

Characterization, Identification, and Cytotoxicity of Fungal Volatile Organic Compounds from the Selected Strain

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INTRODUCTION

Volatile Organic Compounds (VOCs) are organic chemical compounds that are highly volatile, allowing them to disperse widely in the environment. These compounds are often associated with distinctive odors and can originate from both anthropogenic activities and natural sources, including microorganisms such as bacteria and fungi. VOCs play significant roles in environmental processes, particularly in plant disease prevention. In terms of physical health, VOCs have shown therapeutic potential in cancer treatment and In mental health research, VOCs have been shown to improve sleep quality, alleviate depression and anxiety symptoms and reduce stress while enhancing psychological well-being, as measured through validated psychological metrics. However, research on fungal VOCs remain limited in Thailand.

OBJECTIVES

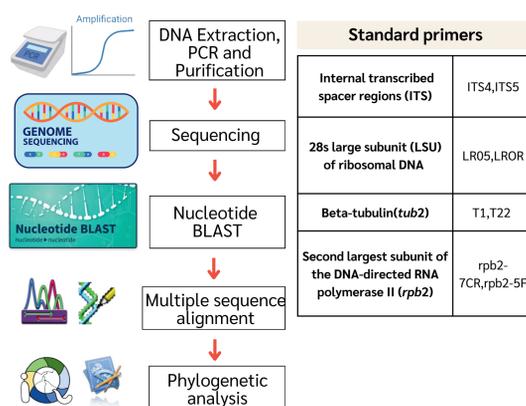
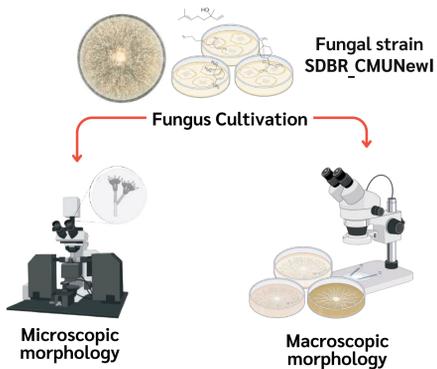
- To identify the volatile organic compounds profile produced from selected fungi
- To study the effect of fungal volatile organic compounds on cancer cell line and normal cell line.

METHODOLOGY

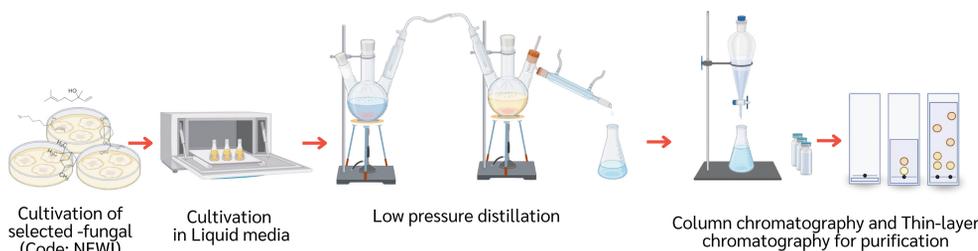
1. Fungal Identification

• Morphological identification

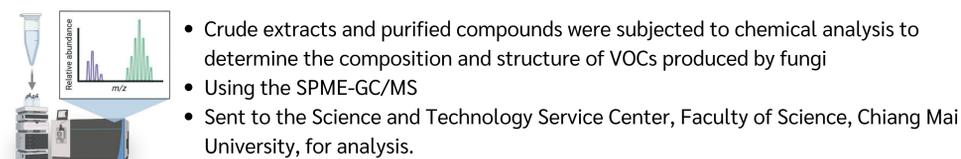
• Identification base on Phylogenetic analyses



2. Fungal volatile organic compounds extraction and purification

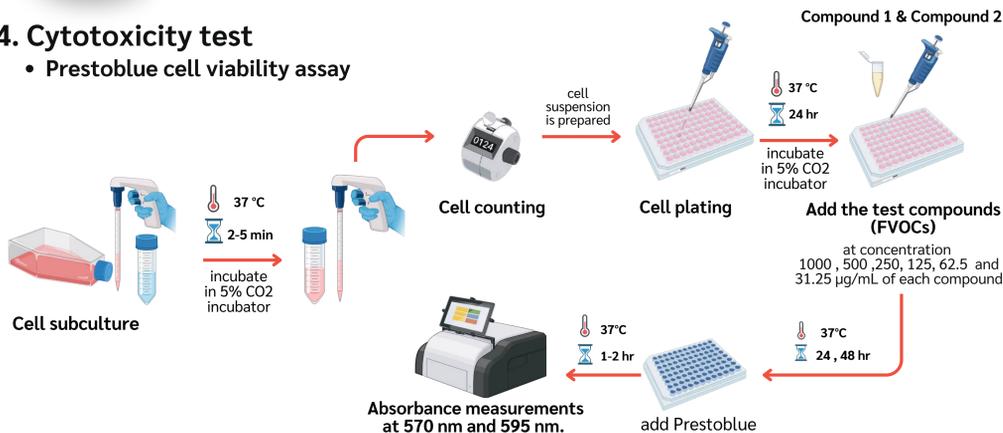


3. Qualitative analysis of Fungal volatile organic compounds



4. Cytotoxicity test

• Prestoblu cell viability assay



RESULTS

1. Fungal Identification

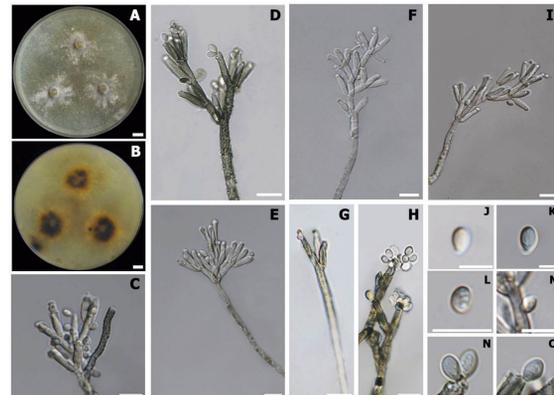
• Colonies characteristics

Media	Colony diameter (mm)
PDA	7.5 to 8.0
OA	7.6 to 8.0
PCA	7.6 to 8.0
CZA	7.4 to 8.0
SNA	4.0 to 4.5
CMA	7.4 to 8.0

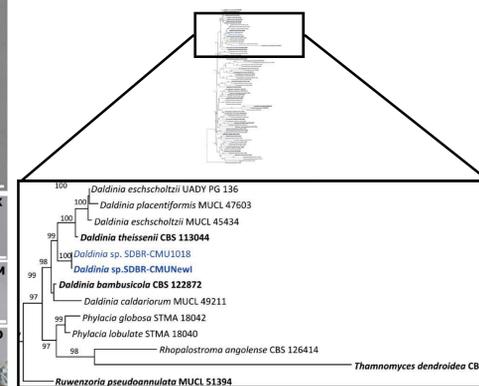
Different colony morphologies of strain SDBR_CMUNewl in different media after 7 days at 25 °C (The top row represents the obverse sides, while the bottom row represents the reverse sides.)

RESULTS

• Morphological identification



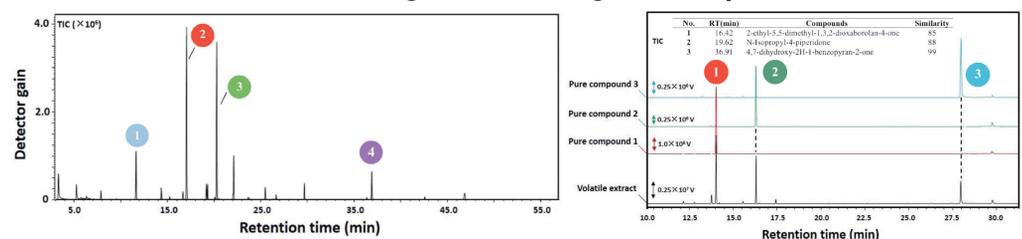
• Phylogenetic analyses



(A); Obverse colonies grown at 25 °C on PDA (B); Reverse colonies grown at 25 °C on PDA. (C-I); Conidiophores with nodulisporium-like branching patterns with spore. (J-O); Conidia. Scale bar: A-B = 1 cm, C-O = 10 µm.

The selected fungal strain is identified as a novel species belonging to the genus *Daldinia* based on Phylogenetic analysis using ITS, LSU, *rpb2*, and *tub2* sequences

2. Qualitative analysis of fungal volatile organic compounds

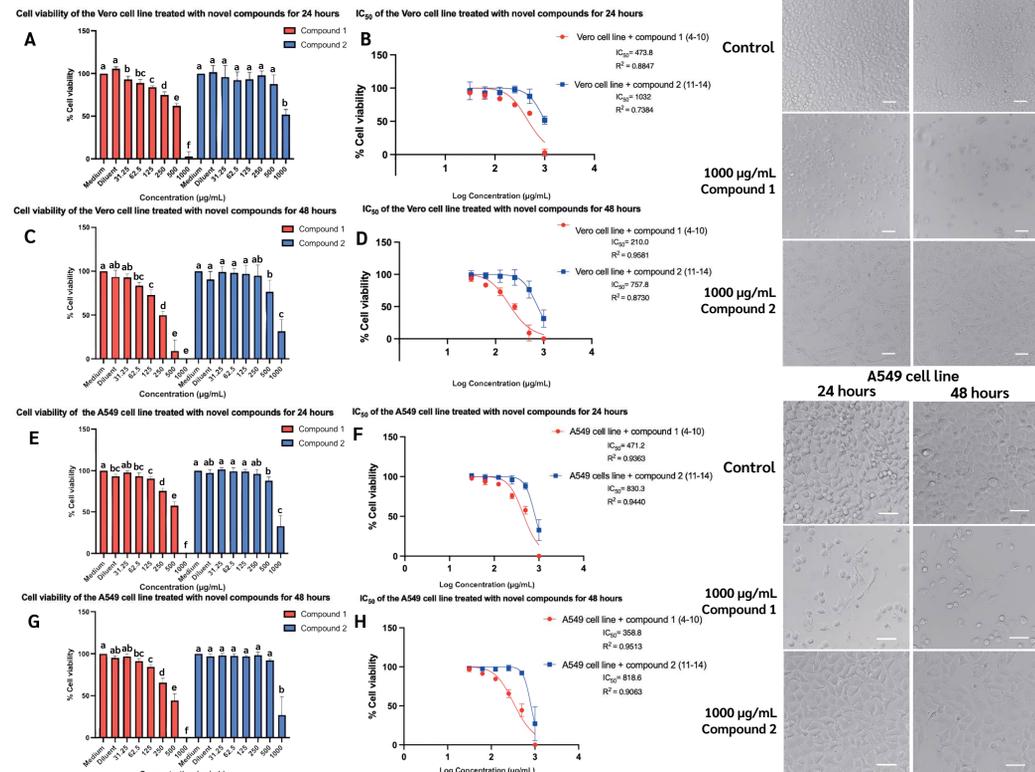


The fungal volatile organic compounds (FVOCs) produced by this strain were identified as novel compounds, and results from NMR analysis revealed that the novel compound included;

- Compound 1 is 2-ethylidene-5-methyloxalan-3-one
- Compound 2 is 6-methyl-3-vinyl-1,2-dioxan-4-one

3. Cytotoxicity test

• Presto blue cell viability assay



CONCLUSION

The selected fungal strain is identified as a novel species belonging to the genus *Daldinia* based on morphology and phylogeny. FVOCs produced by this strain were identified as novel compounds. Cytotoxicity assays revealed that Compound 1 exhibited higher cytotoxicity than Compound 2 in both Vero and A549 cell lines.

REFERENCES

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