QUALITATIVE ANALYSIS IN SALVIA AETHEROLEUM UNDER THE IMPACT OF CERTAINTECHNOLOGICAL FACTORS AT THE DIDACTIC STATION IN TIMIŞOARA (ROMANIA)

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Abstract: *Knowing volatile oils is an important issue taking into account the widespread aromatherapy. In 2009, the European Medicine Agency (E.M.A.) published a final monograph replacing the monographs of national authorities of the European Union for the recording of traditional plant medicine containing Common sage as active ingredient. Quality according to the Quality Standards corersponding to the European Pharmacopoiea is a previous condition for recording essential/volatile oils (e.g., Sage PhEur leaves or Sage PhEur tincture). As far as essential Common sage oil is concerned, E.M.A. concluded that risks do not overrun benefits: therefore, there will not be any monograph on Common sage of the European Community unless they bring up new clinical evidence. In the United States, Salvia Folia is regulated as food ingredient and as a component of food supplements. Common sage leaves is listed as G.R.A.S. (Generally Recognised as Safe) to be sued as a condiment or as natural flavour, while Salvia Aetheroleum is a G.R.A.S. agent used only as aromatic.To use the essential oil as flavour, they published a monograph titled Quality Standards for the Essential common sage oil in the United States in the Pharmacopoeia of the Convention for Food Chemical Products, Codex. For therapeutic use, as part of the U.S. Food and Drug Administration (F.D.A.), there is a revision going on (O.T.C. Over the Counter sub-commission that regulates the possibility of using certain natural-based medicine without a medical prescription), to prove the safety and efficacy of common sage oil combined with mint oil in mouth hygiene and therapeutic products. Common sage oil is characterised by a high level of thujone. Consumption of common sage oil as single ingredient implies a high risk of overdose. In the monograph by the H.M.P.C. (Committee on Herbal Medicinal Products), the presence of thujone (common sage leaves) is allowed in preparations, but it is restricted to a daily intake of 0.5 mg/person for a amximum duration of 2 weeks. According to the regulations applyable to traditional plant medicines stipulated in Chapter 2a of the Directive 2001/83/CE, article 16a paragraph (1) letter (a) concerning their use in minor directions that do not require a doctor's surveillance, the risk – benefit analysis in commons sage is negative. If new information concerning the clinical safety and efficacy of the common sage oil were available, such documents could be re-evaluated by the H.M.P.C.*

Key words*: essential common sage oil, α-thujone, β-thujone, camphor row direction, quality of essential oil*

INTRODUCTION

According to the application for recording by the Directive 2001/83/CE 16d paragraph (1) for *Salviae folia*, the traditional acknowledged uses (extract of dried plant tea, liquid extract and tincture) are: (a) for the symptomatic treatment of the light dyspeptic discomfort such as stomach burns and ballooning; (b) for the suppression of excessive sweat; (c) for the treatment of mouth and throat conditions; and (d) for the treatment of minor skin conditions.

The properties of common sage come from the nature of its compounds such as phenolic diterpenes – carnosic acid, carnosol; phenolic acid – rosmarinic acid that can substitute synthesis antioxidants; and the components of the essential oil such as oxygenated monoterpenes – (a) α- thujone, β- thujone and (b) 1,8-cineol, camphor, limited doses because

of their toxic effect; therefore, we need to limit their use as food flavours: 0,0005 kg g-1 (TISSERAND & BALACS, 1995).

A quality essential common sage oil should contain the following: α- thujone + β-thujone > 50% and camphor < 20% (GUENTHER, 1949; PUTIEVSKY, 1992).

According to ISO (ISO 1997) specifications, the following compounf concentrations are allowed: 18-43% α- thujone and 3-8.5% β- thujone; action: antispastic, antibacterian, antifungic; uses: throat inflammation, aphta, stomatites, vaginitis (ovules); external uses: gargare, gels (antiseptic of the mouth cavity); internal uses: gastro-intestinal conditions (choleretic, carminative, stomachic).

Thujone and thujol from the volatile common sage oil (*Salviae aetheroleum*) are neurotoxic and abortive substances.

Camphor is used externally, as revulsive (camphor alcohol), and internally, as cardio-respiratory analeptic in emergency cases (parenterally) and *per os*, as pulmonary antiseptic and cardio-respiratory analeptic.

Therapeutic action of camphor: camphor crystals are kept as volatile oils or crystals at low temperatures. It is used in some skin, respiratory, circulatory, and rheumatic conditions. It has an antipruriginous, antineuralgic, anti-inflammatory, lubrifier and stimulatory action of the blood circuit. The following are camphor products: camphor alcohol, camphor ointment (Online: http://ro.wikipedia.org/wiki/Camfor).

The main factors impacting the quality of the essential common sage oil are as follows: genotype, location of the crop, and plant phonologic stage.

MATERIAL AND METHODS

In this paper, we present the results of research of the essential common sage oil, i.e. herba and dried folia. Monitoring the biochemical components of the essential common sage oil was done within the graduation of the factor A, i.e. over the two directions of the plant rows: E-W and N-S.

The biological material we used was the common sage cultivar *De Răsmireşti* of the species *Salvia officinalis* L. obtained from S.C. PRONATURA S.R.L. Zalău (Bihor County). The seed came from typical, vigorous plants with a high content of oil 90% pure, 65% germinating and weighing 7.5 g (volume of 1,000 grains).

Experimental research was carried out at the Didactic Station of the Banat University of Agricultural Science and Veterinary Medicine in Timişoara. The experiment is of the bifactorial type with annual replication and set after the randomized block method in a single row with 3 replications in which we applied the randomization of the factor B. Factor A: sage plant row directed E-W (A_1) and sage plant row directed N-S (A_2). Factor B: establishing proper doses of NPK with 6 graduations: b_1: $N_0P_0K_0$, b_2: $N_{30}P_{30}K_{30}$, b_3: $N_{60}P_{60}K60$, b_4: $N_{90}P_{60}K_{60}$, b_5: $N_0P_0K_0$ + foliar fertilisation, b_6: $N_{30}P_{30}K_{30}$ + foliar fertilisation. The cultivation technology of the experimental field was the current one.

Crude material consisted of herba and leaves. The aerial parts of the common sage plant were harvested during the formation of the floral bug and dried in the shadow. After drying, the leaves were separated from the stems, grounded and treated with water to extract the essential oil of *Salviae folia*. To obtain essential oil from *Salviae herba*, we grounded stems and leaves of common sage.

Measuring the content of essential common sage oil and the components of the essential common sage oil was done after the methods described in the Romanian Pharmacopoeia 2008 at the S.C. Laboratoarele Fares Bio Vital S.R.L. Orăştie (Hunedoara County) Quality Control.

RESULTS AND DISCUSSIONS

Aetheroleum salviae: obtained by water vapour training of the fraction; aspectul: yellow liquid, yellow-greenisg, browning; composition: α- and β-thujone, eucalyptus, caphor, borneol, pinen, limonen (according to the Romanian Pharmacopoeia, 2008).

The content of volatile oil, α-thujone, β-thujone and camphor in the common sage leaves depending on the plant row direction E-W shows the following: content of volatile oil 1.74%, α-thujone 17.70%, βethujone 8.05% and camphorr 17.71%. In accordance with the ISO, 1997: α- thujone 18.00-43.00%, β-thujone 3-8.50% and camphor < 20.00%, quality results in *Salvia Aetheroleum Folium* with sage plant row directed E-W are good, except for β-thujone which ranges at the maximum admited limit (8.05%) (Figure 1).

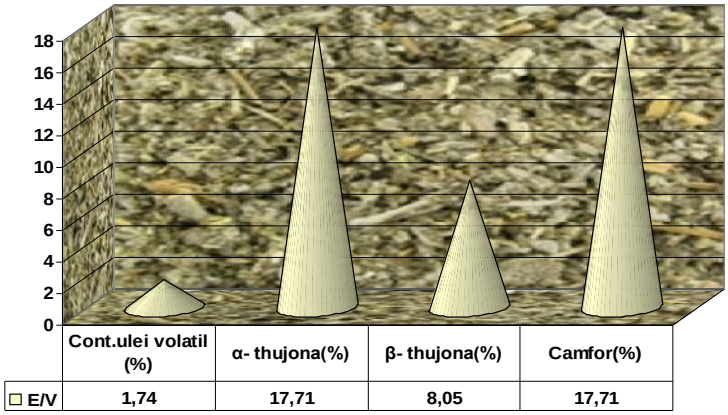


Figure 1. Content of α- thujone, β- thujone and camphor in *Salviae folia* depending on sage plant row direction E-V

Common sage leaves content of volatile oil, α-thujone, β-thujone and camphor depending on plant row direction N-S is as follows: essential oil content 1.80%, α-thujona 21.14%, β-thujona 5.66% and camphor 15.97% (Figure 2).

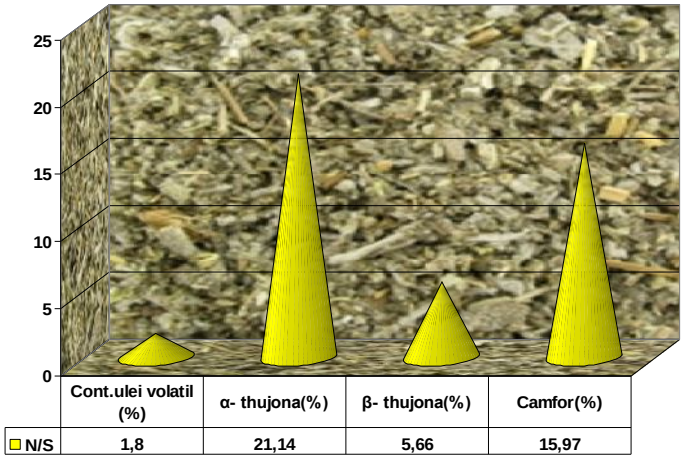
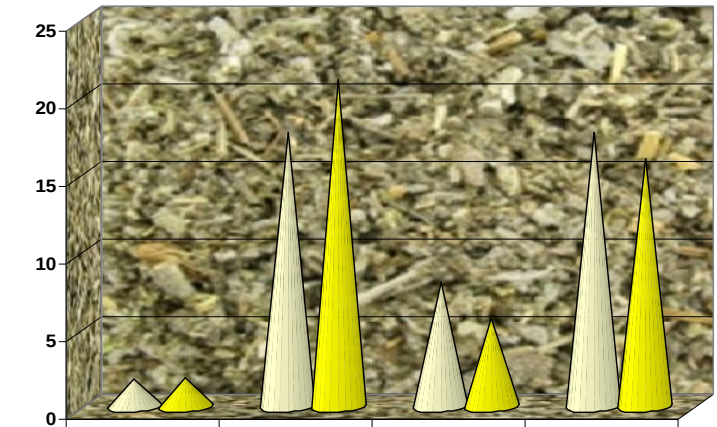


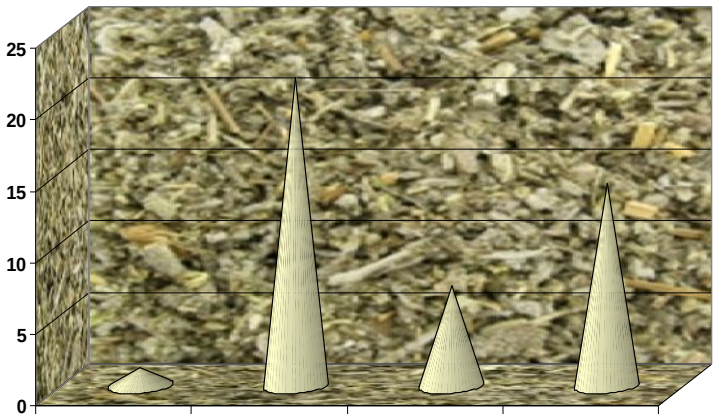
Figure 2. Content of α- thujone, β- thujone and camphor in *Salviae folia* depending on sage plant row direction N-S



	Cont.ulei volatil (%)	α- thujona(%)	β- thujona(%)	Camfor(%)
E/V	1,74	17,71	8,05	17,71
N/S	1,8	21,14	5,66	15,97

Figure 3 Content of α- thujone, β- thujone and camphor in *Salviae folia* depending on sage plant row direction E-V, N-S

Content of volatile oil, α-thujone, β-thujone and camphor in *Salviae Herba* depending on plant row direction E-W, are as follows: content of essential common sage oil 1.20%, α-thujone 21.41%, β-thujone 6.95% and camphor 14.09%. according to the ISO, 1997: α-thujone 18.00-43.00%, β-thujone 3.00-8.50% and camphor < 20%, quality results in *Salvia Aetheroleum Herba* over the plant row direction E-W are good (Figure 4).



	Cont.ulei volatil (%)	α- thujona(%)	β- thujona(%)	Camfor(%)
E/V	1,2	21,49	6,95	14,09

Figure 4. Content of α- thujone, β- thujone and camphor in *Salviae herba* depending on sage plant row direction E-V

Content of volatile oil, α-thujone, β-thujone and camphor *Salviae Herba* depending on common sage plant row directed N-S have the following values: volatile oil 1.15%, α-thujon 25.00%, β-thujone 7.23% and camphor 14.68% (Figure 5).

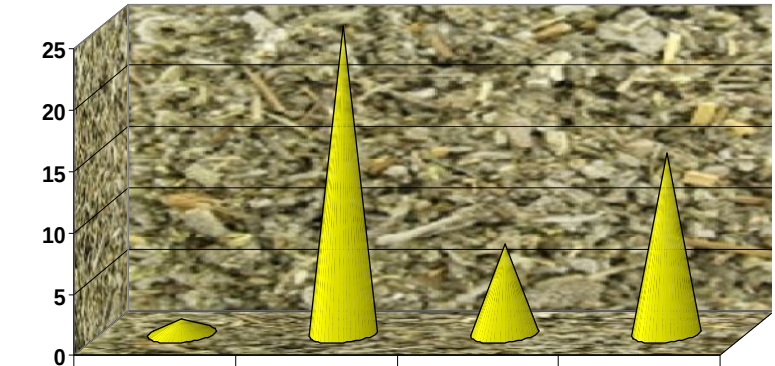


Figure 5. Content of α- thujone, β- thujone and camphor in *Salviae herba* depending on sage plant row direction N-S

Comparing quality result in *Salviae Aetheroleum Herba* over the plant row direction (E-W, N-S), we can say that when plants are orienetd N-S, the quality of the essential oil in the common sage cultivar *De Răsmireşti* i better: α-thujone (21.49%), β-thujone (6.95%) and camphor (14.09%) (Figure 6).

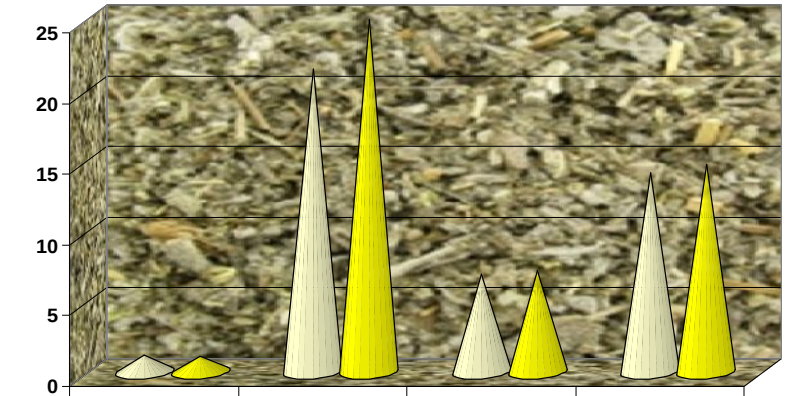
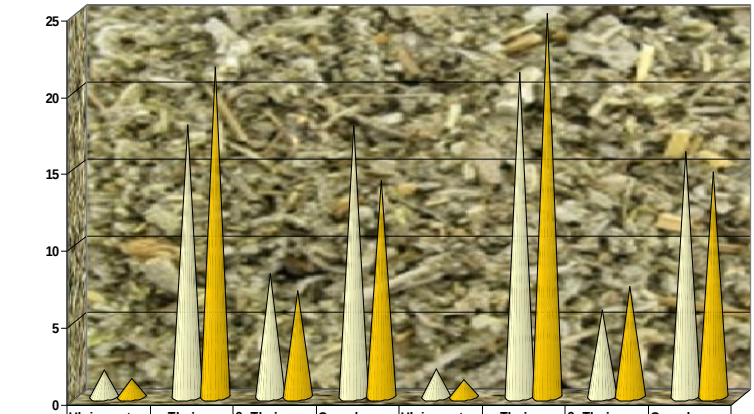


Figure 6. Content of α- thujone, β- thujone and camphor in *Salviae herba* depending on sage plant row direction E-V, N-S

In the condition of the Didactic Station in Timişoara, the common sage cultivar *De Răsmireşti* (*Salvia officinalis* L.) has, under the impact of certain technological factors – plant row direction (E-W and N-S), gaschroamtographic testing of oil quality from herba and folia – the features show in Figure 7.



	Ulei esent.	α- Thujona	β- Thujona	Camphor	Ulei esent.	α- Thujona	β- Thujona	Camphor
	E/V (%)				N/S (%)			
FOLIA	1,74	17,71	8,05	17,71	1,8	21,14	5,66	15,97
HERBA	1,2	21,49	6,95	14,09	1,15	25	7,23	14,68

Figure 7. Content of α- thujone, β- thujone and camphor in *Salvia folia* and *Salviae herba* depending on sage plant row direction E-V

CONCLUSIONS

The common sage cultivar *De Răsmireşti* (*Salvia officinalis* L.) has, in the conditions of the Didactic Station in Timişoara, sowed over different cardinal directions (E-W and N-S), variations of the content of oxygenated monoterpenes endowing it with ISO, 1997 quality – from good to very good – of the essential common sage oil from herba and folia.

A good content of oil (1.74%) and a very good quality are to be noted in *Aetheroleum Salviae Folium* sowed over the direction E-W.

Depending on the world market requirements, from medicine company to medicine company manufacturing plant-based medicine, food and beverage manufacturers and, last but not least, of pharmaceutical companies, and with certain technological factors, essential common sage oil can be monitored from the point of view of its biochemical components of interest.

ECONOMIC ARGUMENTS OF THE PRACTICAL IMPLICATIONS OF THE RESEARCH

With the world economic crisis, applying certain technological factors in the cultivation of the common sage bring forth a new perspective in the production of quality crude vegetal products that meet current standards.

The handling of genetic material and the development of new medicinal plant cultivars is very costly and work-consuming. The present research brings forth new elements of cultivation technology in common sage meant to result in quality vegetal material.

The results of the present study are part of a doctoral programme titled *„Ways of improving cultivation technologies of Common sage to increase herba, folia, and volatile oil content of Salvia oficinalis L."* and financed by the Ministry of Education, Research, Youth

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