MICROBIOLOGY

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PECULIARITIES ACTINOMYCETES IN SOILS ENVIRONS OF TBILISI

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Abstract

Four samples of soil from the brown- carbonated,alluvial,chestnut soils of Vashlisjvari,Digomi,Gldani,Ortachala (environs of the city Tbilisi) have been taken. Different physiological groups of microorganisms, among them actinomycetes were isolated from these soils, and their quantitative composition has been studied. Among the four isolated strains of actinomycetes most revealed selective antagonistic activity towards the gram-positive and gram-negative microorganisms:*Elythrosporangium brasiliense, Actinosporangium 874, Agrobacterium tumefaciens* (causes vine cancer), *Xanthomonas campestris* (infects cabbage), *Pectobacterium aroideae*. the mutual antagonistic properties of antagonists were investigated.

Keywords: azotobacter, amylolytic bacteria, cellulose-destructors, nitrificators, saprophytes.

Actinomycetes are members of a large group of pleomorphic Gramm-positive bacteria, many of which have some tendency of mycelial growth. The metabolic multilaterality of actinomycetes, accompanied by the production of primary and secondary metabolites of economic importance, made possible

their biotechnological applications. They are a promising source of products like antibiotics, enzyme inhibitors, antiparasitic and anticancer agents [1,2]. They are one of the most important sources for the discovery of new antibiotics. An important number of drugs and analogs obtained from actinomycetes are successfully introduced in the market and used today in clinical practice. Actinomycetes are still one of the most important sources of chemical diversity and a source to search for novel structures that require the integration of diverse disciplines. These can range from novel strategies to isolate species previously not cultivated, to in silico biosynthetic predictions from whole gene sequences and novel engineered heterologous expression. Thus, studying of the conditions of their evolution and distribution peculiarities is significant [3-5]. Actinomycetes are significant groups of soil-inhabiting associations of microorganisms. They may account for 10 to 30% of the total soil rhizosphere microorganisms. Many of actinomycetes are antagonistic forms. The main source for obtaining different forms of actynomycetes is soil. From this point environs of Tbilisi soils are less studied.

The purpose of our investigation was to study the microflora of brown -carbonated,alluvial,chestnut soils of environs of Tbilisi.

Materials and Methods

Both the gramm-positive and gramm-negative microorganisms served as test objects: *Erythrosporangium brasiliense Actinosporangium violaceum, Staphylococcus aureus, Escherichia coli, Mycobacterium rubrum 374, Agrobacterium tumefaciens* (causes vine cancer), *Xanthomonas campestris* (infects cabbage), *Pectobacterium aroideae,* as well as actinomycetes isolated from brown carbonated,alluvial,chestnut soils.

Cultivation of actinomycetes was performed on Krasilnikov's synthesized medium (CP-I). Antagonistic properties were studied by Block's method [6].Modern methods of soil microflora testing have been used in study [7].

Results and discussion

Four samples of soil, picked from brown -carbonated,alluvial, chestnut soils environs of Tbilisi have been tested.

Following physiological groups of microorganisms were isolated from the tested soils: saprophytic and amylolytic bacteria, fungi, cellulose-destructors, actinomycetes, nitrificators of the I and II phase and azotobacter. Results are demonstrated in table 1.

According to experimental results, it is clear that the quantitative composition of microorganisms of the tested soils is different. Saprophytes dominated in all four samples. They made in average 68,2% of the total number of microorganisms. This fact indicates that the studied soils are rich of plant and animal residues and an process of transformation takes place here.

As for the percentage of particular group of microorganisms, in the

four sample the amount of anaerobic bacteria ,amylolytic and cellulose-destructors prevailed. Content of actinomycetes was significantly higher in the second sample compared to other ones, while the second sample was rich of nitrificators of the II phase.

Peculiarities of the distribution of antagonistic actynomycetes in experimental samples were studied on the next step of investigation. The pure cultures of actinomycetes were isolated from the soil samples, for this purpose (four strains: V, D, G, O) and analyzied to reveal the antagonistic properties. Experimental results are presented in table 2.

Table 1

Number of microorganisms per one gram of the dry soil								
Soil type	Solis environs of Tbilisi							
Site of sampling	brown carbonated				alluvial		chestnut	
	V	D	G	O				
Groups of micro-organisms	number	%	number	%	number	%	number	%
Saprophytes	120314.10^6	2,77	$236873\ 10^6$	36,775	3898305.10^6	43,96	113822.10^6	68,2
Cellulose-destructors	16596	$0,03 \cdot 10^{-6}$	15169	$2,35 \cdot 10^{-6}$	23392	$2,610^{-6}$	673445	$403,510^{-6}$
Amylolytic bacteria	$7153065 \cdot 10^6$	16,51	$408 \cdot 10^6$	6,34	$583 \cdot 10^6$	6,52	530.10^6	31,79
Anaerobic bacteria	46544	$0,01 \cdot 10^{-6}$	35705,8	$5,5 \cdot 10^{-6}$	29604,4	$3,3 \cdot 10^{-6}$	106188	$63,6 \cdot 10^{-6}$
Nitrificators (Iphase)	$10633 \cdot 10^6$	0,002	$366394 \cdot 10^6$	56,88	$44294\ 10^6$	1,16	440648	264.10^{-6}
Nitrificators (IIphase)	271629	0,06	200700	$31 \cdot 10^{-6}$	649718	$26 \cdot 10^{-6}$	367095	$219,9 \cdot 10^{-6}$
Actinomycetes	8730	0,002	14586-	2,2 10	1695	$0,110^{-6}$	8190	$4,910^{-6}$
Microscopic fungi	$8,69\ 10^3$	0.002	$94\ 10^3$	1410^{-6}	$91\ 10^3$	$10,210^{-6}$	$1111,4\ 10^3$	$66,7 \cdot 10^{-6}$
Total number of micro-organisms	$43318380 \cdot 10^6$	$6441011\ 0^6$	8944610^6	$166874,2410^6$				
Soil humidity (%)	10	8	7	9,5				

Table 2

Antagonistic properties of actinomycetes

Test-object	Antagonistic culture			
	V	D	G	O
	Size of the inhibition zone, mm			
Bacillus sporangium	1,0	0,0	0,0	1,7
Actinosporangium violaceum	0,0	3,5	0,0	1,7
Staphylococcus aureus	0,0	3,5	1,5	0,0
Escherichia coli	0,0	0,0	0,0	3,6
Mycobacterium rubrum 874	2,5	1,8	2,0	0,0

Agrobacterium tumefaciens	0,0	0,0	0,0	2,0
Xanthomonas campestris	0,0	0,0	0,0	0,0
Pectobacterium aroideae	0,0	0,0	1,5	2,6

From the table it is clear that the physiological activity of actinomycetes towards the experimental test-objects was revealed with different intensity. The most effective appeared to be the culture O, which inhibited growth and development of *Pectobacterium aroideae* and *Esherichia coli* (size of the inhibition zone was 3.6mm), *Agrobacterium tumefaciens (*size of the inhibition zone was 2,0mm), *Elythrosporangium brasiliense* and *Actinosporangium violaceum* (size of the inhibition zone was 1,7mm). The strain V revealed antagonism only against *Mycobacterium rubrum* 874 (size of the inhibition zone was 2,5mm) and *Elytrosporangium brasiliense* (size of the inhibition zone was 1,0mm).

The strain G was antagonistic only against *Mycobscterium rubrum* 874 (size of the inhibition zone was 2,0mm), *Staphylococcus aureus* and *Pectobacterium aroideae* (size of the inhibition zone was 1,5mm).

Strain of actinomycetes D revealed antagonism only against *Mycobacterium rubrum* 874 (size of the inhibition zone was 1,8mm), *Actinosporangium violaceum* and *Staphylococcus aureus* (size of the inhibition zone was 3,5mm).

From the experimental results it may be concluded that almost all actinomycetes isolated from brown carbonted,alluvial,chestnut soils environs of Tbilisi revealed different level of antagonism.

The mutual antagonism of actinomycetes was studied as well. Experimental results are demonstrated in table3.

Table 3

The mutual antagonistic properties of actinomycetes

Test-object	Antagonistic strain			
	V	D	G	O
	Size of the inhibition zone, mm			
V	0.0	2,5	3,5	3,5
D	3,0	0,0	0,0	0,0
G	3,0	2,25	0,0	2,25
O	5,0	5,25	0,25	0,0

Obtained results demonstrate that actinomycetes isolated from soils of Tbilisi environs reveal mutual antagonistic properties.

The most active was the strain V, which inhibited the strain O (size of the inhibition zone was 5,0mm), the strainG (size of the inhibition zone was 3,0mm) and the strain D (size of the inhibition zone was 3,0mm). The strain D inhibited the growth and development of strains: O (size of the inhibition zone was 5,25mm), V(size of the inhibition zone was 2,5mm), and G (size of the

inhibition zone was 2,25mm). The strain G inhibited growth of the strains V and O.

Obtained results clear that the pure cultures of actinomycetes, isolated from Tbilisi environs demonstrated selective activity against both, gram-positive and gram-negative microorganisms, as well as against each other.

Conclusions

• Active processes of transformation of the plant residues and nitrogen fixation takes place in brown carbonated,alluvial,chestnut soils (environs of Tbilisi).

• The brown- carbonated,alluvial,chestnut soil (environs of Tbilisi) is rich of actinomycetes with selective antagonistic activity.

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IMMUNOLOGY CELL BIOLOGY

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STUDY OF THE LARVAE GALLERIA MELLONELLA EXTRACT EFFECT ON THE BEHAVIORAL ACTIVITY OF ANIMALS BY THE METHOD OF «OPEN FIELD» AND «SUOK TEST»

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Abstract

It was made a comparative analysis of behavioral reactions in drinking water and 40% extracts of larvae of greater wax moth (*Galleria mellonella* L.) laboratory mice. It was taken the basis such indicators as the number of crossed squares (KGC), and vertical motor activity – the number of racks, the reaction time of fading, the total number of acts of defecation, and vegetative parameters (the number of boluses). The experiment showed that the discover of the