Original Article

Development of a Novel Biotechnological Fragrant Product, Eremothecium Oil

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ABSTRACT

The assessment of Eremothecium oil biological activity via kinetics modelling revealed valid positive correlations between level of bacterial multiplication and lag-phase prolongation under different concentrations (from 0.49 to 7.81 μL/mL). Toxicity intensity correlated with phenyl ethanol (R = −0.9; strong negative association), geraniol (R = 0.6; moderate positive association), nerol (R = −0.55; moderate negative association), linalool (R = −0.74; strong negative association), and total monoterpene alcohol (R = 0.5; moderate positive association) content.

Keywords: Biotechnology, Essential Oil, Microbial Synthesis, *Eremothecium*, Toxicity, Fragrant Compounds.

INTRODUCTION

In recent years, there has been an increasing interest in biotechnological sources of rose-scented products.[1] In 1986, Bugorskiy *et al.* revealed that homothallic ascomycetes *Eremothecium ashbyi* and *E. gossypii* are able to produce rose-scented essential oil, whose composition is similar to that of natural rose essential oil.[2] While previous studies have mainly focused on the study of fundamental problems,[1-5] none have assessed the biological activity of this new pharmaceutical substance (Eremothecium oil). In this study, we, therefore, sought to reveal its antimicrobial and toxic effects depending on its component composition.

MATERIAL AND METHODS

The extraction and analysis of aroma-forming compounds in cultural broths of *Eremothecium ashbyi* Guilliermond 1935 (VKM F-3009, VKM F-4565, VKM F-4566, VKPM F-36, VKPM F-340, and VKPM F-1320) and *Eremothecium gossypii* Kurtzman 1995 (VKM F-2627, VKM F-3276, VKM F-3296, and VKPM F-1321) strains were carried out via organic solvent extraction and distillation followed by gas-liquid chromatography.[3-5] We assessed antimicrobial activity using 27 bacteria and fungi cultures via two methods: disk-diffusion and serial dilutions. Oil toxic effects were revealed using *in vitro* biotesting with *Paramecium caudatum*. The statistical data analysis was performed via Excel (Microsoft) and Statistica software (critical level of significance P = 0.95).

RESULTS & DISCUSSION

Eremothecium oil possessed the highest antibiotic activity against *E. coli, P. aeruginosa*, *Myxococcus* sp., *L. acidophilus, L. lactis* ssp. *lactis, S. maltophilia, A. baumannii*, *K. pneumoniae*, *S. aureus*, *B. subtilis*, *B. megatherium*, and *C. albicans*. We revealed the minimal inhibitory con-

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centrations of distillated oil from E. *ashbyi* for *C. albicans*, *S. aureus*, and *E. coli*. These concentrations correspond with those of oil from rose petals. The study of test-culture growth kinetics showed that Eremothecium oil had bacteriostatic activity against *E.coli* and *S. aureus* (death rate higher than 85.0%) at a concentration of 7.8 μL/mL; however, it does not affect *C. albicans*. After 20 h, oil at a concentration of 860 μg/mL showed the highest toxicity on *P. caudatum* (100 %). At the same time, the average lethal concentration among all oil samples was 210 μg/mL. Oil at concentrations of 860–1720 μg/mL possessed an acute toxic effect (cell viability of *P. caudatum* decreased more than 50% than in control); Concentrations from 210 to 430 μg/mL do not have acute and subacute toxicity. Effect intensity correlated with phenyl ethanol (R = –0.9; strong negative association), geraniol (R = 0.6; moderate positive association), nerol (R = –0.55; moderate negative association), linalool (R = –0.74; strong negative association), and total monoterpene alcohol (R = 0.5; moderate positive association) content. We revealed the weak negative correlation between sample activity on *P. caudatum* and citronellol (R = –0.19) content.

CONCLUSION

The content of the aroma-forming compounds and their combination, which possessed additional inhibitory activity, causes the antimicrobial and toxic action of Eremothecium oil. This data correspond with those for essential oil from rose petals.

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CONFLICT OF INTEREST

The authors do not have any conflict of interest.

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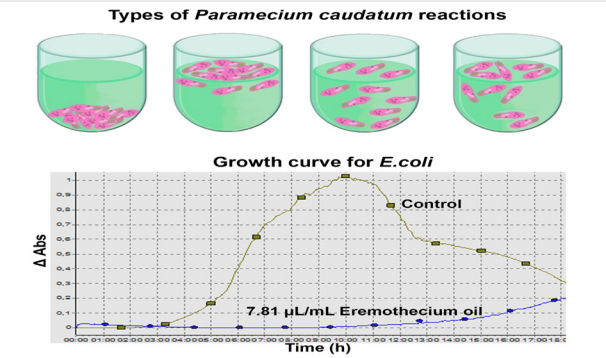
PICTORIAL ABSTRACT



SUMMARY

- We assessed Eremothecium oil biological activity and revealed valid positive correlations between level of bacterial multiplication and lag-phase prolongation under different concentrations.
- Toxicity intensity correlated with phenyl ethanol, nerol, linalool, and total monoterpene alcohol content.

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