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BIOASSAY OF SELECTED FUNGICIDE ON THIN LAYER CHROMATOGRAPHY AGAINST MOULDS

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FACULTAS TECHNOLOGIAE LIGNI POZNAŃ

Faculty of Wood Technology


Globally, the most common and most dangerous biological factor in constructions and in architectural monuments are **decaying fungi** and **moulds**.

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The efficiency and stability of the formulations for preservatives lignocellulosic materials depend mainly on active ingredients - **BIOCIDES**.

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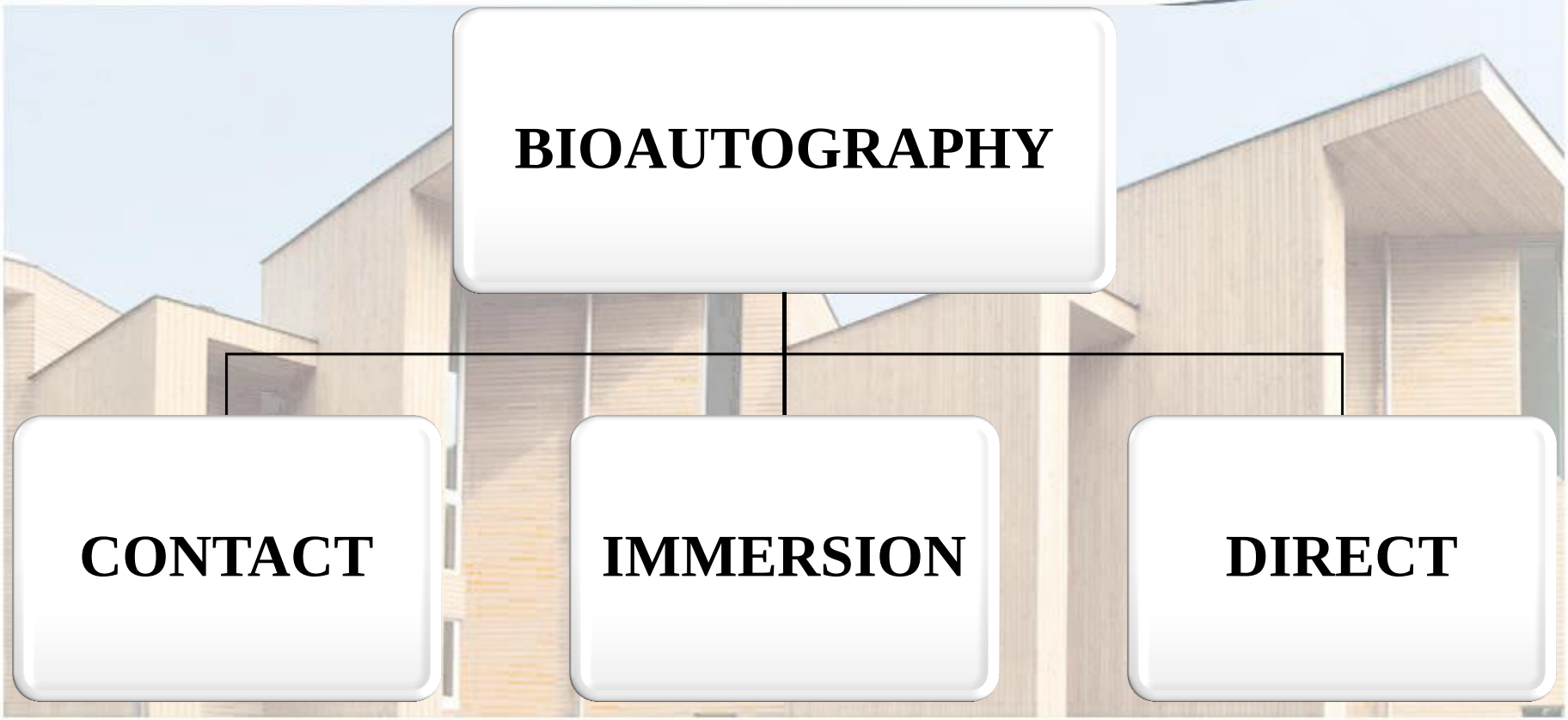

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BIOAUTOGRAPHY-TLC

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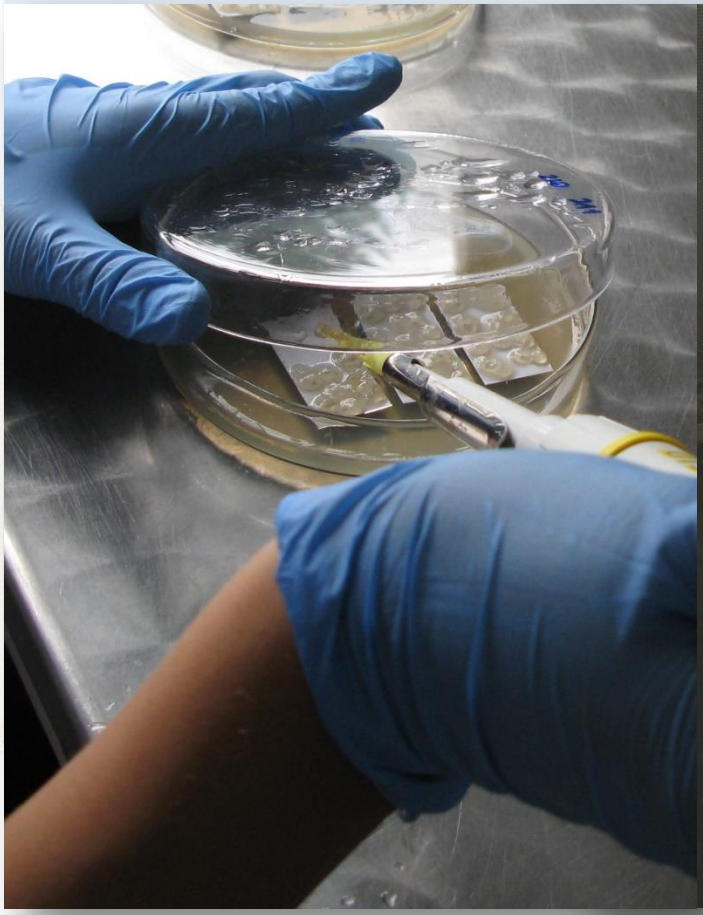
How it works?



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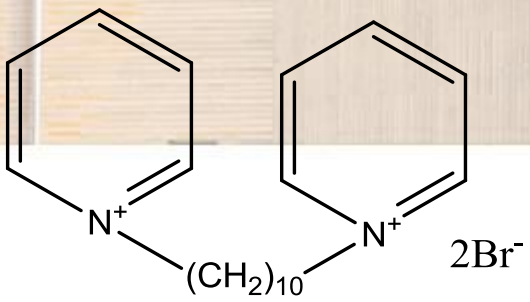
BIOASSAY OF SELECTED FUNGICIDE

The aim of the present work was to analyze the minimal inhibitory concentration (MIC) of selected fungicides:

- 4,5-dichloro-2-octyl-2H-isothiazol-3-one,
- dichloro-2-n-octyl-4-isothiazolin-3-one with 2-octyl-2H-isothiazol-3-one,
- n-alkyl(C12-18)-N,N-dimethyl-N-benzylammonium chloride)

and new synthetic compound using bioautography-TLC method

- (1,10-di(3-hydroxymethylpyridinium) decane dibromide



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BIOASSAY OF SELECTED FUNGICIDE

- Microorganisms: *Aspergillus niger* van Tiegen, a human fungal pathogen.
- Each substance was prepared at concentrations of
  a) 1%
  b) 0.5%
  c) 0.1%
  d) 0.01%
  e) 0.001%
  f) 0.0001%
- TLC-layers were incubated at 28˚C and above 95 RH in darkness.

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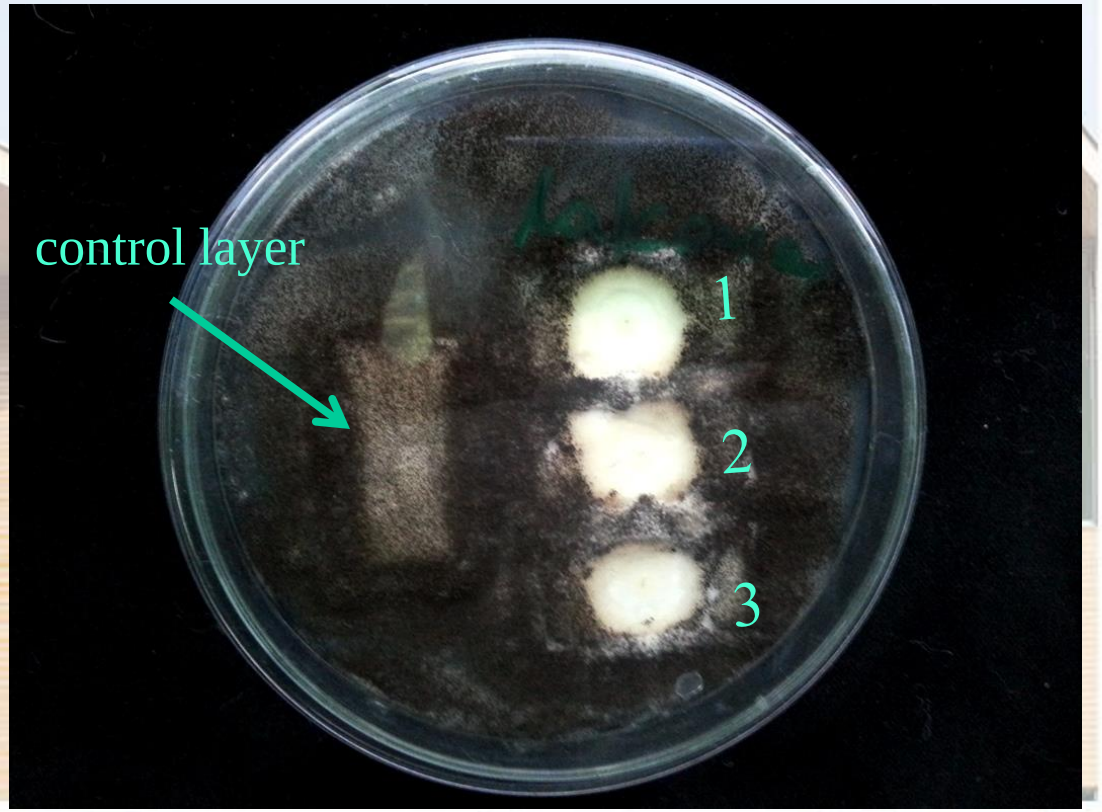
Fungal growth was evaluated macroscopically for 4 days



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RATING-SCALE OF FUNGAL GROWTH

Visual evaluation of microfungi growth on samples was held by the four-point scale of intensity mycelium growth of *Aspergillus niger* set out in table 1.

Rating	Fungal growth on surfaces
0	no visible growth under the microscope
1	invisible growth with the naked eye but are clearly visible under the microscope
2	visible growth with the naked eye, growth of hyphae without spores
3	visible growth with the naked eye, sporulation mycelium
4	intensive growth, covering the entire surface of the test

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RESULTS

C [%]	A				B				C				New synthetic substance			
	1d	2d	3d	4d	1d	2d	3d	4d	1d	2d	3d	4d	1d	2d	3d	4d
1	0	0	0	0	0	0	0	0,33	0	0	0	0,33	0	0	0	0
0,5	0	0	0	0	0	0	0	0,66	0	0	0	0,33	1	1	2	4
0,1	0	0	0	0,33	0	0	0,67	1,67	0	0,33	1,33	2,67	1	1	2,33	4
0,01	0	0,33	1	1,33	1	3	3,67	4	1	3	3	4	1	2,67	3	4
0,001	0,67	1,67	1,67	2	2	4	4	4	2	4	4	4	1,67	3,67	4	4
0,0001	1	3	3,33	4	2	4	4	4	2	4	4	4	2	4	4	4
control	2	4	4	4	2	4	4	4	2	4	4	4	2	4	4	4

A. 4,5-dichloro-2-octyl-2H-isothiazol-3-one
B. dichloro-2-n-octyl-4-isothiazolin-3-one with 2-octyl-2H-isothiazol-3-one
C. n-alkyl(C12-18)-N,N-dimethyl-N-benzylammonium chloride

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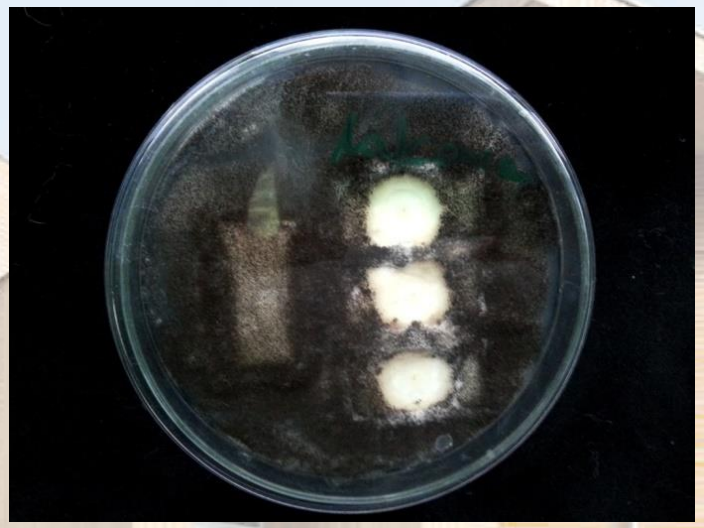
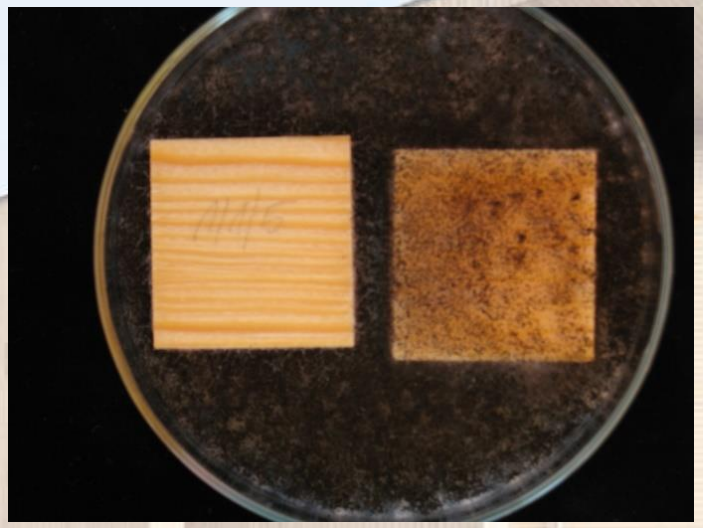
THE NEXT STEP OF TEST





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BIOASSAY OF SELECTED FUNGICIDE ON WOOD

C [%]	A				B				C				New fungicide			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	0	0	0	0	0	0	0	0,2	0	0	0	0,2	0	0	0	1
0,5	0	0	0	0,2	0	0	0	0,6	0	0	0	0,6	2	3	4	4
0,1	0	0	1	2	0	0	0,6	1,6	0	0,4	1,2	2,6	2	3	4	4
0,01	0	1,2	2,6	4	1,6	3	3,6	4	1	3	3	4	3	4	4	4
0,001	0,8	2	3	4	2	4	4	4	2	4	4	4	3	4	4	4
0,0001	3	4	4	4	2	4	4	4	2	4	4	4	4	4	4	4
control	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Rating scale:

0z	no growth of fungi on the specimen, inhibition zone on the medium
0	no growth of fungi on the specimen
1	less than 10 % of the specimen area covered by fungi
2	less than 30 % of the specimen area covered by fungi
3	less than 60 % of the specimen area covered by fungi
4	specimen totally overgrown by fungi

COMPARISON OF RESULTS

C [%]	A				B				C				New synthetic substance			
	1d	2d	3d	4d	1d	2d	3d	4d	1d	2d	3d	4d	1d	2d	3d	4d
1	0	0	0	0	0	0	0	0,33	0	0	0	0,33	0	0	0	0
0,5	0	0	0	0	0	0	0	0,66	0	0	0	0,33	1	1	2	4
0,1	0	0	0	0,33	0	0	0,67	1,67	0	0,33	1,33	2,67	1	1	2,33	4
0,01	0	0,33	1	1,33	1	3	3,67	4	1	3	3	4	1	2,67	3	4
0,001	0,67	1,67	1,67	2	2	4	4	4	2	4	4	4	1,67	3,67	4	4
0,0001	1	3	3,33	4	2	4	4	4	2	4	4	4	2	4	4	4
control	2	4	4	4	2	4	4	4	2	4	4	4	2	4	4	4

C [%]	A				B				C				New fungicide			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	0	0	0	0	0	0	0	0,2	0	0	0	0,2	0	0	0	1
0,5	0	0	0	0,2	0	0	0	0,6	0	0	0	0,6	2	3	4	4
0,1	0	0	1	2	0	0	0,6	1,6	0	0,4	1,2	2,6	2	3	4	4
0,01	0	1,2	2,6	4	1,6	3	3,6	4	1	3	3	4	3	4	4	4
0,001	0,8	2	3	4	2	4	4	4	2	4	4	4	3	4	4	4
0,0001	3	4	4	4	2	4	4	4	2	4	4	4	4	4	4	4
control	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

A. 4,5-dichloro-2-octyl-2H-isothiazol-3-one

B. dichloro-2-n-octyl-4-isothiazolin-3-one with 2-octyl-2H-isothiazol-3-one

C. n-alkyl(C12-18)-N,N-dimethyl-N-benzylammonium chloride

CONCLUSION

simple

more sensitive than other methods

fast determination of fungicidal activity of selected substances

saves time

replicable

inexpensive

quickly verify the fungicidal properties of new chemical substances.

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Thank you for your attention

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