



10.1515/msd-2017-0004

IDENTIFICATION AND QUANTIFICATION THE AROMA COMPOUNDS FROM AUTOCHTHONOUS PLANTS WITH GC/FID SYSTEM

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ABSTRACT: The aims of this paper is to identify and quantify the flavor compounds that exist in plants in order to valorification in the nutritional supplements and food industry. The study was monitoring 16 different plants and the specific aromas was determined on the GC/FID system. The content esters can be reached on intervals starting from 1.0086 mg/L in *Juniperus communis* to 27.0172 mg/L in *Teucrium chamaedrys*. The superior alcohols values parameters start from 5.1209 mg/L for *Melissa officinalis* to 132.0837 mg/L in *Teucrium chamaedrys*. The aldehydes started from at minimum of 1.0218 mg/L at *Centaurium erythraea* and a maximum of 37.1829 at *Vaccinium vitis-idaea*. The terpene compounds starts from 0.0182 mg/L for *Centaurium erythraea* to 19.9280 mg/L at *Teucrium chamaedrys*. The results we obtained by this study represents the foundation for us in these bio potentially active plants in two important industries: the pharmaceutical and the food one-by obtaining nutritional supplements, liquors, extracts and tinctures.

KEY WORDS: plants with bioactive potential, flavors, GC/FID

1. INTRODUCTION

The traditional medicine was currently using this plant without having a really base, only for practical results. However their bioactive effects were well known without having a scientific study. A review of some local plants can provide new opportunities and developed valuable products on the market by maximizin the nutritional, antimicrobial or bioactive qualities.

The Bilberry (*Vaccinium myrtillus*) have a positive impact on capillaries [7]. The Artichoke (*Cynara scolymus*) contains a polyphenols, and other bioactive compounds [14]. Chicory (*Cichorium intybus*) is known for his antimicrobial activity and high anthelmintics [11, 13, 5]. The Dumb (*Teucrium chamaedrys*) is rich in terpene compounds and glycosides [6]. The Fennel (*Foeniculum vulgare*), the Juniper (*Juniperus communis*) and the Thorn (*Xanthium spinosum*) is a medicinal plants rich in essential oils, phytosterols, caffeic acid, flavonoids [10]. Peppermint (*Mentha*) contains a significant quantity of volatile oils, tannins, flavonoids, polyphenolic substances [1, 3]. Wormwood (*Artemisia absinthium*) is a plant with many purposes such as stimulant of gastric secretions, inflammatory, anthelmintic [4]. The Lemon balm (*Melissa officinalis*), St. John's Wort (*Hypericum perforatum*) and Oregano (*Origanum vulgare*) volatile oils contained are rich in

compounds such as bioflavonoids [12, 9]. He flavors are a wide range of chemical compounds that lead to an olfactory perception in plants [8, 2]. The most significant is: superior alcohols, terpene compounds, bitter substances, the aldehydes and ketones, the esters, the way to dose and identify them being possible by using modern methods like gas phase chromatography.

2. MATERIALS AND METHODS

Plants with bioactive potentially: blueberries, artichoke, chicory, dumb, fennel, thorn, juniper, mint, cranberry, hawthorn, wormwood, willow herb, lemon balm, St. John's worth, oregano, centaury. The plants was dried and ground. The powder was homogenized in ethanol 50% for extraction of bioactive components in a ratio of 1:10 for 24 hours. The samples were filtered and brought to dryness. The extract was dissolved in ultrapure water 1:1. The aromatic plants profile evaluation was performed by using the GC / FID system (gas chromatograph coupled with ionisation flame). The standards used was purchased from Sigma Aldrich.

3. RESULTS AND DISCUSSION

Following the figure 1 there is a significant variation in the concentration of esters from the studied plants. It is noted appreciable values on *Teucrium chamaedrys* 27.0172 mg/L and decreased values by 17% for *Vaccinium myrtillus*.

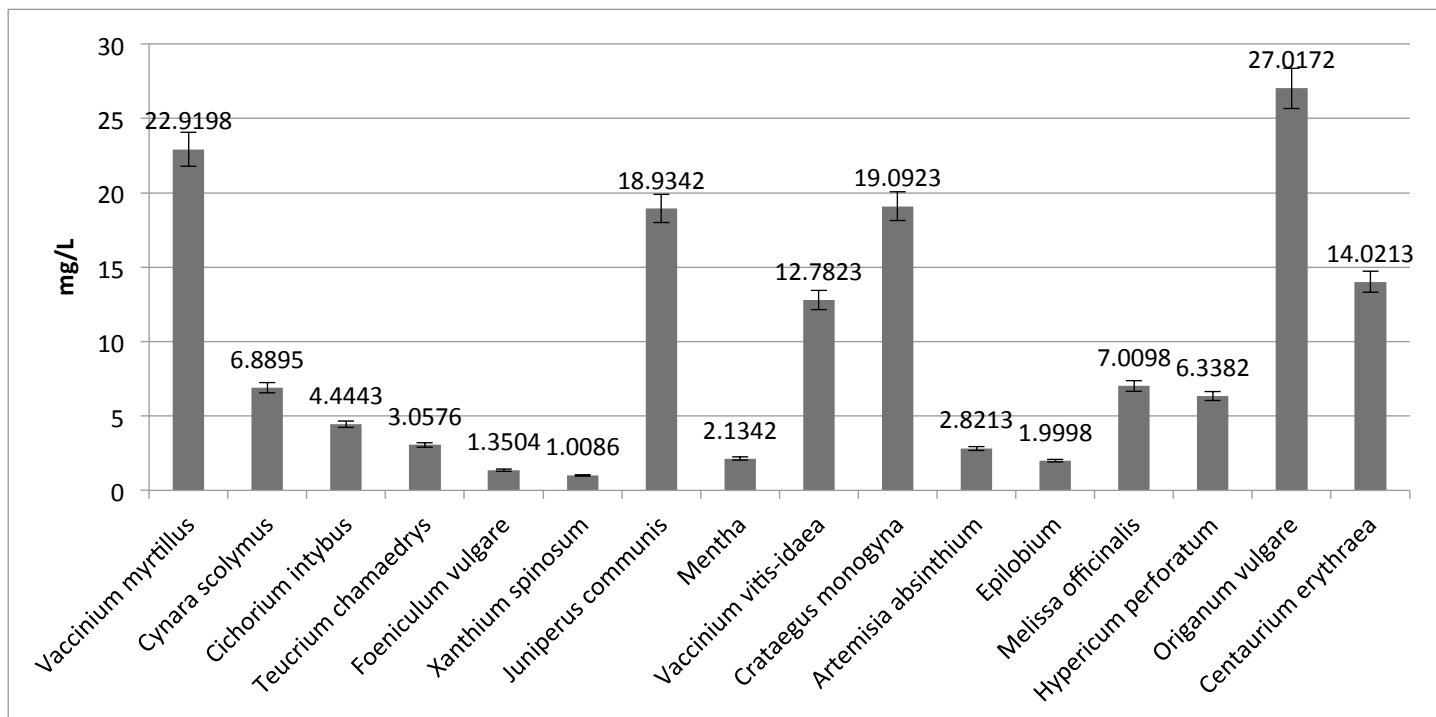


Figure 1. The identification and quantification of esters in the plants with bioactive potential

Similar values of wormwood (*Artemisia absinthium*) has been detected in the mint plant (*Mentha*) - 19.0923 mg / L, respectively 18.9342 mg / L. At 1.3 g / L difference is situated the centaury (*Centaurium erythraea*) from the hawthorn (*Crataegus monogyna*); the values were in this case located at 14.0213 mg / L, respectively 12.7823 mg / L. Low levels of esters presents the chicory plant (*Cichorium intybus*) of 4.4443 mg / L, fennel (*Foeniculum vulgare*) of 3.0576 mg / L, willow herb (*Epilobium*) of 2,8213mg / L, cranberry (*Vaccinium vitis-*

idaea) of 2.1342 mg / L. The lower limit have the following plants: lemon balm (*Melissa officinalis*), the thorn (*Xanthium spinosum*) and juniper (*Juniperus communis*) values are below 2 mg / L, respectively 1.9998 mg / L, 1.3504 mg / L and 1.0086 mg/L.

In the Figure 2 the dumb (*Teucrium chamaedrys*) has an averages of 132.0837 mg / L higher alcohols, which is the maximum value determined by this study.

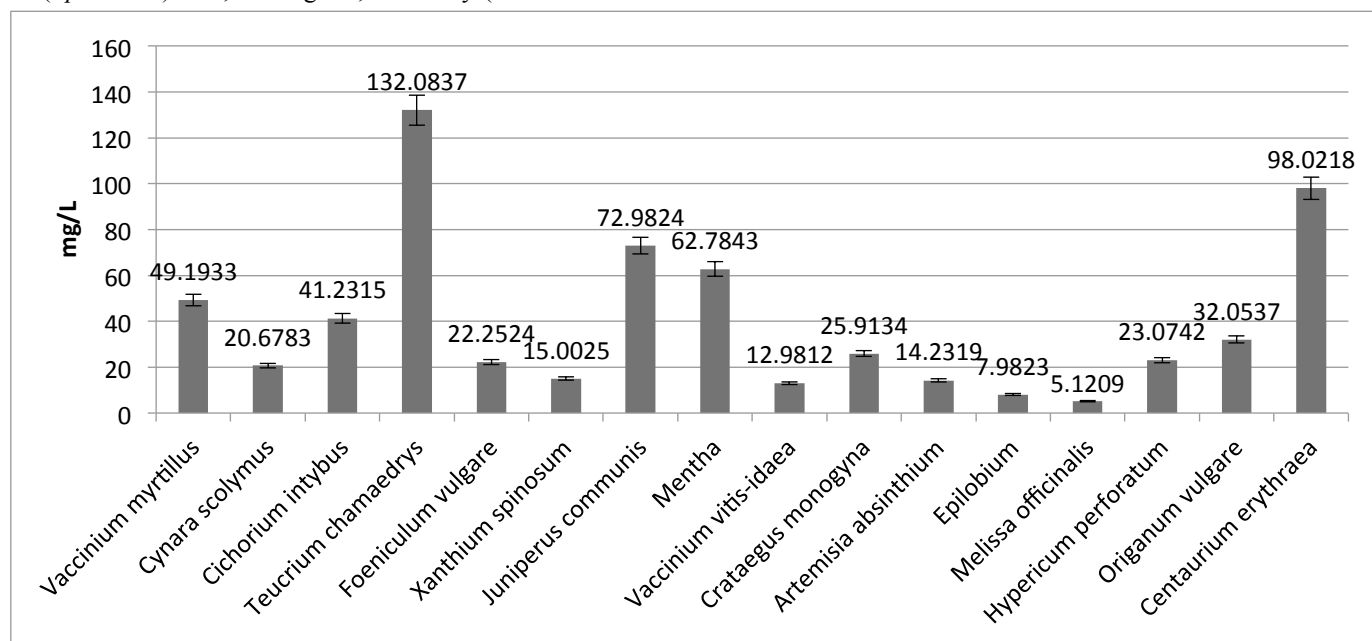


Figure 2. The identification and quantification of superior alcohols in the plants with bioactive potentially

From 30 mg / L and 50 mg / L superior alcohols has chicory (*Cichorium intybus*), blueberries (*Vaccinium myrtillus*) and oregano (*Origanum vulgare*); the average is being determined to 41.2315 mg / L, 49.1933 mg / L, ie 32.0537 mg / L. The lowest values are detected in the hawthorn (*Crataegus monogyna*) 25,9134 mg / L, St. John's wort (*Hypericum perforatum*) 23,0742 mg / L and fennel (*Foeniculum vulgare*) with 22.2524 mg / L.

The aldehydes (Figure 3) is an interesting segment for complete the bioactive profile on studied plants. The resulting values have a minimum of 1.0208 mg / L for centaury (*Centaurium erythraea*), 1.0723 mg / L for lemon balm (*Melissa officinalis*)

Analyzing the results can be seen that four plant extracts sets of the aldehydes values- between 10 mg / L and 20 mg / L. Those are: hawthorn (*Crataegus monogyna*) with 17.9231 mg / L,

fennel (*Foeniculum vulgare*) with 14.6497, St. John's wort (*Hypericum perforatum*) with 14.0271 mg / L, dumb (*Teucrium chamaedrys*) 11, 1098 mg / L. Aldehyde values between 5 mg / L and 10 mg / L were detected in oregano (*Origanum vulgare*) to 9.0484 mg / L, thorn (*Xanthium spinosum*) to 7.4784 mg / L, willow herb (*Epilobium*) of 5.1989 mg / L. The lowest values of aldehydes (1.0723 mg / L respectively 1.0218 mg / L) are detected at centaury (*Centaureum erythraea*) and lemon balm (*Melissa officinalis*).

The Terpene compound is built in plants in different forms. Due to specific reactions presents a range of flavors that can

characterize the plants. In Figure 4 can be seen that the values determined subunit 0.0182 mg / L at centaury (*Centaureum erythraea*), 0.1204 mg / L artichoke (*Cynara scolymus*), 0.1325 mg / L at the willow herb (*Epilobium*), tens dumb (*Teucrium chamaedrys*: 19.9280 mg / L) and peppermint (*Mentha*: 17.9785 mg / L). Terpene compounds values from 10 mg / L and 20 mg / L are seen in fennel (*Foeniculum vulgare*) with 16.2908 mg / L, a thorn (*Xanthium spinosum*) with 15.9213 mg / L, or juniper (*Juniperus communis*) with 13.4538 mg/L.

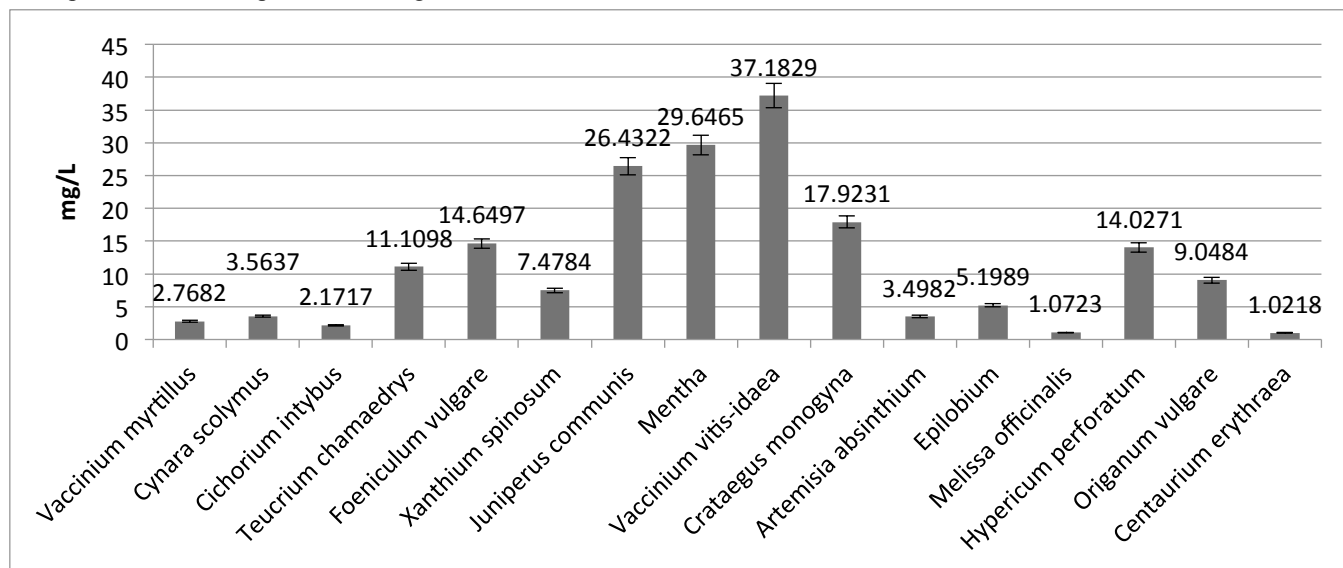


Figure 3. The identification and quantification of aldehydes in the plants with bioactive potentially

Other plants such as chicory, blueberries, cranberries and lemon balm have accumulated terpene compounds values from 4 mg / L to 7 mg / L. The Chicory plant (*Cichorium intybus*) reaches values of 6.2121 mg / L, the bilberry plant (*Vaccinium myrtillus*) have a rate of 5.7854 mg / L and the cranberry plant (*Vaccinium vitis-idaea*) to 4.1851 mg / L.

The lemon balm (*Melissa officinalis*) accumulates 4.0924 mg / L terpene compounds. Under these values we have wormwood (*Artemisia absinthium*) with 2.9143 mg / L terpene compounds, St. John's Wort (*Hypericum perforatum*), hawthorn (*Crataegus monogyna*) with values of 30% -31% lower than sage and oregano (*Origanum vulgare*) with values of 1.5050 mg / L.

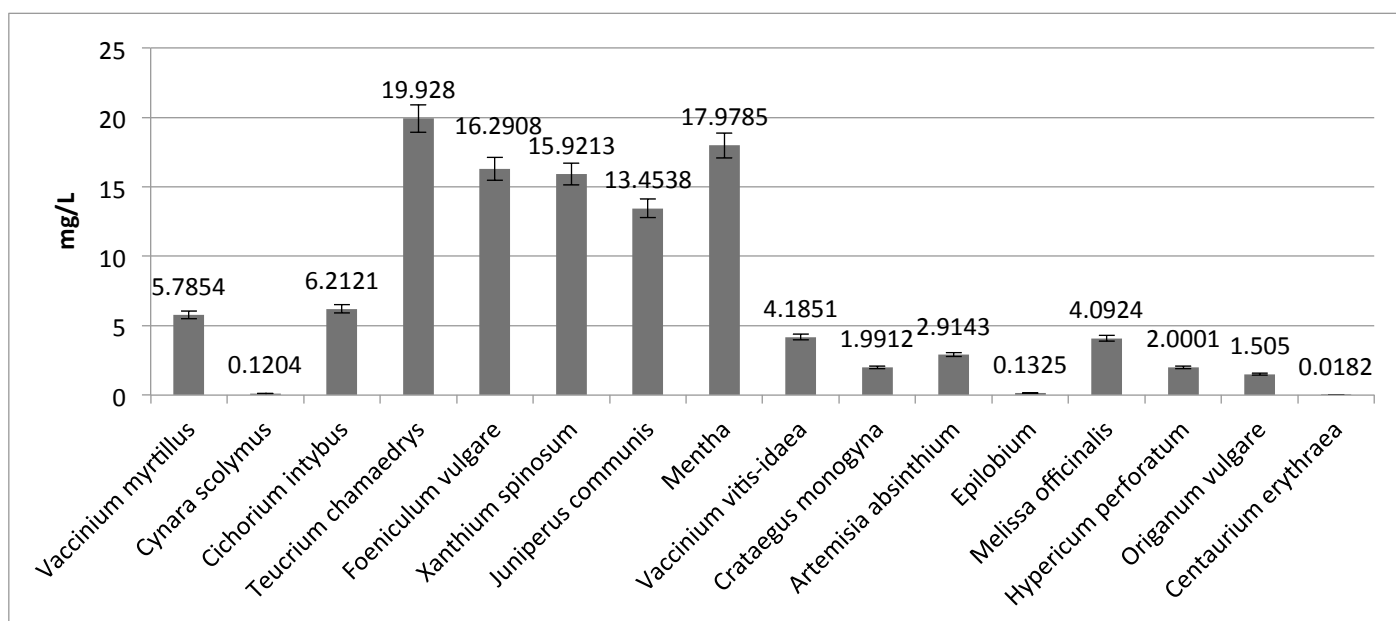


Figure 4. The identification and quantification of terpenes compounds in the plants with bioactive potentially

4. CONCLUSION

Every single plant we used in this study has amounts of bioactive compounds that contribute to their use in food and pharmaceutical industries.

It was detected that the lowest amounts of esters were found in juniper (*Juniperus communis*) and the maximum in dumb (*Teucrium chamaedrys*). The intermediate values can be seen on artichoke (*Cynara scolymus*), oregano (*Origanum vulgare*), St. John's wort (*Hypericum perforatum*).

Superior alcohols lowest value was detected in lemon balm (*Melissa officinalis*) and the maximum values- above 100 mg / L dumb (*Teucrium chamaedrys*).

33% lowest ranges is the values identified in centaury (*Centaureum erythraea*) followed by juniper (*Juniperus communis*) and peppermint (*Mentha*).

The aldehydes values ranges below 50 mg / L -that is a minimum on centaury (*Centaureum erythraea*) of the unit and a maximum of a few tens on cranberry (*Vaccinium vitis-idaea*).

The terpenes compounds are based on much lower values for centaury (*Centaureum erythraea*) and up to values of tens for dumb (*Teucrium chamaedrys*).

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