

Neosartorya spp. (teleomorph of *Aspergillus* spp.) sensitivity to selected cyclic compounds

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INTRODUCTION

Fungi from the genus *Neosartorya* (teleomorph *Aspergillus* spp.) pose significant challenges in the production and storage of crops and fruit-based products due to their heat-resistant ascospores, which lead to food spoilage and potential mycotoxin contamination (Yaguchi et al., 2012).

MATERIALS & METHODS

The influence of 11 cyclic compounds (promethazine, dodecyltrimethyl ammonium bromide (DTAB), compound 48/83, caffeine, benzamidine, cycloheximide, chlorpromazine hydrochloride, doxycycline hyclate, chlortetracycline hydrochloride, methyl viologen dichloride hydrate and berberine chloride) on the growth and respiration of *Neosartorya* spp. was tested. Ten fungal isolates, selected on the basis of previous experiments, were cultured on Potato Dextrose Agar media for 10 days at 30°C. Mycelium and ascospores were then used to obtain suspensions for the inoculation of Biolog® PM21-25 microplates, according to the manufacturer's protocol. The plates underwent 192 hours of incubation at 30°C, with optical density measurements taken every 24-hours to assess Average Fungal Respiration Intensity (AFRI) and Average Fungal Growth Intensity (AFGI).

RESULTS

After 144 hours of coincubation, two substances – promethazine and methyl viologen dichloride hydrate had presented an inhibitory effect against *Neosartorya* spp. isolates. Promethazine has been reported to enhance antifungal susceptibility and disrupt biofilm structure and functioning in *Trichosporon* (Aguiar et al., 2023), as well as having antifungal activity against *Candida tropicalis* (Brilhante et al., 2018). Methyl viologen dichloride hydrate is commonly used as a herbicide (Islam et al., 2021) and as a plant growth modulator (Yang et al., 2018). These results cover the findings of Panek et al., where an isolate of *Neosartorya fischeri* exhibited similar sensitivity (Panek et al., 2016) to these two substances.

Contrastingly, four substances seemed to stimulate the development of *Neosartorya* spp. The first, compound 48/80, is a mixed polymer of p-methoxy-N-methyl phenylethylamine crosslinked by formaldehyde (Schemann et al., 2012). Cycloheximide, doxycycline hyclate and berberine chloride have proven antifungal properties, which in our experiment were not potent enough to affect tested isolates (Santra et al., 2020; Mittal et al., 2022; Zhao et al., 2010). The rest of the studied compounds had no significant influence on the cumulative *Neosartorya* spp. population.

Dual wavelength analysis revealed discrepancies between the respiratory activity and growth capabilities for some isolates. For example, isolate G150/14 was characterized by higher AFRI than AFGI score on e.g. chlorpromazine hydrochloride, indicating metabolic stress. Such results are telling of cyclic compounds ability to affect cellular functions.

CONCLUSION

As proven by this study, promethazine and methyl viologen dichloride hydrate, inhibit *Neosartorya* spp. Both of these substances possess two nitrogen molecules in their structure (NCBI, 2024), however the exact mode of action on *Neosartorya* spp. metabolism needs to be studied further. Despite reported antifungal activity of these chemicals and their potential for agricultural use, the safety of promethazine and

In light of these concerns, it is imperative to explore the sensitivity of *Neosartorya* spp. to a range of chemicals, including cyclic compounds possessing unique structural characteristics and bioactivity against fungal pathogens (Yang et al., 2022). The findings from these investigations can contribute to the development of effective and sustainable strategies for managing these fungal contaminants and safeguarding food quality.

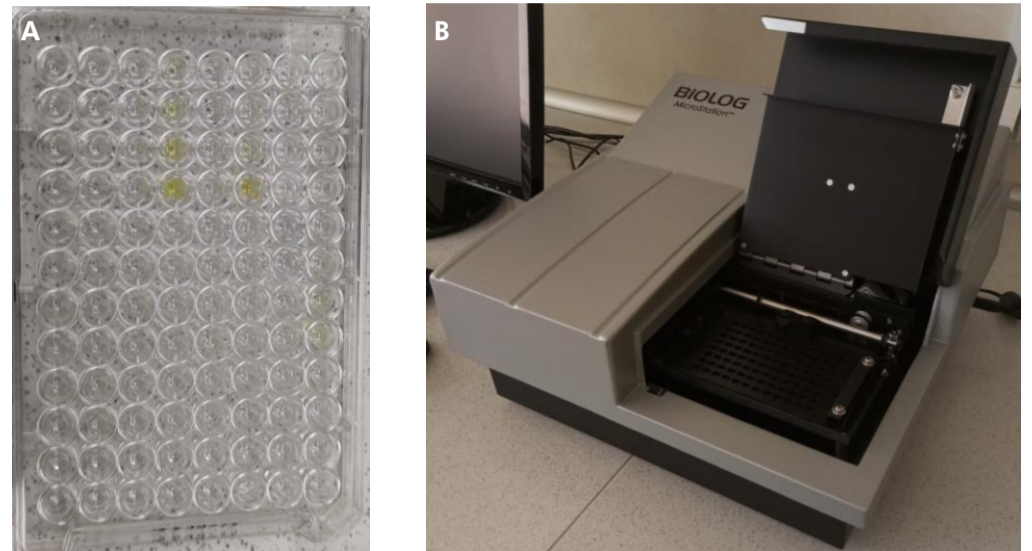


Fig. 1. Biolog® PM microplate (A) and Biolog® MicroStation™ microplate reader (B).

Fig. 2. AFGI of *Neosartorya* spp. isolates under the influence of chemical agents in PM 21-25 Biolog® plates after 144 hours of incubation. Black line corresponds to the optical density of control material cultured without the addition of fungicidal substances. Asterisks signify significant differences between the control and AFGI of isolates in contact with cyclic compounds.

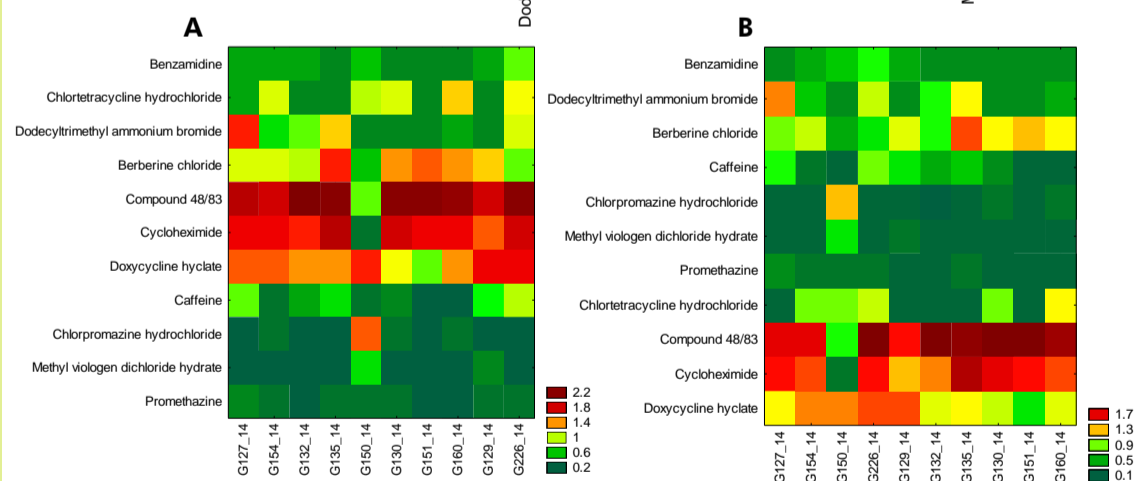
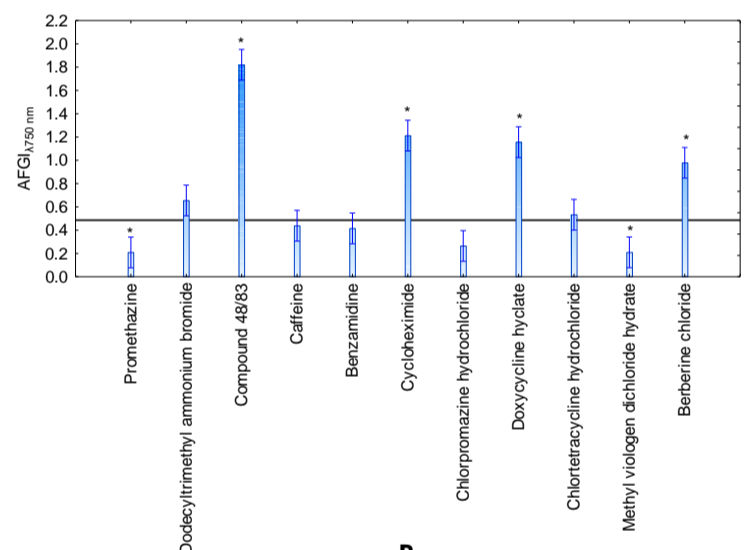


Fig. 3. AFRI (A) and AFGI (B) of *Neosartorya* spp. isolates on PM21-25 plates after 144 h of incubation. Colour scale indicates the optical density on each substrate.

methyl viologen dichloride hydrate must be evaluated to ensure minimal impact on non-target organisms, human health, and the environment if actual application is considered. In summary, these findings provide valuable insights into the potential of cyclic compounds to modulate the growth and respiration of *Neosartorya* spp., contributing to the development of targeted strategies for managing fungal contaminants and ensuring food safety and quality.

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LITERATURE