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## JUNIPER ESSENTIAL OIL (*OLEUM JUNIPERI*) FROM SLOVAKIA

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### **Abstract**

*Since time immemorial, medicinal plants have played the most important part in the composition of therapeutic and various preparation used in popular doctoring. The earliest information about the juniper essential oil is in regard to the Turčiansky oilmen, who occurred in the 15<sup>th</sup> century. At present, juniper fruits for essential oil isolation were donated by collectors in the naturally resources. Essential oils were distilled in the large-scale distillation apparatus specifically designed for aromatic and medicinal plants (Calendula, Co. in Nova Lubovna, Slovakia). Juniper berries usually contain  $2.00 \pm 0.20$  %, volatile oil, depending on geography, altitude, ripeness and other factors. The volatile oil is made up mostly monoterpenes (ca. 58 %), mainly  $\alpha$  – pinene and  $\beta$  – myrcene. Oil of Juniper is given as a diuretic, stomachic, and carminative in indigestion, flatulence, and diseases of the kidney and bladder.*

**Key words:** *juniperus, GC-analyses, essential oil, qualitative-quantitative characteristics*

### **Introduction**

Slovak Republic is placed in the Central Europe. Generally the nature of the country is very heterogenous and has some interesting features. In the territory two fundamental regions of flora can be observed. The thermophilic flora is presented in the Pannonian region in warm basins with a great number of xenophylic species. The Carpatian flora is presented in the majority of the Slovak mountains with significant differentiation of the plant cover according to the elevation above sea level.

Since time immemorial, medicinal plants have played the most important part in the composition of therapeutic and various preparation used in popular doctoring. The experiences of simple people were being the basin for the use of these medicinal plants. In past centuries about 600 or 800 species were used for curative purposes. One of very important medicinal plant is Common Juniper and its essential oil (*Oleum Juniperi*).

Common Juniper (*Juniperus communis* L.) is shrub or small tree; 2-20 ft. Bark reddish brown, shredding off in papery peels. Leaves (needle) taper to a spiny tip, in whorls of 3's with 2 white bands above (or 1 white band sometimes divided by a green midrib, broader than green margin). Flowering time is April to June. Fruits on short stalk; round to broadly oval, bluish black, usually with 3 seeds. The fruit is a berry-like cone which is green the first year and ripens to a bluish-black or dark purple color in the second year (SMALL, 1997).

### **History and Folk Medicine**

The earliest information about the juniper essential oil is in regard to the Turčiansky oilmen, who occurred in the 15<sup>th</sup> century. Their trade channels were localized in the German countryside, Bohemia, Moravia, Sliezko (the part of Poland) and Austria in this time.

On the other side in the Slovak history, the first organization of a medicinal plant harvest and essential oil manufacture were done by the Jesuits in Zniev Monastery (the Central Slovakia). Jesuits came on Turiec (the Central Slovakia) in 16<sup>th</sup> century. Emperor

Rudolf II. donated to the monastery monks, as their asset, the villain settlements: Lazany, Slavs, Vrícko, Polerieka, Leziachovo, St. Jur, Moskovce, Socovce, Stranka and Ondrasova. Peasants living around the monastery had to pass the perquisite to the Jesuit monks every year. Two products: juniper berries and caraway seed were dominated. The "melting pot" for a plant oil distillation was mentioned in 1666. The essential oil (*Oleum juniper*) was produced from the juniper berries in this time. In the course of the 17<sup>th</sup> century the peasants acquired the ability to produce vegetable and plant essential oils. The travelling "oilmen" prepared the oils and peddled them along with other pharmaceutical preparations between villages. Essential oils obtained by distillation or pressing of various herb parts, were used as the basis of many treatments and elixirs with the practice becoming widespread during the 18<sup>th</sup> and 19<sup>th</sup> centuries.

### **Large-scale Isolation of Essential Oil**

The juniper fruits for essential oil isolation were donated by collectors in the naturally resources. Essential oils were distilled in the large-scale distillation apparatus specifically designed for aromatic and medicinal plants. There are two types: Type HV-3000 (height: 5,250 mm, width: 2,180 mm, with container for 200 or 250 kg of dried matter of 400 or 500 kg of fresh matter of plant material) and Type HV-300 (height: 3,400 mm, width: 1,300 mm, with container for 40 or 50 kg of dry matter and 100 or 120 kg of fresh matter of plant material).

### **Qualitative and Quantitative Parameters**

The analysis of the juniper essential oils was carried out using a Vega Series Carloerba Gas Chromatograph, connected to a Spectrophysics SP 4270 integrator. The following operating conditions were used: column: DB5, 30 m x 0.32 mm i.d., film thickness: 0.25 mm, carrier gas : nitrogen, adjusted to a flux of 1 ml/min, injection and FID-detector temperatures: 220 °C respectively 250 °C. Components were identified by their GC retention times, and the resulting values were comparable to those of literature. Oil component standards for comparison were supplied by Extrasynthese Ltd..

### **Results and Discussion**

Juniper berries usually contain  $2.00 \pm 0.20$  %, volatile oil, depending on geography, altitude, ripeness and other factors. The volatile oil is made up mostly monoterpenes (ca. 58 %), mainly  $\alpha$  – pinene ( $30.50 \pm 2.00$  %), sabinene ( $8.00 \pm 1.00$  %),  $\beta$  – pinene ( $2.40 \pm 1.00$  %),  $\beta$  – myrcene ( $22.00 \pm 2.00$  %),  $\alpha$  – phelandrene ( $< 1.00$  %), limonene ( $2.10 \pm 1.00$  %), terpinen-4-ol ( $< 1.00$  %), bornylacetate ( $< 1.00$  %),  $\beta$  – caryophyllene ( $10.20 \pm 1.50$  %). The unit price per 1 kg of juniper essential oil is about 70.-USD (FOB ex-store in Slovakia) and the potential production per year is less than 500 kg.

Juniper berries is an important and raw material in the distilled spirit industry. The Slovak distillers declare a need of approximately 500 tones per year. Paradoxically, juniper berries necessary for the production of liqueurs, syrups and other products in Slovakia are currently only provided by imports from Albania and Macedonia, while it is mostly about prickly juniper berries (*Juniperus oxycedrus* L.) (FORSTHOFFER, 2015). This juniper essential oil is very high in  $\alpha$  – pinene (42 – 50 %), and limonene (7 – 9 %), which have very advantageous aroma. In general, it is possible to state that the essential oils from Slovakia are comparable to the same raw-materials from Albania and Macedonia, which are purchased on the world market in order to the alcoholic beverage production. The price per 1 kg of

*Juniperus oxycedrus* berries is 0.6 Euro and *Juniperus communis* berries: 1.6 Euro in 2015. Essential oil is used for production origin Slovak alcoholic drink “Spišská Borovička” (Prelika Co., Prešov, Slovakia).

### **Medicinal Action and Uses**

Oil of Juniper is given as a diuretic, stomachic, and carminative in indigestion, flatulence, and diseases of the kidney and bladder (DUKE et al., 2002). The oil mixed with lard is also used in veterinary practice as an application to exposed wounds and prevents irritation from flies. The fruit is readily eaten by most animals, especially sheep, and is said to prevent and cure dropsy in the latter. The chief use of Juniper is as an adjuvant to diuretics in dropsy depending on heart, liver or kidney disease. It imparts a violet odour to the urine, and large doses may cause irritation to the passages. An infusion of 1 oz. to 1 pint of boiling water may be taken in the course of twenty-four hours (TUCKER, DEBAGGIO, 2000).

### **Conclusion**

The juniper essential oil, in particular, is high in  $\alpha$  – pinene,  $\beta$  – myrcene,  $\beta$  – caryophyllene and terpinen-4-ol, which have very advantageous aroma therapeutic properties. In general, it is possible to state that the essential oils from Slovakia are comparable to the same products which are purchased on the world market. Oil of Juniper is given as a diuretic, stomachic, and carminative in indigestion, flatulence, and diseases of the kidney and bladder.

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