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In vitro antifungal activity of silver-doped dolomite against *Fusarium verticillioides*

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Introduction

In maize (*Zea mays*), *Fusarium verticillioides*, an endophytic and opportunistic pathogen prevalent in the tropics, causes ear and stalk rot and seedling damage, and produces **fumonisins** - hepatotoxic mycotoxins regulated by ANVISA (limit: 2 µg/g). It is detected in **>90% of Brazilian maize samples**.

Objective

To evaluate the antifungal effect of silver ions (Ag^+) carried in dolomite on the *in vitro* mycelial growth of *F. verticillioides* and to estimate its EC_{50}.



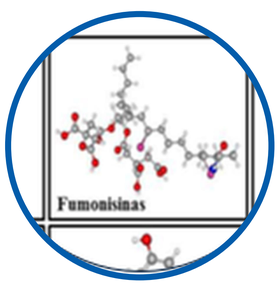
F. verticillioides



Ear rot



Rotten kernels



Mycotoxins (fumonisins)



Abnormal ears



Seedling damage

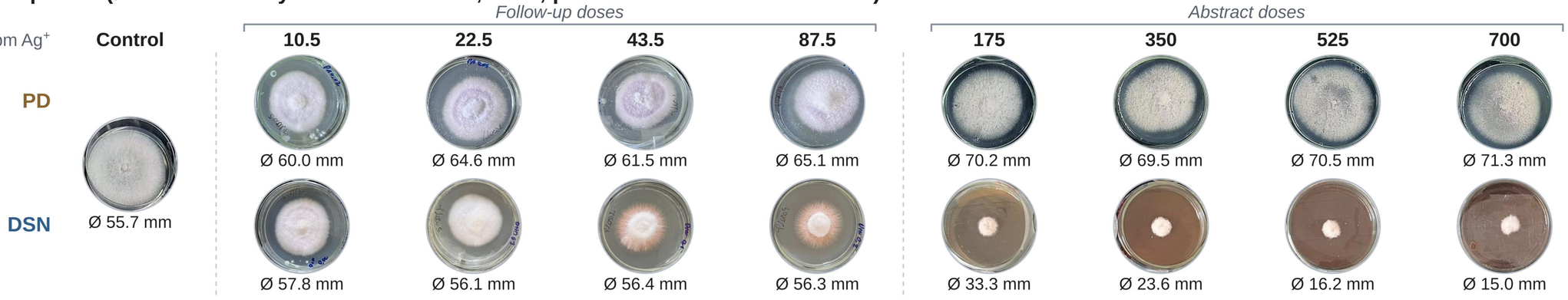
Materials and methods

A Experimental workflow



Treatments: Control (C) · Pure dolomite (PD) · Dolomite + $AgNO_3$ (DSN) | n = 5 plates | ANOVA · Tukey HSD (α = 0.05) | Nonlinear regression (EC_{50})

B Representative plates (Ø = mean colony diameter at 120 h, n = 5; photos taken at different times)



Results

258 ppm
EC_{50} · DSN (95% CI 228–292)

78–80%
Inhibition at 525–700 ppm Ag^+

+26%
Pure dolomite growth ($p < 0.001$)

≤ 87.5 ppm
No inhibition (= control)

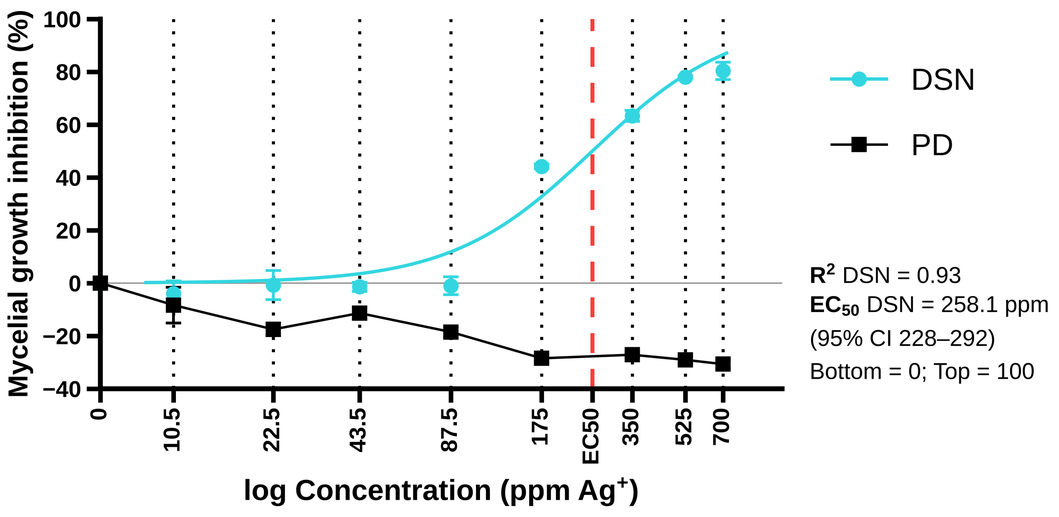


Figure 1. Mycelial growth inhibition at 120 h (mean ± SE, *n* = 5); DSN: variable-slope fit (Bottom = 0, Top = 100); red line: EC_{50}. Negative values: growth above control.

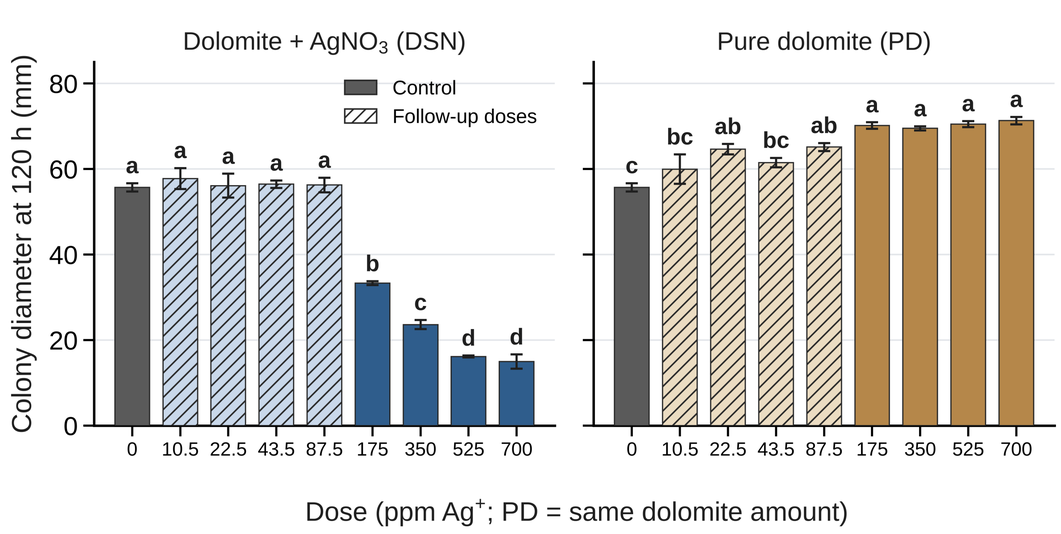


Figure 2. Colony diameter at 120 h (mean ± SE). In each panel, same letters do not differ (ANOVA, Tukey HSD, *α* = 0.05); hatched: follow-up doses.

Conclusion

Silver-doped dolomite inhibited *F. verticillioides* in a dose-dependent way from 175 ppm Ag^+ (EC_{50} ≈ 258 ppm; 78–80% inhibition at 525–700 ppm), with no effect at ≤ 87.5 ppm. Pure dolomite increased growth by ~26%, so the antifungal effect comes from Ag^+. Results confirm the fungistatic potential of silver ions and support *in vivo* trials in *Zea mays*.

References: BRASIL. Agência Nacional de Vigilância Sanitária. Instrução Normativa nº 160, de 1º de julho de 2022. Estabelece os limites máximos tolerados (LMT) de contaminantes em alimentos. Brasília, DF: ANVISA, 2022.

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