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Research of component composition of *Ruta graveolens* L. herb essential oil

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Abstract

With the method of chromatography-mass spectrometry the *Ruta graveolens* L. herb essential oil component composition has been studied. There have been found 34 and identified 20 compounds which are represented with alcohols, aldehydes and ketones. The main components of the essential oil of the aerial part of plant are 2-undecanone (2650,2 mg/kg), 2-nonanol acetate (1826,8 mg/kg), 2-undecanol (733,9 mg/kg), 2-nonanone (699,2 mg/kg).

Keywords: *Ruta graveolens* L, essential oil, chromatography-mass spectroscopic method.

1. Introduction

Essential oils have a wide range of therapeutic action, which allows them to occupy a significant place among the drugs. Today are identified more than 1000 components that contain essential oils referring to 2500 plant species of the world flora [1].

Qualitative chemical composition and quantitative content of individual components of plants and raw materials essential oils may differ a lot and depend on many factors (morphological parts, agricultural, soil, climate conditions, etc.) [2].

Essential oils in plants accumulate both in underground and aerial parts: leaves, herb, stems, inflorescence, bark, buds, petals, fruits, seeds, boxes, roots, rhizomes. Localization of essential oils in plants (glandular cells or patches, glandular hairs, scales, essential oil containers, resin canals) is the characteristic feature of the certain genus plants. Essential oil composition vary during the plant growth and development depending on the function performed by the plant: increase of assimilating surface, flowering, fruit formation, accumulating of nutrients and others. Ontogenetic factors influence the amount of essential oil in the plant that is taken into account when the medicinal plant materials are being harvested. The content of essential oil in the plant varies in dependence on the weather conditions and time of day [3, 4].

2. Materials and Methods

Component composition of the essential oil has been investigated with the gas chromatograph «Agilent Technology» 6890N with the mass-spectrometric detector 5973N. Terms of analysis: chromatographic column is quartz, capillary HP-5MS; column length – 30 m; internal diameter – 0,25 mm; carrier gas – helium; rate of carrier gas – 1 ml/min; volume of the sample – 0,1 – 0,5 mL (for solutions of essential oils); input of the samples with the division of flow 1/50; thermostat temperature – 50 °C with programming from 3 °C/min to 220 °C; detector and evaporator temperature – 250 °C. The components of essential oils were identified by the results of comparing obtained during chromatography of mass spectra of chemical substances which are the components of the studied mixtures with the data of library of mass spectra NIST02 (over 174000 substances). Retention indexes of components have been calculated on the results of essential oils control analyzes with the addition of normal alkanes (C10-C18) mixture [4].

3. Results and Discussion

The results of chromatography-mass spectroscopic analysis of component composition of *Ruta graveolens* L. herb essential oil are shown in Fig. 1, Table. 1.

Thus, as the result of the study of *Ruta graveolens* L. herb essential oil composition 20 compounds that are alcohols, aldehydes and ketones have been identified. The main components of the essential oil of the aerial part of plant are 2-undecanone (2650,2 mg/kg), 2-nonanol acetate (1826,8 mg/kg), 2-undecanol (733,9 mg/kg), 2-nonanone (699,2 mg/kg).

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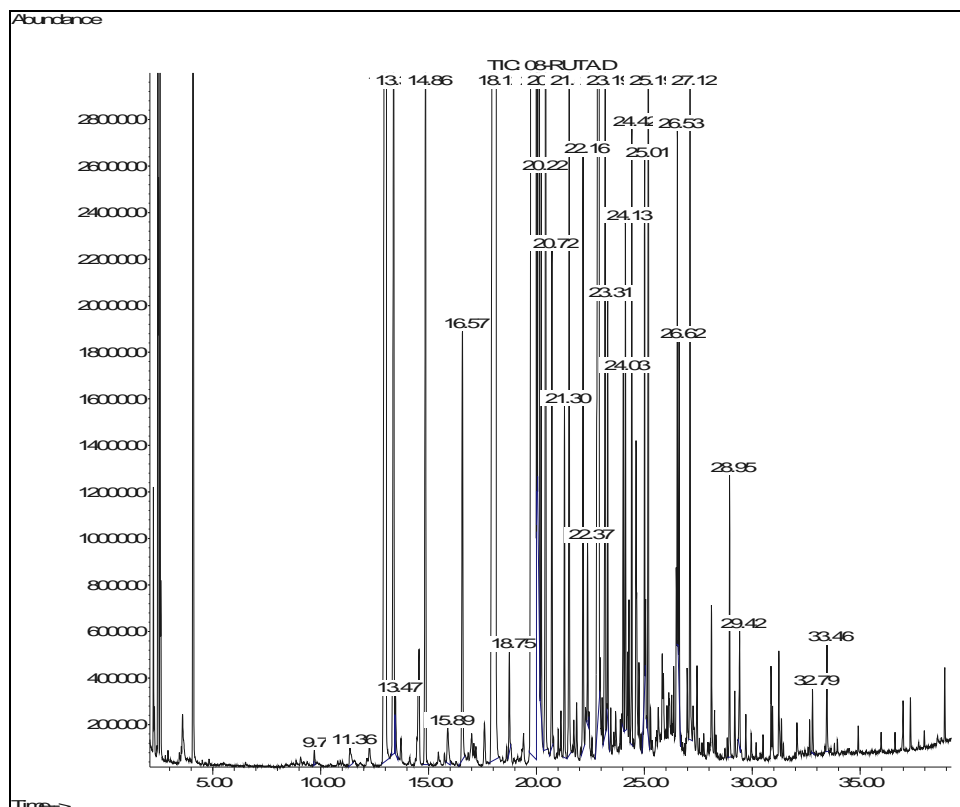


Fig 1: Chromatogram of essential oil of *Ruta graveolens* L. herb

Table 1: Component composition of essential oil of *Ruta graveolens* L. herb

No	Time of yield, sec	Component name	Content, mg / kg
1	9,71	decane	2,0
2	11,36	phenylacetaldehyde	6,0
3	13,03	2-nonanone	699,2
4	13,38	2-nonanone	147,5
5	13,46	nonanal	11,3
6	14,86	4 - methyl - 3 isopropenyl - 4 vinyl - cyclohex - 1 - ene (pregeigerene)	127,5
7	15,89	nonanol	10,5
8	16,57	2-decanone	78,9
9	18,12	2-nonanol acetate	1826,8
10	18,74	unknown substance	14,3
11	19,97	2-undecanone	2650,2
12	20,12	2-undecanol	326,4
13	20,22	decyl acetate	54,8
14	20,43	2-decanol acetate	161,2
15	20,72	unknown substance	61,0
16	21,29	dodecyl acetate	41,9
17	21,51	2-dodecanone	107,6
18	22,16	unknown substance	73,0
19	22,36	unknown substance	21,5
20	22,89	2-undecanol acetate	733,9
21	23,19	unknown substance	128,2
22	23,3	tridecyl acetate	40,4
23	24,02	unknown substance	43,6
24	24,12	unknown substance	62,2
25	24,42	unknown substance	66,1
26	25,01	unknown substance	45,8
27	25,19	unknown substance	95,0
28	26,53	unknown substance	45,9
29	26,62	2-dodecyl valerate	33,2
30	27,12	octadienyl benzol	104,8
31	28,95	1-octenyl benzol	32,2
32	29,41	unknown substance	16,2
33	32,79	unknown substance	7,9
34	33,46	unknown substance	14,9

4. Conclusions

1. For the first time with the method of chromatography-mass spectrometry the *Ruta graveolens* L. herb essential oil component composition has been studied, there have been found 34 and identified 20 compounds which are represented with alcohols, aldehydes and ketones.
2. Among the components of essential oil the dominated ones are 2-undecanone (2650,2 mg/kg), 2-nonanol acetate (1826,8 mg/kg), 2-undecanol (733,9 mg/kg), 2-nonanone (699,2 mg/kg), which are the marker compounds for the studied materials.
3. The content of individual volatile compounds creates prerequisites for further study of *Ruta graveolens* L. as a promising source of raw materials.

5. References.

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