In-vitro effect of polyamine spermine on mycelium growth of pathogenic *Fusarium spp*. isolated from wheat

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Background:

Fungal pathogens from the genus *Fusarium* are globally distributed and rank among the most economically significant causes of root, stem base, and head diseases in wheat. Infections with these pathogens lead to grain contamination with mycotoxins hazardous to human and animal health, as well as reduced yield and quality.

Symptoms of Fusarium infection on seedlings (a), wheat heads (b), and leaves (c), compared to the respective healthy controls (Khaledi et al., 2017).

Vitavax - commonly used fungicide

Conventional Management:

Control strategies commonly rely on synthetic fungicides applied to seeds or during plant vegetation. However, current trends in agriculture emphasize the reduction of chemical inputs in favor of more sustainable and eco-friendly approaches.

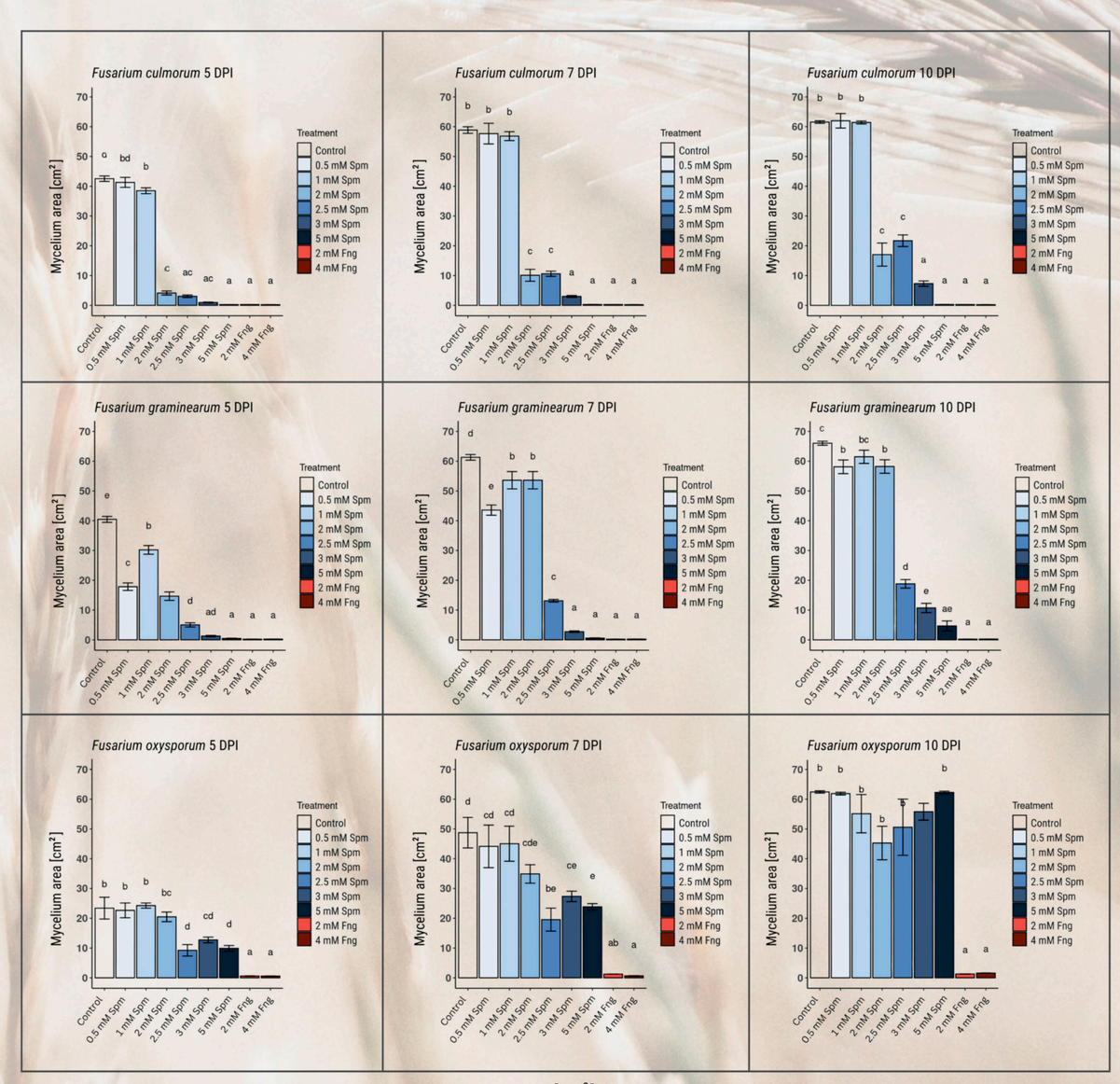
Research Focus and Objective:

In line with the principles of sustainable and organic farming, this study investigates the antifungal efficacy of the polyamine spermine as a potential biocontrol agent against *Fusarium*-induced root and head diseases in cereal crops studied as an alternative to synthetic fungicides.

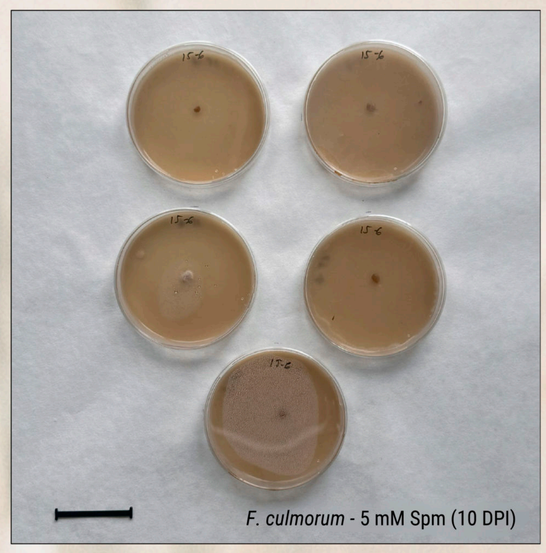
Spermine - tested polyamine

Methodology:

In vitro assays were conducted under sterile conditions to assess the effect of spermine, incorporated into agar-based nutrient media at concentrations ranging from 0.5 mM to 5.0 mM, on the mycelial growth of three pathogenic *Fusarium* species isolated from wheat.



Fusarium mycelial growth area [cm²] measured 5, 7 and 10 DPI



Key Findings:

- Spermine, applied at a concentration of 5 mM in nutrient medium, exhibited a strong antifungal effect against *F. culmorum*, resulting in complete (100%) inhibition of mycelial growth.
- In the case of *F. graminearum,* growth suppression reached up to 93%, indicating a slightly lower but still significant fungistatic effect.
- *F. oxysporum* showed minimal sensitivity under the same experimental conditions.

Future Directions:

Based on these *in vitro* results, the 5 mM concentration of spermine is considered the most promising for further research. Future experiments will focus on evaluating its effectiveness as a seed priming in wheat to control root disease incidence and development caused by *Fusarium culmorum* in early plant growth stages.

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