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Antifungal activity of substances obtained from different sources

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Abstract

In research were separately and compositionally studied the antifungal activity of White Naftalan oil, which highly purified from Naftalan petroleum and essential oils obtained from some plants included in the flora of Azerbaijan. Became clear that, although the White naphthalene oil or essential oils have antifungal activity, this activity is more effective in the form of compositions. The composition of the used essential oils and the biological properties of test cultures play a significant role among the factors that affect the quantitative indicator of this effect.

Keywords: Naftalan petroleum, White naftalan oil, Azerbaijani flora, essential oils, composition, antifungal activity.

Introduction

As is known ingredients, substances, preparationsn and so on remedyand used during therapeutic and prophylactic activities in the treatment of diseases caused by microorganisms is obtained from natural sources or by artificial means. Preparations used over time, reducing the effects or creating resistant forms of microorganisms and its make necessary to keep these issues in focus and and constantly seeking new methods and approaches to eliminate pathologies caused by microorganisms[11].

In the background of noted, among of natural sources special attention is paid to Naftalan oil, but the bactericidal and fungicidal effect of Naftalan oil[1], which has no analogues in the world, despite this their therapeutic features is learned very little compared to other.

In the treatment of people medicinal plants as a source of natural preparation have a major importance. Thus, various substance obtained from the mentioned plants including essential oils has a large pharmacological activity and is currently being used in various fields of medicine as a carrier features, that have a broad spectrum effects[10]. In addition some essential oil with herbal origin also has harmful effects as toxic, burning, tannin. Therefore, finding new approaches to the use of essential oils also protects their relevance.

In some of researches preparation of various composition of Naftalan petroleumwith essential oils, showed increase of efficiency to use both essential oils obtained both from plants and from Naftalan petrole[9]. Despite this, determination of effectiveness of this approach on a small number of essential oils and the use of standard test cultures leaves open the solution to this problem for farther researches.

For this reason, the purpose of this researchers were to study fungicidal properties of different compositions prepared from white Naftalan petroleumcleaned on high technology and essential oils obtained from some essential oil plants included in the flora of Azerbaijan[4].

Materials and Methods

In research were used white naphthalene petroleum, obtained as a result of the application of high technologies from from Naftalan petroleum and essential oils obtained from some medicinal herbs included in the flora of Azerbaijan. Information on the plants used to obtain essential oils is summarized in Table 1. As seen, all of the used plants included in the flora of Azerbaijan belongs to essential oil plants and the essential oils contained in them differs both quantitative and compositional elements.

Table 1. General characteristic of essential oils contained in plants which used in research

Plant	Contained total amount of essential oils (%)	The number of main components,contained in essential oils (%)
Nepeta cataria L.	2,5-3,0	Menthol- 98,5 Limenton- 0,92
Mentha piperita L.	2,5-6,0	Menthol – 89,87 Menthon – 6,02
Achillea millefolium L.	0,75-1,0	Thymol- 57,24 Menthol -17,89
Artemisia absinthium L.	0,2—0,5 %	Thymol- 30,97 Evcaliptol -24,13
A.vulgaris L.	0,3-0,7	Iso-thymol – 71,81 Evkaliptol – 17.15
Apium graveolens L.	1,0-1,7	Carbocrol -63.83 o-cumene – 21.0 menthol -11,68

Fungicidal properties of both white naphthalane oils and essential oils, as well as compositions made from them were carried out by the method of hole [5]. At this time, the degree of activity was determined by the following indicators (Table. 2):

Table 2 The degree of fungicid activity

No	The degree of activity	Diameter of the lysis zone (D)
1	Strong	D > 29 mm
2	Medium	D = 20-29 mm
3	Weak	D < 20 mm

As the test culture were used fungi which widely spread in the Azerbaijan conditions and synthesizing a number of dangerous toxins.

All the experiences conducted in the research process was identified according to some authors [6, 8], as well as methods and approaches which used in our previous works [2-3, 7]. All received results were statistically handled.

Results and Discussion

As noted, the purpose of the presented work was dedicated to the investigation possibility to use naphtalan oil extracted from naphthalan petroleum with the essential oil obtained from the essential oil plants which at present individually or in some other way useing in the treatment of various diseases. For this reason, in research firstly were determined fungicidal features of both the white naphthalan oil and essential oils which intended to use.

Table 3 Fungicidal properties of white naphthalene oil (by diameter of lysis zone, mm) and essential oils (0,01%, by the yield of biomass, g/l)

Test cultures (control biomass g/l)	Acquisition sources of essential oil which were studied by fungicide properties.								white naphthalene oil
	Nepeta cataria L.	*Mentha piperita* L	*Achillea millefolium* L.	*Artemisia absinthium* L.	*A.vulgaris* L	*Apium graveolens* L	*Hypericum perforatum* L.	Wild coriandre	
Candida alpicans(4,0)	0,01	0	0	0	0,05	0	0,03	0	11
Fusarium oxysporium (3,96)	0	0	0,01	0	0,03	0	0	0	17
Aspergillus niger (6,5)	0,02	0	0,04	0	0,06	0	0,07	0	16
A.ochraceus (5,6)	0,05	0	0	0	0	0	0	0	14
Penicillium citrinum	0	0	0	0	0	0	0	0	21
Penicillium cyclopium (4,1)	0	0	0	0	0	0	0,02	0	20

Table 4 The effect of various density of essential oils to the growth of fungi.

Fungi	Amount of essential oil in the medium (%)	*Achillea millefolium*	*Hypericum perforatum*	*Nepeta cataria*
		Biomass yield (g/ l)		
A.ochraceus	0,01	0,00	0,00	0,05
	0,005	0,15	0,34	0,26
	0,001	0,44	0,57	0,49
	Control	5,61		
Cladosporium herbarium	0,01	0,00	0,00	0,10
	0,005	0,00	0,00	0,23
	0,001	0,16	0,22	0,43
	Control	3,71		
Fusarium moniliforma	0,01	0,03	0,00	0,15
	0,005	0,19	0,20	0,25
	0,001	0,51	0,68	0,52
	Control	3,74		
F.oxysporum	0,01	0,04	0,00	0,00
	0,005	0,21	0,12	0,10
	0,001	0,61	0,48	0,42
	Control	3,96		
Penicillium citrinum	0,01	0,00	0,00	0,00
	0,005	0,08	0,07	0,09
	0,001	0,31	0,28	0,42
	Control	3,82		
P.cyclopium	0,01	0,02	0,00	0,00
	0,005	0,22	0,20	0,13
	0,001	0,41	0,38	0,32
	Control	4,12		

In this regard from the carried out of research it became clear that,both white Naftalan oil and essential oils obtained from separate plants have fungicidal activity and this time results obtained according to the quantitative indication of activity differes from each other. In the formation of this difference plays a role both fungicidal feature of learned sources, and biological characteristics of used test cultures. The results obtained about fungicidal characteristics of separate sources was given in Table 3. As seen, both essential oils and white naftalan oil has more or less degree fungicid features. For example, the fungicidal effect of white naphthalan oil is characterized by weakness to all test fungi, but in all cases essential oils are characterized by a strong degree. True, in some variants, growth of fungi is observed, but in this case the forming biomass compared to control in the best case decreases 93 times. From the characteristic of separately essential oils obtained from plants, became clear that, in all cases essential oil of *Mentha piperita* L, *Apium graveolens* L, *Artemisia absinthium* L. completely stops growth of test cultures, ie. their essential oils has a strong bactericidal effect. Were determined that, in all cases, test cultures of *Penicillium citrinum* and *Aspergillus ochraceus* is unsustainable to the influence of essential oils, only exception was observed during useing essential oil of *Mentha piperita* L, and at this time the decrease growth of Aspergillus ochraseus was more than 112 times. In general, it should be noted that, one of the main results of research that, fungi from the genus of *Penicillium* unsustainable to the impact of the essential oils obtained from the studied plants as well as white naphthalan oil compared to other genus of fungi. It is true that the effect of white naphthalene oil is not so high, because in all cases, although weakening is observed with the effect of white naphthalene oil but does not occurs full stop growth of fungi ie. mainly both essential oil is characterized fungicidal but white naphthalen oil with fungicostatic effect.

Thus, from the results of the research at this stage became clear that, white naphthalene oil, as well as essential oils obtained from some plants have both fungicidal and fungistatic effects, and none of the used materials was not recorded stimulation prosess (Table. 4). As seen, reduction of the amount of essential oil added to the medium from 0,01% to 0,005 and 0,001% in all cases can lead to decline of fungicidal feature, but formed biomass compared to control is at least 5.5 times less (*Fusarium moniliforma*). Similar results is observed with the essential oils obtained from plants of Apium graveolens L., Artemisia absinthium, Mentha piperita. In this case, reduction of biomass under influence of essential oil constitutes at least 5,1 times In all cases, growth of fungi was weaken due to the effects of aqueous extracts obtained from essential oils plants and it was characterized by various quantitative indicators depending on the density. For example, grows of *A. flavus* due to the effects of the aqueous extract of all three plants is decreasing in 1: 10 ratio 8,6-12,5 times,1:50 ratio 3,2-4.5, and 1: 100 ratio 1,5-1,8 times.

As noted, essential oils, along with their therapeutic properties, are also characterized by negative characteristic,and despite their high antimicrobial properties, separately use them is not always effective [10]. So having allergic reactions and burning properties are the negative characteristics of essential oils. Taking this into account, in the next stage of research were conducted experiments related with to clarify how effective is use of mentioned materials, namely white naphthalen and essential oils. For this purpose, were prepared various compositions with various ratio of essential oils and white naphthalen oil and investigated their fungicidal properties.

The results became clear that used compositions also have fungicidal effects,but this time are clearly visible differences based on the quantitative indicator of the activity in the process. In the creating of these differences both content of composition and the biological activity of tested cultures plays a certain role (Table. 5). As seen,characterization of fungicidal properties with different quantitative indicators in this case also gives itself up, ie. in this case formation of quantitative indicator of fungicidal effect both content of composition and the biological activity of tested cultures plays a certain role.

Table 5. Fungicidal properties of composition of essential oils with White Naftalan oil

Composition	Test cultures	Activity (by diameter of lysis zone, mm)
C. sativus+ white naphthalene oil (0,2/1 ratio)	*Candida albicans*	19
	Fusarium oxysporum	18
	Aspergillus niger	12
	A.ochraceus	27
	Penicillium cyclopium	28
C. sativus+ white naphthalene oil (0,4/1 ratio)	*Candida albicans*	22
	Fusarium oxysporum	21
	Aspergillus niger	15
	A. ochraceus	31
	Penicillium cyclopium	30
P. saxifroqa + white naphthalene oil (0,2/1 ratio)	*Candida albicans*	17
	Fuzarium oxysporum	23
	Aspergillus niger	19
	A. ochraceus	21
	Penicillium cyclopium	24
P. saxifroqa + white naphthalene oil (0,4/1 ratio)	*Candida albicans*	20
	Fuzarium oxysporum	27
	Aspergillus niger	21
	A.ochraceus	27
	Penicillium cyclopium	30

It should be noted, separately both white Naftalan oil and essential oils obtained from used plants have fungicidal effects, but effects of compositions according to its quantitative indicator average 15% is higher, than they separately shows.

In general, it should be noted that, during research was also prepared composition reflecting more density of essential oils and this composition was in ratio of 1: 1. This composition is at the highest level by fungicidal properties, and the most effective compositions were prepared from essential oil of C.sativus and Artemisia absinthium with white naphtalen oils.

Thus, as a result of researches, was found optimal ratio of composition having has high antimicrobial activity. The obtained compositions compared to compositions known in this area show both bactericidal and fungicidal properties against a broader spectrum to microorganisms and occurrence tis effects in the first moments of exposure time, gives more promising and opens opportunities wide use from them in future for practical purposes.

References

1. Аббасов B.M., Abbaszade G., İsayeva G.A. Alizade A.E., Abbasova Z.V., İsmayilova G.E., Azizova A.N. 2017. Research history of Naftalan petroland and tendencies to falsify it.The world of science (Azerbaijan), 3-4(16):15-21.
2. Bakhshaliyeva K.F., Namazov N.R., Gadzheva N. Sh., Aliyeva L.N. 2015. Mycobiota and antifungal activity of Laurus nobilis and *Lacorus calamus* L. The success of Medical Mycology, 14:328-331
3. Bakhshaliyeva K.F., Muradov P.Z. 2016. The anti-mycotic effect of *Helichrysum pilicatum* DC and *Lavandula officinalis* L. Advances in Medical Mycology (Russia), 16:110-113.
4. Damirov .IA. Prilipko L.I., Shukurov D.Z., Kerimov Y.B. 1988. Medicinal plants of Azerbaijan. Baku: Publishing "Maarif" , 320.
5. Egorova N.S. 1995. Guide to practical exercises on Microbiology. Textbook. Allowance. 3rd ed., Revised. and additional. M.: MSU Publishing, 224.
6. Methods of experimental mycology. 1982. Edited by. Bilai V.I. Kiev: Naukova Dumka, 500.
7. Mustafayeva S.J., Bahshaliyeva K.F. 2015. Essential oil and antimycotic properties of Matricaria recutita L. Reports of ANAS, 1:98-102.
8. Netrusov A,İ., Egorova M.A., Zakharchuk L.M. and oth. 2005. Practical By Microbiology. M .: Publishing senter «Academy», 608.
9. Rasulova G.R. 2012. Antimicrobial properties of white naphthalene petroleumand its fractions with different compositions of essential oil. Baku, 24.
10. Qurchenko L. K., Puchkova T. V. 2005. Essential oils: chemistry, technology, analysis and application. M .: School of Cosmetic Chemists, 192.
11. Semyonov V.M., Dimitrachenko T.İ., Jiltsov İ.V. 2004. Microbiological and biological aspects of resistance to antimicrobial drugs. Medical News, 2:10-17.

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