

Chemical constituents and antimicrobial ability of essential oil from the fruits of *Lonicera maackii* (Rupr.) Maxim.

N. O. Khromykh, Y. V. Lykholat, O. O. Didur, T. V. Sklyar, A. O. Anischenko, T. Y. Lykholat

Oles Honchar Dnipro National University, Dnipro, Ukraine

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Oles Honchar Dnipro National
University, Gagarin Ave., 72,
Dnipro, 49010, Ukraine.
Tel.: +38-050-487-87-17
E-mail:
khromykh2012@gmail.com

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Essential oils are the natural products that can pave the way for the creation of effective drugs with various beneficial properties. Plants of *Lonicera maackii* are well known in the natural growth regions of temperate Asia due to therapeutic effects and a high content of the bioactive compounds. Species diversity of steppe vegetation is enriched by the introduction of plants, but the assessment of this process effectiveness should also take into account the realization of plant genetic potential for the accumulation of secondary metabolites in the new growth conditions. The aim of the work was to establish whether the plants of *L. maackii* introduced in the steppe zone could reproduce the health promoting properties. The essential oil from the fruits of *L. maackii* was obtained by hydro distillation method. Chloroform and ethyl acetate fractions isolated from the aqueous distillate of *L. maackii* fruits were analyzed by gas chromatography combined with mass spectrometry (GC-MS analysis). Chemical constituents identified in ethyl acetate and chloroform fraction represented 98.6% and 94.2 % of the total compounds content, respectively. Among the most abundant components were hexadecane, acetic acid, butyl ester, hexadecanoic acid, methyl ester, linoleic acid, and linoleic acid methyl ester in the and the alkanes heptacosane, hexadecane, and tetradecane in chloroform fraction. Linoleic acid and some minor constituents of *L. maackii* fruit essential oil, such as ethyl-isoallochololate, arachidic acid, linalool and d-mannitol-1-decylsulfonyl are well known because of their reported bioactivities. The antimicrobial activity of essential oil was assessed against several clinical and collection bacterial and fungal strains. The results of disc-diffusion assays showed low to moderate activity of *L. maackii* fruit essential oil against Gram-positive and Gram-negative bacterial strains, as well as against fungal itraconazole-resistant clinical strain of *Candida albicans*. Thus, the essential oil derived from *Lonicera maackii* fruits may serve as potential resource of bioactive compounds having beneficial properties, in particular, the ability to overcome the resistance of pathogenic microorganisms to drugs. Further research is needed to identify the full range of bioactivities of the essential oil obtained from honeysuckle fruits.

Keywords: honeysuckle; essential oil; hydro distillation; phytochemicals; secondary metabolites; bioactivity

Introduction

Essential oils (EOs) are the natural products, which have gained popularity in the food, cosmetics, and pharmaceutical industries, because of their strong odor, unique colors, and high volatility (Maggio et al., 2016; De-Montijo-Prieto et al., 2021). The beneficial properties of essential oils for humans in various aspects have been known for a long time, but today they are confirmed by data on their rich chemical composition (Pinto et al., 2017; Diniz do Nascimento et al., 2020). The volatile oils obtained from different parts of plants are composed of a complex mixture of the secondary metabolites (Chouhan et al., 2017) and can be used in various applications such as

pharmaceuticals (Khan et al., 2018). In particular, the essential oils obtained from different plants showed a broad fungicidal effect; of these, the antifungal potential of aromatic plant *Bupleurum rigidum* essential oil was reported (Zuzarte et al., 2021). The confirmed biological activities of the essential oil from traditional medicinal plants *Artemisia judaica* (Abu-Darwish et al., 2016) and *Schisandra chinensis* (Lee et al., 2021) were the most prominence in significant anti-inflammatory effects. Essential oils of four different *Pinus* species showed inhibitory action against respiratory pathogenic bacterial strains (Mitić et al., 2018). Apart the health-promoting ability, the essential oils demonstrate a remarkable activity against the tested food-borne microorganisms, and

might be a new potential source as natural antimicrobial agents applied in food systems (Zeng et al., 2011; Campana et al., 2022). Thus, the essential oils are able to improve the shelf life of packaged products, control the microbial growth, and replace the chemical food storage drugs (Vergis et al., 2015; Pateiro et al., 2021).

Lonicera maackii (Rupr.) Maxim (Amur honeysuckle) belongs to the genus *Lonicera* Linn. (*Caprifoliaceae* family) which is native to temperate Asia in northern and western China, Mongolia, Japan, Korea. Species of genus *Lonicera* Linn. have been used in traditional Chinese medicine, functional foods, cosmetics and other applications, together with their pharmacological activities including anti-inflammatory, antiviral, antimicrobial, anticancer, hepatoprotective, antioxidant, neuroprotective, antidiabetic, anti-allergic, immunomodulatory effects (Ge et al., 2022). Researchers showed that the health-promoting properties of the genus of *Lonicera* Linn plants might be associated with the presence of about 420 components including 87 flavonoids, 222 terpenoids, 51 organic acids; among them, saponins and sapogenins together with their pharmacological activities have immunomodulatory effects and hemolytic toxicity (Fang et al., 2020). In particular, the roots, leaves and flowers of *L. maackii* possess antibacterial activity; additionally, the roots also been used for the treatment for malaria disease, removing fever and to treat pulmonary fever bronchitis in children caused by bacteria (Yang et al., 2018). Therapeutic effects of the extracts from fruits, flowers and leaves of *L. maackii* are due to a high content of wide spectrum of the bioactive compounds, including iridoids, triterpenes, volatile oils, flavonoids, and phenylpropanoids. For example, chlorogenic acid, high content of flavonoid compounds, and acid ethyl esters were found among the main chemical constituents of *L. maackii* (Yong et al., 2014). The time-of-drug addition experiments demonstrate (Li et al., 2021) that acids and flavonoids extracts of honeysuckle have the potential to be developed into an antiviral agent against influenza virus, especially for oseltamivir-resistant viruses. Moreover, recent studies (Du et al., 2021) have revealed that the honeysuckle combined with conventional therapy may be beneficial for the treatment of COVID-19 in improving lung characteristics, clinical cure rate, clinical symptoms, and laboratory indicators and reducing the rate of conversion to severe cases. Apart the health benefits, the essential oils of *Lonicera* species have been reported as the active insecticidal agents; for example, *L. japonica* flower buds essential oil showed potential in terms of contact and fumigant toxicity against the grain storage insects including booklouse and maize weevils (Zhou et al., 2012).

Plants of *Lonicera maackii* have successfully adapted to the climatic conditions of steppe zone of Ukraine, bloom and bear fruit. As of today, the ability of introduced *L. maackii* plants to accumulate high level of the secondary metabolites at whole including the volatile compounds having the known health benefits was not examined. Meanwhile, previous investigations of the introduced plants of other species showed the possibility of distinctions in the antioxidant potentials and polyphenolic compounds content (Khromykh et al., 2018; Lykholat et al., 2019). Regarding plant volatiles, there is evidence that their biosynthetic process exhibits remarkable genotypic variability and phenotypic plasticity (Maffei et al., 2011). Taking into account the above, the purpose of this work was to investigate the chemical composition and antimicrobial capacity of the essential oil isolated from *L. maackii* fruits.

Material and methods

Plant material was collected at the end of September 2021 on the territory of Botanical Garden of Oles Honchar Dnipro National University (48°26'7" N, 35°2'34" E, Dnipro city, steppe zone of Ukraine). Here, plants of *Lonicera maackii* were introduced above 15 years ago. Steppe climate has several unfavorable traits including low precipitation (473 mm

average, but 265 mm in dry years) and sharp temperature changes during year.

The freshly collected ripe fruits of *L. maackii* were taken to the laboratory followed by washing with warm water and air-drying at 20 °C in the shade. The method of hydro distillation (Khan et al., 2018) was used to obtain the essential oil from the fruits of *L. maackii*. The weighted portion (78.0 g) of dried fruits was subjected to hydro distillation for 4 h to give an oil. The aqueous distillate (250 mL) obtained during hydro distillation was successively extracted with chloroform and ethyl acetate (three times 50 mL) in a separatory funnel. The combined chloroform extracts and combined ethyl acetate extracts (150 mL) were dried using anhydrous Na₂SO₄, filtered, and the solvents were removed by rotary evaporation under reduced pressure to acquire the volatile oil. The total yield of the oil was 0.25% (w/w) on a dry weight basis.

Chloroform and ethyl acetate fractions of the essential oil derived from the fruits of *Lonicera maackii* were subjected to the gas chromatography – mass spectrometry (GC-MS) analysis using Shimadzu GCMS-QP 2020 EI equipped with Rxi®-5ms column (30 m × 0.25 mm, film thickness 0.25 µm) containing 5% diphenyl/95% dimethyl polysiloxane as a fixed liquid phase. The column temperature 50 °C, with 5 min initial hold, and then programmed temperature gradient increased to 300 °C at a rate of 15 °C per min, and kept constant at 300 °C for 10.5 min. The carrier gas helium passed at a flow rate 54 ml/min. Injector temperature was 300 °C; sample volume was 1 µL. Mass Spectrum Library 2014 for GC-MS (O2125401310) was used to identify the separated compounds by comparing the mass spectra obtained with those stored in the library database (National Institute of Standards and Technology library similarity index, NIST14.lib, NIST14s.lib). The content of individual compounds was estimated using the corresponding peak area and expressed as a percentage of the total sum of identified compounds.

Antimicrobial activity of *Lonicera maackii* fruit essential oil, as well as fruit and leaf crude isopropanol extracts were tested using the disc diffusion method (Bhimba et al., 2012). The test bacterial strains were taken from the culture collection of Microbiology, Virology and Biotechnology Department of Oles Honchar DNU; of these, there were several Gram-negative and Gram-positive bacterial strains. Two different fungal strains of *Candida albicans* have the clinical origin. Antibiotic ofloxacin (5.0 µg per disc) was used as the positive control for the bacterial strains; itraconazole 10.0 µg was used as the positive control for the fungal strains. Antimicrobial activities of the essential oil, fruit and leaf isopropanol extracts were estimated on the diameter of the inhibition zone (mm) around the discs.

All bioassays were carried out in five replication. Experimental results was processed by analysis of variance (ANOVA). The data obtained were expressed as the Mean ± Standard Deviation, and the differences between means were compared with Tukey's HSD. All differences were considered statistically significant at $P < 0.05$.

Results and discussion

Generally, more numerous chemical compounds were detected in chloroform fraction in comparison with the ethyl acetate fraction of the essential oil isolated from the fruits of *Lonicera maackii*. As for the ethyl acetate fraction, compounds identified by GC-MS analysis represented 98.6% of the total peak areas on chromatogram, and 26 compounds in this fraction exhibited more than 0.1% of total peak areas (Table 1).

The principal constituents of the ethyl acetate fraction of the essential oil, containing more than 10% of the total peak areas, were Hexadecane (15.65% of total) and Acetic acid, butyl ester (14.33% of total). Next group of the constituents of the *Lonicera maackii* fruits essential oil consisted of the compounds having 1–10% of the total peak areas. There were Nonadecane (8.35 % of total), Tetracosane (8.30%),

Table 1GC-MS analysis of ethyl acetate fraction of the essential oil from *Lonicera maackii* fruits

No	RT, min	Compound name	Area, %	Molecular formula	MWT
1	1.900	Acetic acid, butyl ester	14.33	C ₆ H ₁₂ O ₂	116
2	2.091	1-Methoxy -2-propyl acetate	0.20	C ₆ H ₁₂ O ₃	132
3	2.176	Benzene, 1,3-dimethyl	6.75	C ₈ H ₁₀	106
4	2.592	Hydroperoxide, 1-methyl-1-phenylethyl	0.47	C ₉ H ₁₂ O ₂	152
5	2.707	Acetoxyacetic acid, nonyl ester	0.45	C ₁₃ H ₂₄ O ₄	244
6	2.772	1,3,5-Trimethylbenzene (syn. Mesitylene)	0.55	C ₉ H ₁₂	120
7	2.952	1,3-Pentanediol-4-methyl-2-nitro	0.41	C ₆ H ₁₃ NO ₄	163
8	3.749	d-Glicero-d-galacto-heptose	0.38	C ₇ H ₁₄ O ₇	210
9	3.928	Dodecane	0.80	C ₁₂ H ₂₆	170
10	5.157	Hexadecane	15.65	C ₁₆ H ₃₄	226
11	6.817	1-Hexadecanol, 2-methyl	0.39	C ₁₇ H ₃₆ O	256
12	6.940	Ethyl isoallocholate	0.49	C ₂₆ H ₄₄ O ₅	436
13	7.041	Isopropyl tetradecyl ether	0.31	C ₁₇ H ₃₆ O	256
14	7.266	Tetracosane	8.30	C ₂₄ H ₅₀	338
15	7.398	d-Mannitol, 1-decylsulfonyl	0.54	C ₁₆ H ₃₄ O ₇ S	370
16	7.785	9,9-Dimethoxybicyclo(3.3.1)nona-2,4-dione	0.36	C ₁₁ H ₁₈ O ₄	212
17	7.852	Hexadecanoic acid, methyl ester	6.32	C ₁₇ H ₃₄ O ₂	270
18	8.101	Dibutyl phthalate	7.36	C ₁₆ H ₂₂ O ₄	278
19	8.154	Nonadecane	8.35	C ₁₉ H ₄₀	268
20	8.263	Eicosanoic acid (syn. Arachidic acid)	0.37	C ₂₀ H ₄₀ O ₂	312
21	8.599	9,12-Octadecadienoic acid, methyl ester	6.62	C ₁₉ H ₃₄ O ₂	294
22	8.634	9,12,15-Octadecatrienoic acid, methyl ester (ZZZ)	4.07	C ₁₉ H ₃₂ O ₂	292
23	8.697	Heneicosanoic acid, methyl ester	0.39	C ₂₂ H ₄₄ O ₂	340
24	8.865	9,12-Octadecadienoic acid (Z,Z) (syn. Linoleic acid)	8.14	C ₁₈ H ₃₂ O ₂	280
25	8.899	9,12,15-Octadecatrienoic acid, ethyl ester	2.81	C ₂₀ H ₃₄ O ₂	306
26	8.972	Heptacosane	4.99	C ₂₇ H ₅₆	380

Note: RT – Retention time, MWT – Molecular weight. Compound content is expressed as percentage of total.

9,12-Octadecadienoic acid (ZZ) (8.14%), Dibutyl Phthalate (7.36%), Benzene, 1,3-dimethyl (6.75%), 9, 12-Octadecadienoic acid, methyl ester (6.62 %), Hexadecanoic acid, methyl ester (6.32%), Heptacosane (4.99%), 9,12,15-Octadecatrienoic acid, methyl ester (4.07%), and 9,12,15-Octadecatrienoic acid, ethyl ester (2.81%).

As for the chloroform fraction of the essential oil derived from the *Lonicera maackii* fruits, chemical compounds identified by GC-MS analysis represented 94.2% of the total peak areas on chromatogram. Of these, 33 constituents achieved more than 0.1% of total peak areas (Table 2).

Table 2GC-MS analysis of chloroform fraction of the essential oil from *Lonicera maackii* fruits

No	RT, min	Compound name	Area, %	Molecular formula	MWT
1	2.042	Furfural	0.12	C ₅ H ₄ O ₂	96
2	2.691	Decane	1.62	C ₁₀ H ₂₂	142
3	3.265	Linalool	0.31	C ₁₀ H ₁₈ O	154
4	3.635	Undecane, 5-methyl	0.19	C ₁₂ H ₂₆	170
5	3.734	Undecane, 3-methyl	0.13	C ₁₂ H ₂₆	170
6	3.922	Dodecane	9.43	C ₁₂ H ₂₆	170
7	4.205	Furan, 4,5-diethyl, 2,3-dihydro, 2,3-dimethyl	0.15	C ₁₀ H ₁₈ O	154
8	4.875	Decane, 4-ethyl	0.34	C ₁₂ H ₂₈	170
9	4.981	Heptadecane, 7-methyl	0.25	C ₁₈ H ₃₈	254
10	5.109	3-Hexadecene (Z)	0.18	C ₁₂ H ₂₆	224
11	5.166	Tetradecane	14.84	C ₁₄ H ₃₀	198
12	5.511	Octane, 2-cyclohexyl	0.19	C ₁₄ H ₂₈	198
13	5.983	Nonadecane	0.23	C ₁₉ H ₄₀	268
14	6.015	Tetradecane, 5-methyl	0.86	C ₁₅ H ₃₂	212
15	6.119	Pentadecane, 2-methyl	0.25	C ₁₈ H ₃₄	226
16	6.235	1-Pentadecene	0.15	C ₁₅ H ₃₀	210
17	6.280	Hexadecane (syn. Cetane)	16.02	C ₁₆ H ₃₄	226
18	6.398	Undecan-4-cyclohexyl	0.59	C ₁₇ H ₃₄	238
19	6.901	2-Methyltetracosane	0.46	C ₂₅ H ₅₂	352
20	7.135	Heptadecane, 3-methyl	0.33	C ₁₈ H ₃₈	254
21	7.357	5-Octadecene (E)	0.46	C ₁₈ H ₃₆	352
22	7.646	Dodecane-4-cyclohexyl	1.26	C ₁₈ H ₃₆	224
23	7.953	Eicosane, 2,4-dimethyl	1.07	C ₂₂ H ₄₆	310
24	8.047	Eicosane, 2-methyl	0.26	C ₂₁ H ₄₄	296
25	8.108	Phthalic acid, butyl-undecyl ester	0.69	C ₂₃ H ₃₆ O ₄	376
26	8.171	Hexacosane	6.27	C ₂₆ H ₅₄	366
27	8.272	1-Hexadecanol	0.60	C ₁₆ H ₃₄ O	242
28	8.606	9,12-Octadecadienoic acid (Z,Z) (syn. Linoleic acid)	0.12	C ₁₈ H ₃₂ O ₂	280
29	8.906	8,11,14-Eicosatrienoic acid (Z,Z,Z)	0.12	C ₂₀ H ₃₄ O ₂	308
30	8.985	Heneicosane	2.73	C ₂₁ H ₄₄	298
31	9.579	Docosane, 2,4-dimethyl	0.56	C ₂₄ H ₅₀	338
32	10.148	Bis[2-ethylhexyl]isophthalate	0.40	C ₂₄ H ₃₈ O ₄	390
33	10.608	Heptacosane	34.73	C ₂₇ H ₅₆	381

Note: RT – Retention time, MWT – Molecular weight. Compound content is expressed as percentage of total.

The principal constituents in chloroform fraction of the essential oil, containing more than 10% of the total peak areas, were alkanes Heptacosane (34.73% of total), Hexadecane (16.02%), and Tetradecane (14.84%). Next group of the constituents of the *Lonicera maackii* fruits essential oil consisted of the compounds having 1–10% of the total peak areas. There were Dodecane (9.43 % of total), Hexacosane (6.27%), Heneicosane (2.73%), Decane (1.62%), and Dodecane, 4-cyclohexyl (1.26%). The minor constituent of chloroform fraction of the *L. maackii* fruits essential oil, Linalool (0.31% of total), has several bioactive properties

including the anti-inflammatory, anticancer, antimicrobial, analgesic, antidepressive and neuroprotective properties (Pereira et al., 2018). In addition, Linalool was reported as one of the principal compounds in the essential oil of *Lonicera japonica* flower buds obtained by hydro distillation (Zhou et al., 2012).

At whole, several compounds of both essential oil fractions derived from *L. maackii* fruits are well known due to antioxidant, antimicrobial and other beneficial properties (Fig. 1).

Of these constituents, d-Mannitol, 1-decylsulfonfyl has anticancer, antimicrobial activity and serves as a non-steroidal inhibitor of cyclooxygenase-2 and potential anti-inflammatory

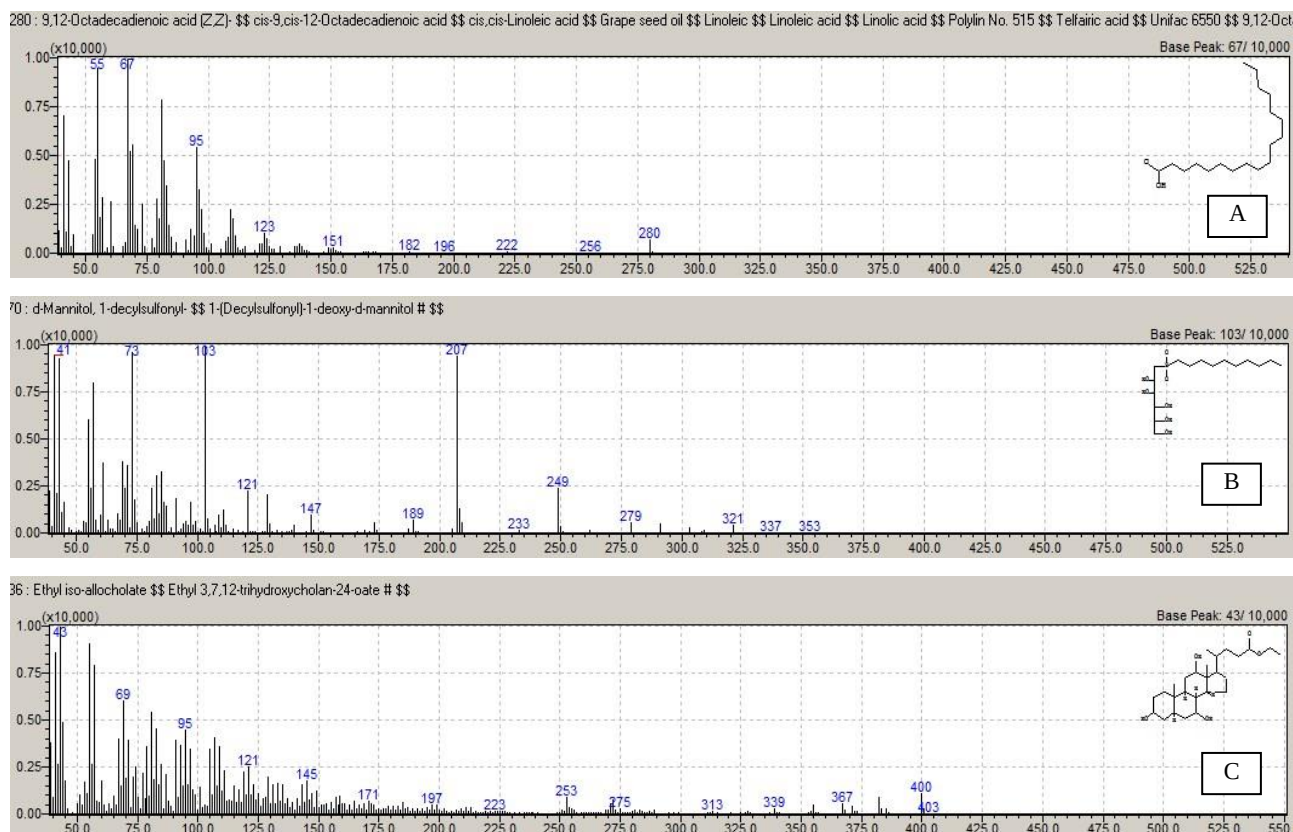


Fig. 1. Constituents of *Lonicera maackii* fruits essential oil having the known bioactivity:
A – Linoleic acid, B – d-Mannitol, 1-decylsulfonfyl, C – Ethyl isoallocholate

drug (Dr. Duke's Phytochemical and Ethnobotanical Databases, 2022). In addition, anti-inflammatory activity was shown by Ethyl isoallocholate (Sosa et al., 2016) and Linoleic acid (Kumar et al., 2015). As for the Linoleic acid, it is bioactive compounds having versatile health benefits including antibacterial activity (Dilika et al., 2000), antifungal activities against plant pathogenic fungi (Walters et al., 2004), and cancer prevention (Diab et al., 2021). Hexadecanoic acid, methyl ester has antioxidant, nematocidal, and hypocholesterolemic activity (Easwaran & Ramani, 2014). The compound Methyl ester of 9,12,15-octadecatrienoic acid (Z,Z,Z) was found among the main constituents of leaf essential oil of *Adenophorae Radix* plants having anti-aging action (Lan et al., 2017), and as a bioactive component of *Wedelia chinensis* having cytotoxic activity (Banu & Nagarajan, 2013).

Essential oil from *Lonicera maackii* fruits showed low to moderate activity against most pathogenic microbial strains tested in the disc diffusion bioassays. The highest bacterial growth inhibition was noted for *Erwinia dissolvens* (among Gram-negative) and *Micrococcus lysodeikticus* (among Gram-positive). Regarding fungal strain *Candida albicans*, low activity of the essential oil was found against one of the tested clinical strains (Fig. 2).

Antimicrobial assays carried out by the disc diffusion method showed bioactivity of the isopropanolic extracts from *L. maackii* fruits against all tested strains (Table 3).

In our study, there were no significant differences between Gram-positive and Gram-negative strains in sensitivity to the action of the *Lonicera maackii* fruits essential oil. Similar data were reported about the inhibitory activity of the essential oils from the needles of four different *Pinus* species (Mitić et al., 2018). On the other side, numerous published data indicate that Gram-negative organisms are believed to be slightly less sensitive to essential oils than Gram-positive bacteria (Xianfei et al., 2007; Seow et al., 2014; Vergis et al., 2015). The probable reasons for these differences can be due both to the composition of essential oils from plants of different species, and to the methods of obtaining essential oils. According to the published data, fungal strains *Candida albicans* are not susceptible to the action of the essential oils. The significant germ tube inhibition in *C. albicans* was caused by the action of essential oil from aromatic plant *Bupleurum* (Zuzarte et al., 2021). The effect of essential oil from the aerial parts *Artemisia judaica* against *C. albicans* achieved 80% inhibition of filamentation (Abu-Darwish et al., 2016). Growth inhibiting action of *Lonicera maackii* fruits essential oil against clinical strain of *C. albicans* was not high, however, it was found in the absence of antibiotic itraconazole activity. Thus, our findings indicate the possibility of influencing antibiotic-resistant strains with the help of essential oils. In general, study results confirm the feasibility of further research on the bioactivity of *Lonicera maackii* fruits essential oil.

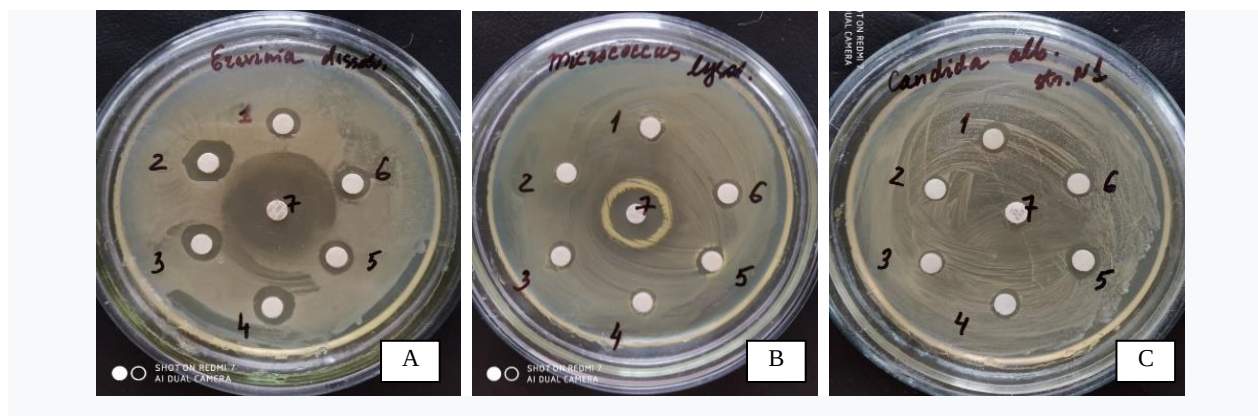


Fig. 2. Bioactivity of *Lonicera maackii* against *E. dissolvens* (A), *M. lysodeikticus* (B), and *C. albicans* (C): 1, 2 – leaf extracts; 3, 4 – fruit extracts; 5, 6 – fruit essential oil; 7 – antibiotic

Table 3

Diameter of inhibition zones (mm) caused by the *Lonicera maackii* fruits essential oil isopropanolic extracts ($x \pm SD$, $n = 5$)

Test-culture	<i>L. maackii</i> extracts	Positive control ¹
<i>Erwinia dissolvens</i> 170	$9.68 \pm 0.13^*$	28.8 ± 0.40
<i>Micrococcus lysodeikticus</i> 2665	$8.83 \pm 0.17^*$	15.98 ± 0.18
<i>Candida albicans</i> (clinical strain)	$9.44 \pm 0.24^*$	7.94 ± 0.16 – itraconazole

Notes: 1 – for bacteria, discs with 5.0 μ g ofloxacin were used as positive control, and for *C. albicans* – discs with 10.0 μ g itraconazole; the diameter of the inhibition zones (mm), including the disc diameter (6 mm), are given as mean $\pm$ SD; * – statistically significant difference between the means of the two samples within a line at the $P < 0.001$ (by Student's t-test).

Conclusion

Essential oil from the ripe fruits of introduced plant *Lonicera maackii* obtained by hydro distillation and subjected to the gas chromatography – mass spectrometry (GC-MS) analysis showed wide spectrum of chemical compounds having well-known bioactivities. At whole, fifty-nine constituents were identified including alkanes (dominated by Heptacosane, Hexadecane, and Tetradecane), fatty acids (Linoleic acid; 8,11,14-Eicosatrienoic acid; Arachidic acid), fatty acid esters (9,12-Octadecadienoic acid, methyl ester; 9,12,15-Octadecatrienoic acid, ethyl ester; Hexadecanoic acid, methyl ester; 9,12,15-Octadecatrienoic acid, methyl ester), aromatic compounds (Benzene, 1,3-dimethyl; Hydroperoxide, 1-methyl-1-phenylethyl; Mesitylene). Several compounds of essential oil including d-Mannitol, 1-decylsulfonyl, Ethyl isoallocholate, Linoleic acid, Hexadecanoic acid, methyl ester, Methyl ester of 9,12,15-octadecatrienoic acid, and Linalool are well known due to antioxidant, antimicrobial, cancer prevention and other health-promoting properties. Antibacterial activity of *L. maackii* fruits essential oil was low to moderate and comparable in levels against Gram-positive and Gram-negative pathogenic strains. The highest bacterial growth inhibition was noted for *Erwinia dissolvens* and *Micrococcus lysodeikticus*. Clinical fungal strain *Candida albicans* showed low sensitivity to the inhibiting action of essential oil, while resistance to antibiotic itraconazole, indicating the essential oil viability as the components of the novel drugs for human health. Study results confirmed the useful properties saving by the introduced *Lonicera maackii* plants and their cultivation expedience under the steppe climate.

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