide lancet-shaped leaves, the widest in the middle, and pointed on the top).

Finger-shaped tubers have the following orchids: *Orchis maculata*, *Orchis latifolia*, *Orchis palustris*, *Orchis sambucina*, as well as related species with the finger-shaped tubers (*Gymnadenia conopsea*).

While the orchids blossom only the young tuber is extracted. The trained collectors of medicinal plants also extract it after the blossom, as the yield is bigger at the time, and the young tuber is larger. However, one should be careful not to dig the tubers of the other non-medicinal or poisonous

plants. The special attention should be paid to autumn saffron. Extracted tubers are cleaned of soil, washed in cold water, stringed on the thread or place in the net, put in the boiling water, kept for a few minutes until the water boils again or scalded by hot water, then they are dried in the draft, in the sun or in the drier at temperature lower than 70°C. By boiling water the tubers lose the unpleasant odour and bitterness which they have when they are fresh, they dry more quickly, starch grains are turned into the glue, and the dried tuber as a result becomes transparent and hornlike. The tubers which are not scalded dry slowly, darken and become moldy before they are completely dried.

Boling water destroy the enzymes and the salep obtained in such way can be preserve for a long time. The tubers prepared in such way are round, heart-shaped, whereas some resemble fist or are paw-fork-shaped, very hard, hornlike and very heavy (they look like pebble), little transparent on the surface, 1-4 cm long, and 0.5-3 cm wide. On the top they have a stamp of the stem bud. On the surface they are irregularly furrowlike, uneven, netlike rugged, whereas some are almost smooth or little rough. Their colour is brownish or white-yellow. Their taste is very mucous and insipid.

The name salep is derived from the Persian **sahlep i schalap**= slimy, the name for the little tubers and for the hot drink which is made from them, either from the orchid species of the *Orchis* genus or from the related genera *Gymnadenia*, *Ophrys*, *Platanthera*, etc.

The main ingredient of salep is mucus (about 50%), there are 25% of starch, about 5% of albumen, 1% of sugar. It also contains cellulose, fat substances, organic acid and other pharmacodynamic active substances. Salep is a typical mucous drug, which is very beneficial and useful. By cooking in water the thick, sinewy, sticky, colloidal solutions are obtained. When used, it forms a noble membrane on the mucosa which alleviates pains and prevents inflammation. Therefore, salep has been used in the scientific medicine for centuries as a mild, harmless, efficient healing remedy for treatment of the various diseases. The primary role of salep is to heal and strengthen the organism.

Salep is often used in the form of so-called "salep mucus". According to the regulations of our pharmacopoeia (Pharmacopoeia Jugoslavica) our pharmacies prepare this mucus when it is needed, with the doctor's prescription, in the following way: 1 g of salep in powder and 1 g of lactose (milky sugar) are mixed well and this mixture is put in the measured bottle. The mixture is drenched with 2 g of alcohol, mixed, filled up with 10-15 g of boiled

destilled water the weight of which is up to 100g. The liquid is often shaked until it is completely cool and the even thick mucus is formed.

The mucus prepared in this way is very useful and healing, but children do not like drinking it. Therefore, prior to use it has to be mixed well in a glass with currant, orange, lemon, cherry juice, or some other refreshing drink.

French and some other pharmacopoeias give this description for making the medicine- sweet, pleasant for use, in contrast to a pure salep which is insipid and disagreeable, owing to which many persons, particularly children do not like drinking it: 30g of chocolate is dissolved in the mild heat, 1,000g of salep in the form of the noble powder is added, mixed well and poured in the forms which the children prefer.

Salep is drunk as a remedy for enjoyment, sweet, and nourishing drink. Salep which is cooked in water or milk for a long time the makers sweetened with honey, spiced with aromatic herb powders and poured in order that it is drunk hot. Salep is harmlees, nourishing and healing drink, and easily digested food, the use of which is yet to be affirmed.

An important precondition for the preservation of the species diversity of orchids on their natural habitats is the large-scale orientation towards the plantation production (**Fig. 2** and **3**).



Fig. 2. The production of the orchids from the culture, Zlatar Mt. (author: M. Matović, 2010)

Conclusion

Relations between man and his search for the medicines in nature have a long tradition, about which different sources in the form of the written data, preserved monuments and original plant medicines testify. Knowledge which these sources give to use is undoubtedly the result of a long human struggle with diseases, in which man learnt

to find the medicines in plants, their bark, seedlings, fruits, leaves and other organs. For many medicines of plant origin, which were known in the oldest human civilizations as well and which have been used for millennia, the modern science confirmed the active effect and incorporated them in Pharmacopoeia.



Fig. 3. Experimental plots of orchids from the culture, Zlatar Mt. (author: M. Matović, 2010)

The orchids are widely spread in Zlatar from the very foot to the top of the mountain. Out of 75 species, which grow in Europe, the mild part of Asia, North Africa, on the Canary Islands and in North America, 13 species are present in flora of Serbia and some of them are rare and endangered, and we found 9 *Orchis* species at Zlatar Mt. Alongside with systematic and chemical diversity, Zlatar orchids are very variable and morphological. This is particularly expressed in the variability of the shapes of the tubers ranging from round and

egg-shaped to the paw-shaped with the numerous transitory forms.

Salep is obtained from little tubers is typical, mucous drug, which is very efficient and useful. By cooking in water the thick, sinewy, sticky and colloidal solutions are obtained. Upon use, salep forms a noble membrane on the mucosa, which covers the mucus, alleviate and soothes the pains and inhibits the inflammation, because of which is has been used in medicine for centuries as a mild, harmless, efficient healing remedy for the treatment of the various diseases. Thus, the primary role of salep is to heal and strengthen organism.

A number of the medicinal plants which are in circulation have a limited spread in Serbia, and owing to the use in folk and official medicine they become endangered, which points to the need of the limited collecting and possibility of the prohibition of the total use in Serbia.

Primary protection of some representatives of orchid family (Orchidaceae) comes from the 1973 CITES (*Convention On International Trade In Endangered Wild Flora And Fauna*) and later, from IUCN Red List (*Orchid Specialist Group*). For the individuals of these species, their parts and derivates, the trade is prohibited, except for seeds and pollen, seedlings or culture of tissues *in vitro* obtained individuals, as well as cut plants of flowers produced in the culture.

Alongside with the protection of these species, it is needed to protect the areas, such as protected natural properties, identify the centers of medicinal plants, as well as the parts of the network of the important plant areas. The protection is carried out in the habitat (*in situ*) and outside of it (*ex situ*).

Medicinal plants with mucous substances have a concrete ability as every other creatures or their groups to take part in the preservation of the accord and harmony in the biosphere. Nature is perfectly rational and useful, so it left to a chance not even a particle of the biosphere which would endanger its sustainable development. At preservation and improvement of biodiversity of medicinal plants and other plant species the way of sustainable use of biological resources can be defined, if the economically important biological resources are concerned, or the revitalisation can be applied on the nature habitats, if we want to protect the economically important species. For both approaches it is needed to make the plan and programme of the protection, which contains the information about spread, ecology of the species, endangerment, measures for protection.

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