

# Evaluation of the properties and degradative potential of soil isolates

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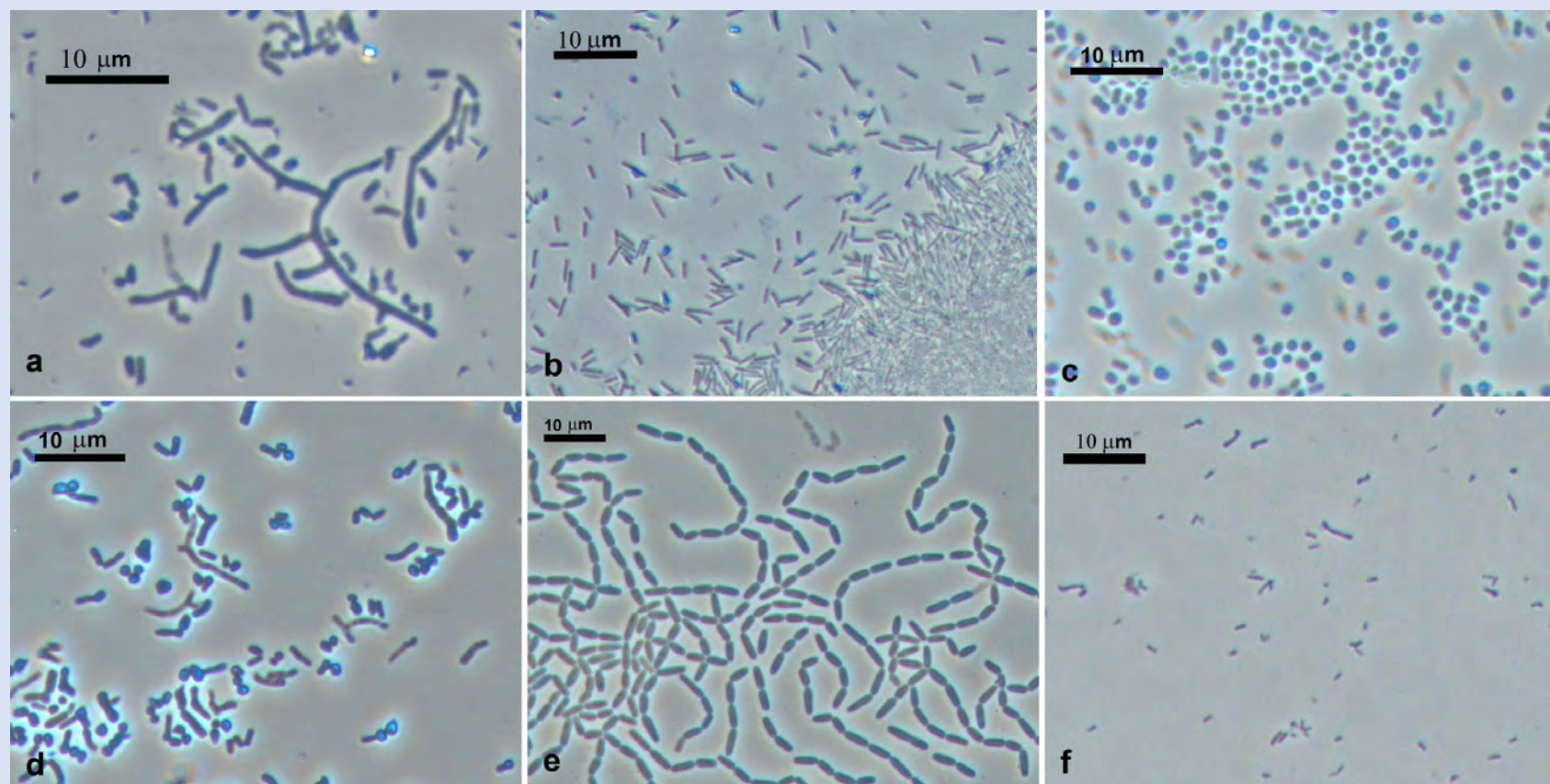
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Microorganisms from various taxonomic groups play a crucial role in environmental cleanup, specifically in the bioremediation of contaminated soils and aquatic ecosystems by decomposing toxic pollutants or transforming them into less toxic substrates that can be easily recycled.

The purpose of this study was to characterize soil isolates for their potential application in biotechnologies for environmental remediation.

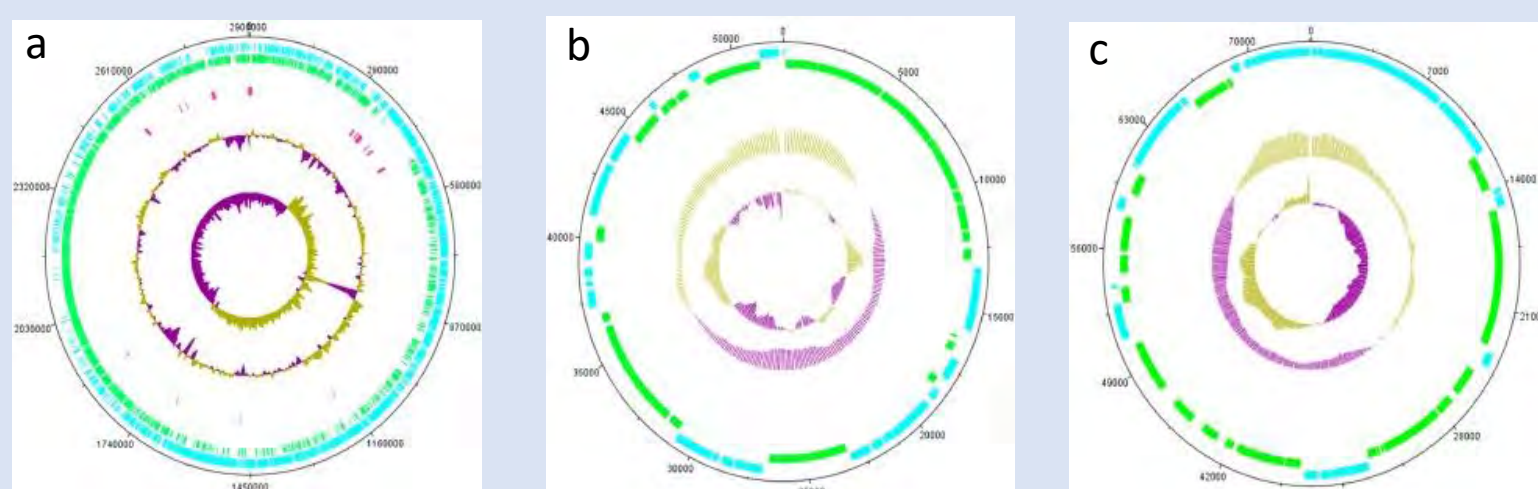
## Microscopy of isolates



Phase contrast microscopy of isolated strains: a – *Rhodococcus qingshengii* 7B, b – *Stenotrophomonas* sp. Fch 5, c – *Acinetobacter* sp. 2/2A, d – *Rhodococcus* sp. 6/4a, e – *Peribacillus* sp. Ton/1B, f – *Microbacterium* sp. ch.h./3B

## Sequencing analysis of strain genomes

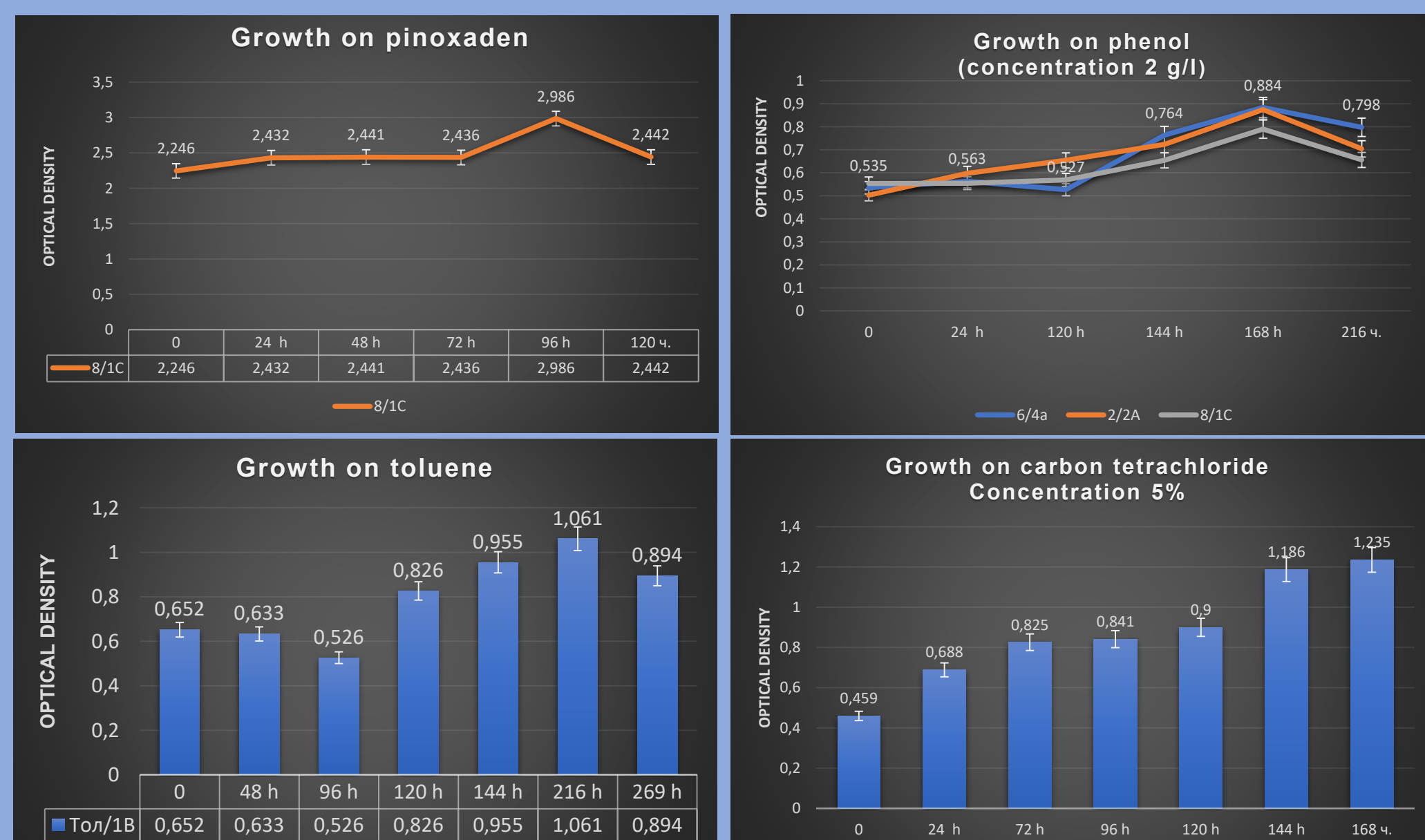
*Rhodococcus qingshengii* 7B и *Exiguobacterium alkaliphilum* Ex.1



Chromosome (a) *Exiguobacterium alkaliphilum* Ex.1 and two plasmids, pE52 (b) и pE73 (c).

Strain	№ в GenBank	Chromosome size, MB	Number of plasmids
<i>Rhodococcus qingshengii</i> 7B	BioProject – PRJNA669224, BioSample – SAMN16450133, GenBank – NZ_CP063234.1- NZ_CP063236.1.	6.28	2
<i>Exiguobacterium alkaliphilum</i> Ex.1	BioProject – PRJNA721848, BioSample – SAMN18740301, GenBank – NZ_CP073101.1- NZ_CP073103.1	2.9	2

## Growth on a wide range of pollutants



## Conclusion

- new bacteria-destroyers of toxic organic compounds were isolated and identified;
- optimal cultivation conditions were determined for all isolates;
- toxicity studies were conducted using daphnia as a test object;
- more than 20 strains have been deposited in the All-Russian Collection of Microorganisms of the Institute of Biophysics and Physics of the Russian Academy of Sciences;
- 6 bacteria were sent for field testing, positive results were obtained.

A wide range of substrates utilized by strains has become the basis for the creation of biological products that are promising for the bioremediation of soils exposed to toxic pollutants in a wide temperature range and high salinity of the treated environment.

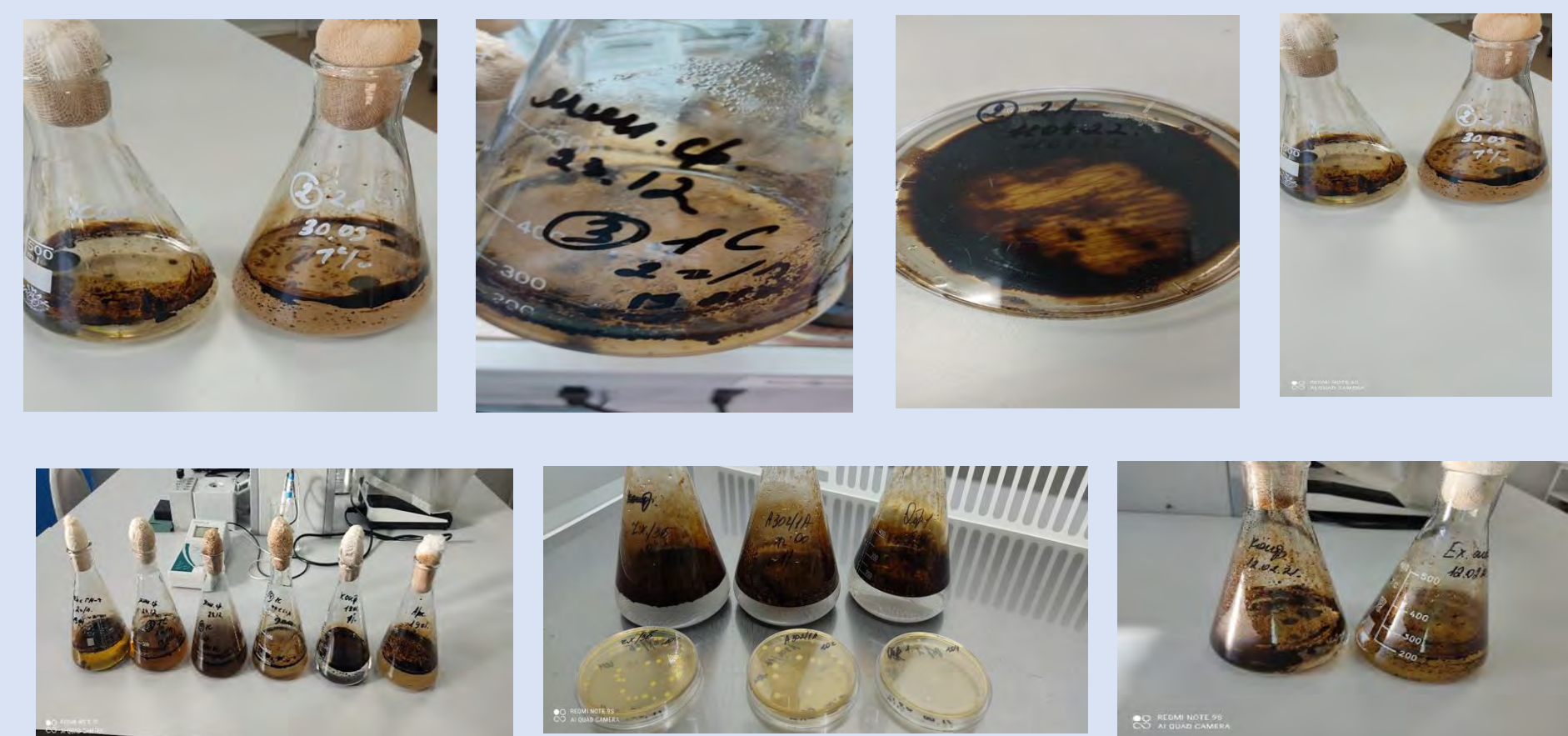
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## Recyclable substrates

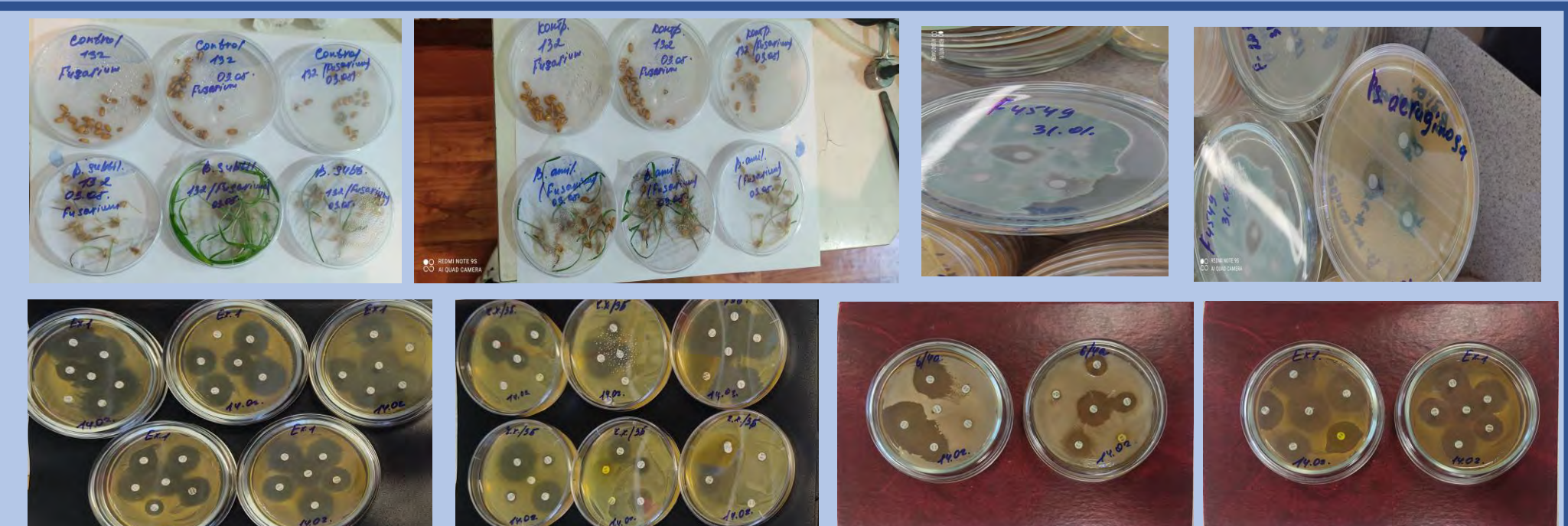
Strain	Growth substrate
<i>Bacillus</i> sp. B1	phenol up to 0,5 g/l ,pinoxaden, biphenyl.
<i>Rhodococcus</i> sp. 6/4a	phenol up to 2 g/l , carbon tetrachloride, petroleum hydrocarbons, pinoxaden , biphenyl , isoprene .
<i>Pseudomonas</i> sp. 8/1C	phenol up to 2 g/l , carbon tetrachloride, petroleum hydrocarbons, pinoxaden , biphenyl , isoprene
<i>Microbacterium</i> sp. ch.h./3B	Toluene, carbon tetrachloride.
<i>Bacillus</i> sp. B2	phenol up to 0,5 g/l ,pinoxaden, biphenyl.
<i>Pseudomonas putida</i> AAMB/1A	phenol up to 2 g/l , petroleum hydrocarbons.
<i>Peribacillus</i> sp. Tol/1B	Toluene, biphenyl, diesel fuel, benzyl.

## Ability of destructor strains to degrade petroleum products

Percentage of loss of petroleum products in samples, treated with destructor strains ranged from 40 to 60% in 15 days.



## Antimicrobial, antifungal activity and antibiotic sensitivity



## Biotechnological potential of strains as plant growth stimulators and cellulose destructors

