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**TERPENOIDS OF *MATRICARIA CHAMOMILLA* L.  
FROM DIFFERENT PLACES OF GROWTH**

**Abstract.** In this work, a comparative gas chromatography-mass spectrometry analysis of the component composition of CO<sub>2</sub>-extracts from *Matricaria chamomilla* L. raw materials collected at the site of medicinal plants of the International Research and Production Holding “Phytochemistry” (Karaganda region, Republic of Kazakhstan), Mozheikovo agro-town (Grodno Region, Belarus) and in the vicinity of Sarkand (Almaty region, Republic of Kazakhstan) was undertaken. As a result of the research conducted, it was revealed that the major components of the obtained CO<sub>2</sub>-extracts of *Matricaria chamomilla* L. are: bisabolol oxide A, bisabolol oxide B and en-in-dicycloether. Meanwhile, in the CO<sub>2</sub>-extract of *Matricaria chamomilla* L. collected at the site of medicinal plants of JSC “IRPH “Phytochemistry” the quantitative content of matricarin and chamazulene are prevailed. Thus, the content of matricarin exceed three times, and the content of chamazulene five and two times, in comparison with extracts obtained from the Belarusian and Almaty raw materials.

The prospect of using *Matricaria chamomilla* L. raw material that grows on the medicinal plants site of JSC “IRPH “Phytochemistry” in the production of the anti-inflammatory ointment “Matripin-Dent” has been established.

**Key words:** *Matricaria chamomilla* L., CO<sub>2</sub>-extraction, chromato-mass spectrometry, chamazulene, matricarin.

**Introduction**

In modern medicine, herbal medicines occupy a special place, as they have a wide range of biological activity, which allows them to be used for the prevention and treatment of many diseases.

Phytopreparations are included in more than 85 pharmaceutical groups of medicines and most of them do not have equivalent synthetic substitutes [1].

Flowers of *Matricaria chamomilla* L., which have been used in medical practice for a long time as an anti-inflammatory, antiseptic and antispasmodic medicines [2] and are used as raw materials for obtaining fees, extracts, medicines “Romazulan” (Romania), “Rotokan” (Russia), “Rekutan” (Ukraine), “Camillozan” (Germany), “Alorom” (Russia), “Stomatofit” (Poland) [3-5] should be included among the types of plant raw materials that are widespread in the foreign and domestic pharmaceutical market.

The annual public health need for *Matricaria chamomilla* L. inflorescences is quite large and the amounts are about 250 tons [6]. At the same time, its main part is provided due to cultivation in specialized farms and only insignificant volumes - due to the harvesting of wild-growing raw materials [7].

Therefore, it is a relevant task to study of plant resources and to evaluate stock of herbs for the rational use of them and expansion of the range domestic drugs in the pharmaceutical market [8].

The pharmacological effect of *Matricaria chamomilla* L. flowers is due to the presence of a whole complex of biologically active substances with a broad spectrum of biological activity in their composition [9-17], primarily essential oils, flavonoids, coumarins, and sesquiterpene lactones of matricarin and matricin, which are the initial compounds in the biosynthesis of chamazulene possessing anti-inflammatory and antiallergic action.

*Matricaria chamomilla* L. raw materials are also used in the manufacture of cosmetics and pharmaceuticals. Recent studies show that the use of raw *Matricaria chamomilla* L. for cosmetic preparations is due to the high content of phenolic compounds [18-21].

An analysis of recent studies shows that for the production of high-quality extracts from *Matricaria chamomilla* L. raw materials, it is advisable to use compressed and liquefied gases as solvents. According to the literature [22, 23], supercritical CO<sub>2</sub>-extraction is preferable.

Despite the existing range of medicines, extracts of *Matricaria chamomilla* L. continue to be a promising object for further study and the creation of new medicines with a number of pharmacological and therapeutic activity.

JSC "International Scientific and Production Holding "Phytochemistry" on the basis of "Karaganda Pharmaceutical Plant" LLP develops and introduces into production the original drug "Matripin-Dent", which consists of carbon dioxide extracts of *Populus balsamifera* and *Matricaria chamomilla* L. In order to determine the suitable raw materials of *Matricaria chamomilla* L. and to obtain high-quality CO<sub>2</sub>-extracts with a quantitative content of biologically active substances, we studied 3 types of *Matricaria chamomilla* L. raw materials growing in various places.

The purpose of the work is a chemical study of the component composition of CO<sub>2</sub>-extracts of *Matricaria chamomilla* L. depending on the place of growth.

### Experimental part

#### *Materials and research methods*

The materials used for the study were *Matricaria chamomilla* L. inflorescences collected in the flowering phase in various places: at the medicinal plant site of the JSC "International Research and Production Holding "Phytochemistry" (Karaganda, Kazakhstan), in the Mozheikovo agrotown (Grodno Region, Belarus) and Sarkand (Almaty region, Republic of Kazakhstan).

Drying of the raw material was carried out by the airily-shadow method at a temperature of 25-30°C.

CO<sub>2</sub>-extraction of all types of raw materials was carried out under the same supercritical conditions: pressure - 250 bar, temperature: 50°C, extraction time: 180 min. After that, a three-fold water-alcohol treatment of the obtained CO<sub>2</sub>-extracts was carried out to precipitate and separate the lipophilic components. For each stage, the mass of ethanol was used; the mass of ethanol is three times the mass of the extract, and the mass of water, one and a half times the mass of the extract. The extract was dissolved in alcohol, heated to 70°C. After that, water heated to 70°C was immediately added to the resulting solution. The solution was stirred and left in a dark place for a day, then filtered. The precipitate was re-treated with alcohol and water. The filtrate obtained after three processing steps was evaporated on a rotary evaporator.

The qualitative and quantitative content of essential oil components in CO<sub>2</sub>-extracts was determined by gas chromatography-mass spectrometry on a gas chromatograph with an Agilent 7890/5975C mass-selective detector. A 5% Phenyl Methyl Silox HP-5MS column (30 mm×250 mm×0.25 mm) was used with a helium carrier gas velocity of 1 ml/min. Evaporator temperature - 230°C. The gas chromatography column was kept at 40°C for 5 min; with temperature programming up to 240°C with a rate of temperature change of 5°C/min, and then kept in isothermal mode for 50 min. Sample entry mode with flow division. The sample volume is 0.1 µl. The conditions for recording mass spectra are 70 eV, the mass range is m/z 10-400. The percentage of components was calculated automatically based on the peak areas of the total ion chromatogram. Components were identified by mass spectra and retention times using the Wiley GC/MS library.

### Results and discussion

According to the analysis by the GC/MS method, it is established that the main components of the CO<sub>2</sub>-extracts of *Matricaria chamomilla* L. are: bisabolol oxide A (21.51%, 17.90% and 18.57%), bisabolol oxide B (17.11%, 5.71% and 14.32%) and en-in-dicycloester (18.93%, 43.58% and 21.17%) (table 1).

Meanwhile, the quantitative content of matricarin and chamazulene in the CO<sub>2</sub>-extract of *Matricaria chamomilla* L., collected in the area of medicinal plants of JSC "IRPH "Phytochemistry", prevails as opposed places of growth. Thus, the content of matricarin exceed three times, and the content of chamazulene five and two times, in comparison with extracts obtained from the Belarusian and Almaty raw materials. Also, the quantitative content of the en-in-dicycloester in the CO<sub>2</sub>-extract obtained from the Belarusian raw materials of *Matricaria chamomilla* L. should be noted, its content is 2 times higher than from the Kazakh raw materials.

Table 1 - Comparative component composition of CO<sub>2</sub>-extracts of *Matricaria chamomilla* L., depending on the place of growth

Component name	CO <sub>2</sub> -extract of <i>Matricaria chamomilla</i> L.					
	JSC "International Research and Production Holding "Phytochemistry" (Karaganda, Kazakhstan)		Mozheikovo (Grodno Region, Belarus)		Sarkand (Almaty region, Republic of Kazakhstan)	
	RT, min	Content, %	RT, min	Content, %	RT, min	Content, %
β-farnesene	26.882	2.01	26.876	3.50	26.830	1.83
Spathulenol	29.903	1.30	29.897	1.49	29.846	0.18
<b>Bisabolol oxide B</b>	<b>31.666</b>	<b>17.11</b>	<b>31.643</b>	<b>5.71</b>	<b>31.585</b>	<b>11.87</b>
Bisabolol oxide	32.289	8.50	32.278	5.85	32.226	5.84
Herniarin	33.159	4.50	33.147	7.13	-	-
Chamazulene	33.331	4.78	33.319	0.88	33.262	1.80
<b>Bisabolol oxide A</b>	<b>33.668</b>	<b>21.51</b>	<b>33.645</b>	<b>17.90</b>	<b>33.582</b>	<b>14.36</b>
<b>En-in-dicycloester</b>	<b>36.438</b>	<b>18.93</b>	<b>36.443</b>	<b>43.58</b>	<b>36.346</b>	<b>21.17</b>
N-hexadecanoic acid	37.845	1.07	-	-	38.446	0.47
9,12-octadecadienoic acid	41.410	0.42	41.193	1.50	41.513	1.61
Matricarin	45.885	2.71	45.867	0.90	45.872	0.94

At the same time, chamazulene and sesquiterpene lactone matricarin are relatively valuable biologically active substances in the studied extracts, both components have an anti-inflammatory effect and are the main components of *Matricaria chamomilla* L. raw material [24, 25].

### Conclusion

On the basis of the obtained results, it was established that the main components of the isolated CO<sub>2</sub>-extracts are bisabolol oxides A and B and en-in-dicycloester. Due to the comparative study of the component composition of extracts of *Matricaria chamomilla* L. it was revealed that the quantitative content of matricarin and chamazulene in the extract of *Matricaria chamomilla* L. collected at the medicinal plants site of JSC "International Scientific and Production Holding "Phytochemistry" (Karaganda region, Republic of Kazakhstan) are prevailed in comparison with extracts selected from the Belarusian and Almaty raw materials.

Thus, to obtain a CO<sub>2</sub>-extract of *Matricaria chamomilla* L. with a quantitative content of pharmacologically active components for the drug "Matripin-Dent", it is advisable to use raw materials growing on the medicinal plants site of "International Scientific and Production Holding "Phytochemistry", since this raw material has a quantitative content of basic pharmacologically active compounds with a wide range of pharmacological activity.

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«Фитохимия» халықаралық ғылыми-өндірістік холдингі» АҚ, Қарағанды қ., Қазақстан Республикасы

### ӨРТҮРЛІ АЙМАҚТАРДА ӨСЕТІН ДӘРІЛІК ТҮЙМЕДАҚТЫҢ (*MATRICARIA CHAMOMILLA* L.) ТЕРПЕНОИДТАРЫ

**Аннотация.** Осы жұмыста «Фитохимия» халықаралық ғылыми-өндірістік холдингінің дәрілік өсімдіктер учаскесінде (Қарағанды облысы, Қазақстан Республикасы), Можейково агроқалашығында (Гродно облысы, Беларусь Республикасы) және Сарқанд төңірегінде (Алматы облысы, Қазақстан Республикасы) жиналған дәрілік түймедақ шикізатынан алынған СО<sub>2</sub>-сығындыларының компоненттік құрамына салыстырмалы хроматографиялық масс-спектрометриялық талдау жүргізілді. Жүргізілген зерттеулер нәтижесінде дәрілік түймедақтан алынған СО<sub>2</sub>-сығындыларының мажорлы компоненттері бисабололоксид А, бисабололоксид Б және ен-ин-дициклоэфир болып табылатыны анықталды. Сонымен қатар «Фитохимия» ХҒӨХ» АҚ дәрілік өсімдіктер учаскесінде жиналып алынған дәрілік түймедақтың СО<sub>2</sub>-



сығындыларында матрикарин мен хамазуленнің мөлшері басым болып келетіні анықталды, атап айтқанда, белорустық және алматылық шикізаттан алынған сығындылармен салыстырғанда матрикарин мөлшері үш есе, ал хамазулен бес және екі есе артық.

«Фитохимия» ХФӨХ» АҚ дәрілік өсімдіктер учаскесінде өсетін дәрілік түймедақ шикізатын кабынуға қарсы «Матрипин-Дент» жакпамайының өндірісінде қолдану келешегі анықталды.

**Түйін сөздер:** дәрілік түймедақ, *Matricaria chamomilla* L., CO<sub>2</sub>-экстракциялау, хроматографиялық масс-спектрометрия, хамазулен, матрикарин.

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### ТЕРПЕНОИДЫ РОМАШКИ АПТЕЧНОЙ (MATRICARIA CHAMOMILLA L.) ИЗ РАЗЛИЧНЫХ МЕСТ ПРОИЗРАСТАНИЯ

**Аннотация.** В данной работе проведен сравнительный хромато-масс-спектрометрический анализ компонентного состава CO<sub>2</sub>-экстрактов из сырья ромашки аптечной, собранной на участке лекарственных растений Международного научно-производственного холдинга «Фитохимия» (Карагандинская область, Республика Казахстан), агрогородка Можейково (Гродненская область, Республика Беларусь) и в окрестности Сарканда (Алматинская область, Республика Казахстан). В результате проведенных исследований выявлено, что мажорными компонентами полученных CO<sub>2</sub>-экстрактов ромашки аптечной являются: бисаболоксид А, бисаболоксид Б и ен-ин-дициклоэфир. Между тем, количественное содержание матрикарина и хамазулена в CO<sub>2</sub>-экстракте ромашки аптечной, собранной на участке лекарственных растений АО «МНПХ «Фитохимия» преобладает, так содержание матрикарина превосходит в три раза, а хамазулена в пять и два раза, в сравнении с экстрактами, полученными из белорусского и алматинского сырья.

Установлена перспективность использования сырья ромашки аптечной, произрастающей на участке лекарственных растений АО «МНПХ «Фитохимия» в производстве противовоспалительной мази «Матрипин-Дент».

**Ключевые слова:** ромашка аптечная, *Matricaria chamomilla* L., CO<sub>2</sub>-экстракция, хромато-масс-спектрометрия, хамазулен, матрикарин.

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