ECA 2025 Conference

The 4th International Electronic Conference on Antibiotics

21–23 May 2025 | Online

MDPI

Screening of basidiomycetes submerged culture extracts with high antibacterial activity

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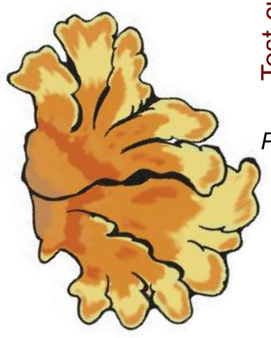
INTRODUCTION & AIM

The search for and study of natural antibacterial and antifungal molecules (including those that overcome pathogen drug resistance) have great scientific and practical importance. Basidiomycetes have a wide range of biosynthetic capabilities and can serve as a source of new biologically active compounds.

The aim of this work was to study the antimicrobial properties of the metabolites that accumulated in basidiomycetes culture liquid.

OBJECTS

Objects of this study were 20 strains of basidiomycetes from the orders Agaricales, Polyporales, and Russulales. In the text we presented results for 8 most active studied strains.



METHOD

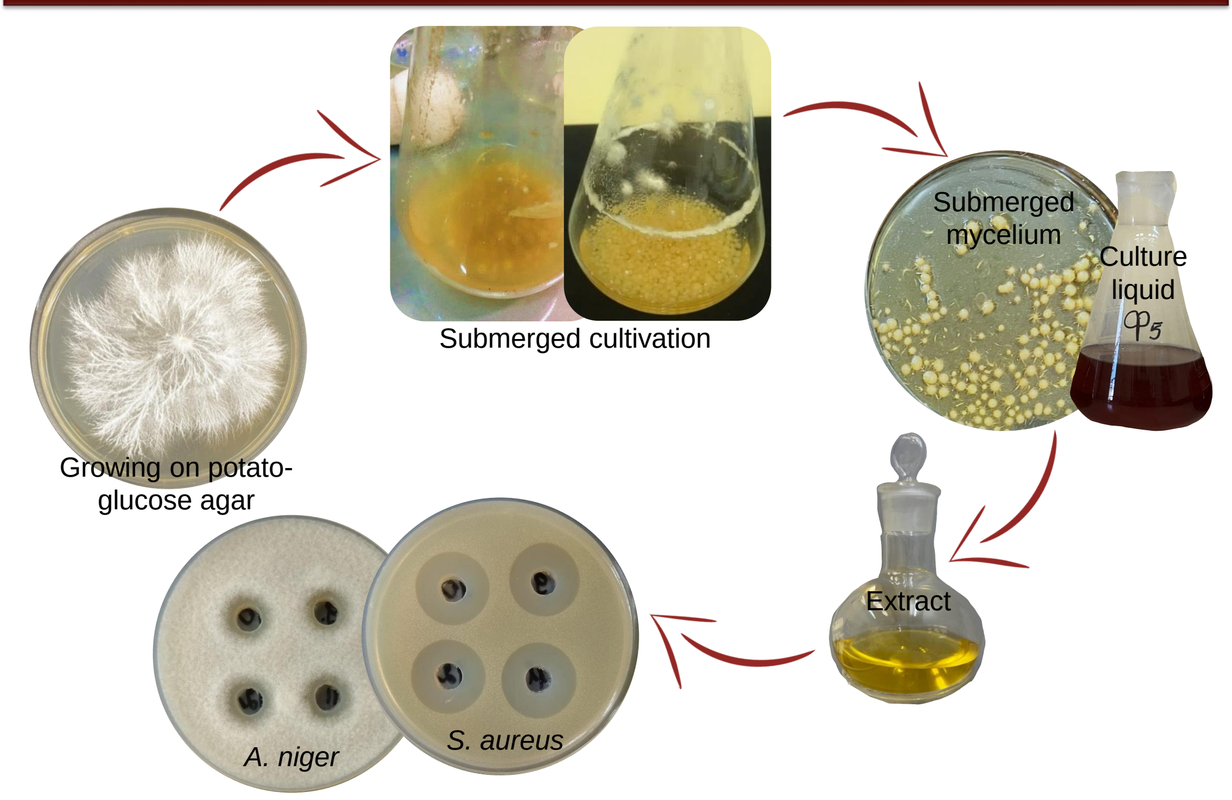


Figure 1. The scheme of the experiment

The studied strains were grown in a submerged culture (fig.1). The culture liquids were extracted with ethyl acetate. The extracts were evaporated and stock solutions with a concentration of 10 mg/mL were prepared. Firstly, antimicrobial activity of the extracts was evaluated by agar well diffusion on a wide test cultures panel. At the second step, the minimum inhibition concentration (MIC) of the most active extracts against Gram-negative and Gram-positive bacteria was determined.

FUTURE WORK

We plan to search for new antimicrobial metabolites in the most active extracts, as well as identify already known compounds.

RESULTS & DISCUSSION

Antibacterial activity was detected in all studied strains extracts. The largest growth inhibition zones (fig.2) of bacteria were observed for extracts of *Fomes fomentarius* 1; *Fomitopsis betulina* 3; *F. pinicola* 2, *Hericium erinaceus* 1, *Hericium coralloides* 1, *H. coralloides* 4, *Laetiporus sulphureus* 3. Some strains demonstrated weak antifungal activity.

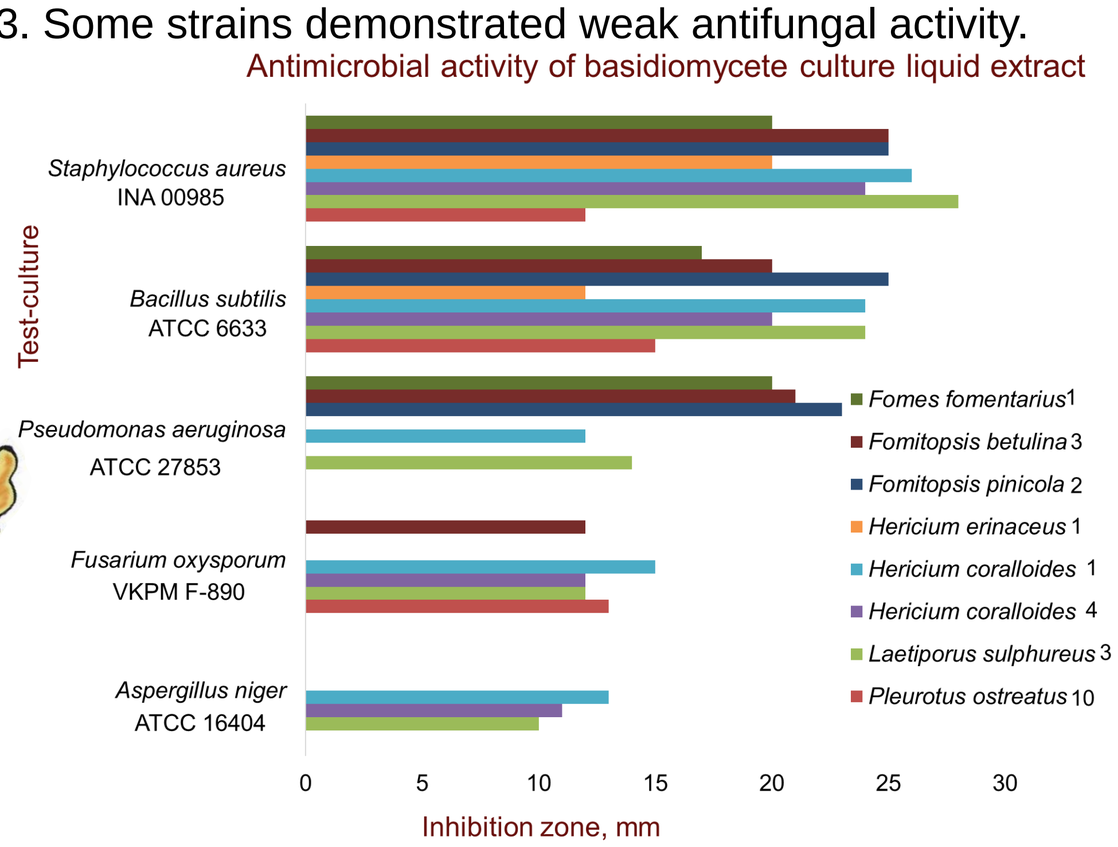


Figure 2. Antimicrobial activity of most active basidiomycete culture liquid extracts.

The lowest MIC value was observed for *H. coralloides* 4, *H. erinaceus* 1, *L. sulphureus* 3 extracts (table 1).

Table 1. Minimal inhibitory activity (MIC) of most active extracts.

Bacteria strains	MIC, µg/mL					
	Fomitopsis betulina 3	*Fomitopsis pinicola* 2	*Hericium erinaceus* 1	*Hericium coralloides* 1	*Hericium coralloides* 4	*Laetiporus sulphureus* 3
***Staphylococcus aureus* 25923 ATCC**	640	640	640	320	**80**	320
***Staphylococcus aureus* 10** ★	320	1280	640	640	320	320
***Staphylococcus epidermidis* 533** ★	640	640	320	320	**160**	320
***Staphylococcus haemoliticus* 585** ★	320	640	320	640	**160**	320
***Enterococcus faecium* 569** ★★	1280	1280	320	640	320	640
***Acinetobacter baumanii* 5696**	640	640	320	>1280	>1280	640
***Escherichia coli* 25922 ATCC**	640	640	640	1280	>1280	1280
***Klebsiella pneumoniae* 13883 ATCC**	640	640	640	>1280	>1280	1280
***Salmonella cholerasuis* 14028 ATCC**	640	>1280	640	>1280	>1280	1280
***Proteus vulgaris* 13315 ATCC**	1280	1280	640	640	640	640

★ - clinical strains ★ - vancomycin A -resistant strain

CONCLUSION

The most active were the *H. coralloides* 4 and *L. sulphureus* 3 culture liquid extracts. The *H. coralloides* 4 extract inhibited the growth of clinical and vancomycin-resistant strains.