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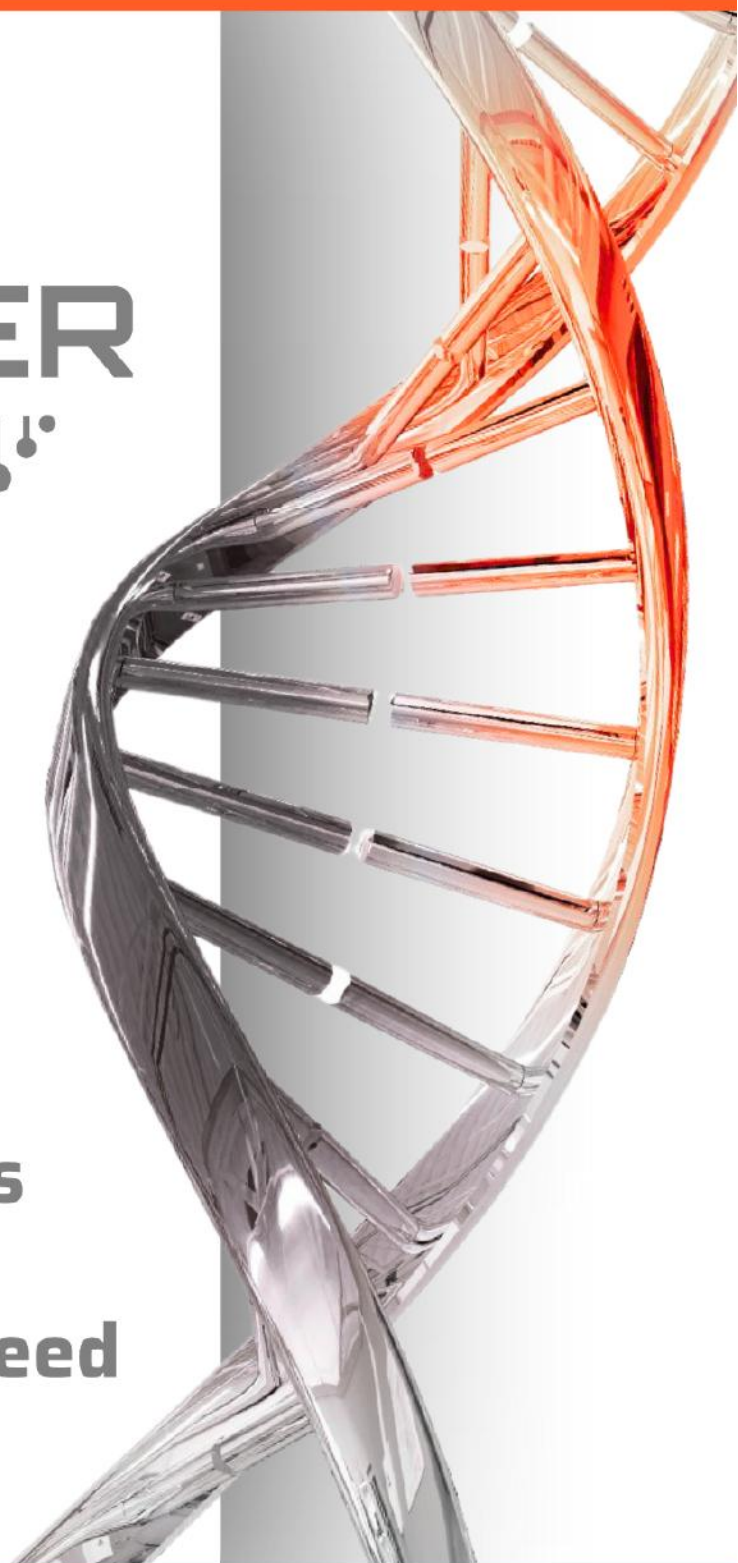


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## ***Bacillus mycoides* as a potential biocontrol agent for *Fusarium* suppression**

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**Introduction:** Suppression of fungal pathogens that are responsible for massive crop losses, with *Fusarium* species as the most prevalent ones, represents a huge challenge in sustainable agriculture. Application of bacterial inoculants is an effective alternative to chemicals as it poses no health risks and has an insignificant impact on the environment.

**Objective:** The application of new bacterial strain *Bacillus mycoides* BHC 3.2 for suppression of *Fusarium poae*, *Fusarium graminearum*, *Fusarium proliferatum* and *Fusarium oxysporum* was the objective of this research.

**Method:** Antifungal activity of isolates was tested *in vitro* on PDA medium using dual culture method and inhibition of fungal growth was calculated based on the formula:  $\text{Inhibition(\%)} = \frac{(\text{Fungal control (mm)} - \text{Treatment (mm)})}{\text{Fungal control (mm)}} \times 100$ . Production of siderophores and indole-3-acetic acid (IAA) was determined by growing strain on Chrome Azurol S (CAS) Blue agar and in tryptophan (2 mg/mL) enriched nutrient broth (NB) by using Salkowski reagent, respectively.

**Findings:** Among tested fungal pathogens, strain BHC 3.2 showed the strongest antagonistic effect against *F. poae* with inhibition over 45%. BHC 3.2 also showed antagonistic effect against *F. graminearum*, *F. proliferatum* and *F. oxysporum* with inhibition lower than 35%. The production of siderophores was not recorded for BHC3.2, while the production of IAA was 3.69 µg/mL.

**Conclusion:** Previous studies showed that *B. mycoides* could be used for reducing the severity of *Fusarium* infections in crops. Results of this research highlight the feasibility of utilizing *Bacillus mycoides* BHC 3.2 in formulating biofertilizers, thereby offering environmentally friendly strategy for plant pathogens control.



## INTRODUCTION

Suppression of fungal pathogens that are responsible for massive crop losses, with *Fusarium* species at the most prevalent ones, represents a huge challenge in sustainable agriculture. Application of bacterial inoculants is an effective alternative to chemicals as it poses no health risk and has an insignificant impact of the environment.

The application of new bacterial strain *Bacillus mycoides* BHC 3.2 for suppression of *Fusarium poae*, *Fusarium graminearum*, *Fusarium proliferatum* and *Fusarium oxysporum* was the objective of this research.



Fig. 1. Parts of cereals infected with *Fusarium* spp.

## METODOLOGY

Antifungal activity of isolates was tested in vitro on potato dextrose agar (PDA) medium using dual culture method. Inhibition of fungal growth was calculated based on the formula:

$$\text{Inhibition(\%)} = \frac{\text{Fungal control (mm)} - \text{Treatment (mm)}}{\text{Fungal control (mm)}} * 100\%$$

Production of siderophores and indole-3-acetic acid (IAA) was determined by growing strain on Chrome Azurol S (CAS) Blue agar and in tryptophan (2 mg/mL) enriched nutrient broth (NB) by using Salkowski reagent, respectively.

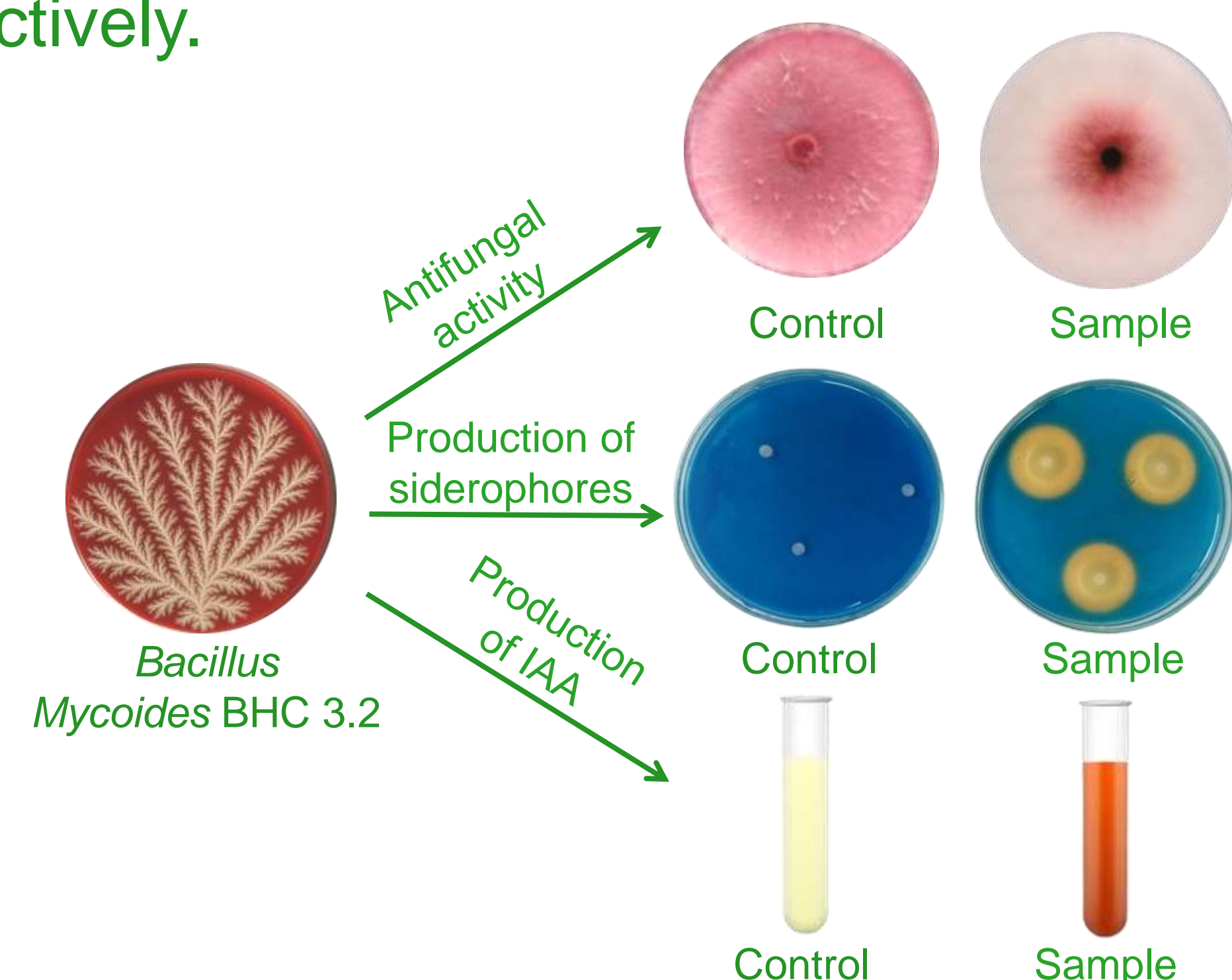


Fig. 2. Overview of applied analytical methods

## RESULTS

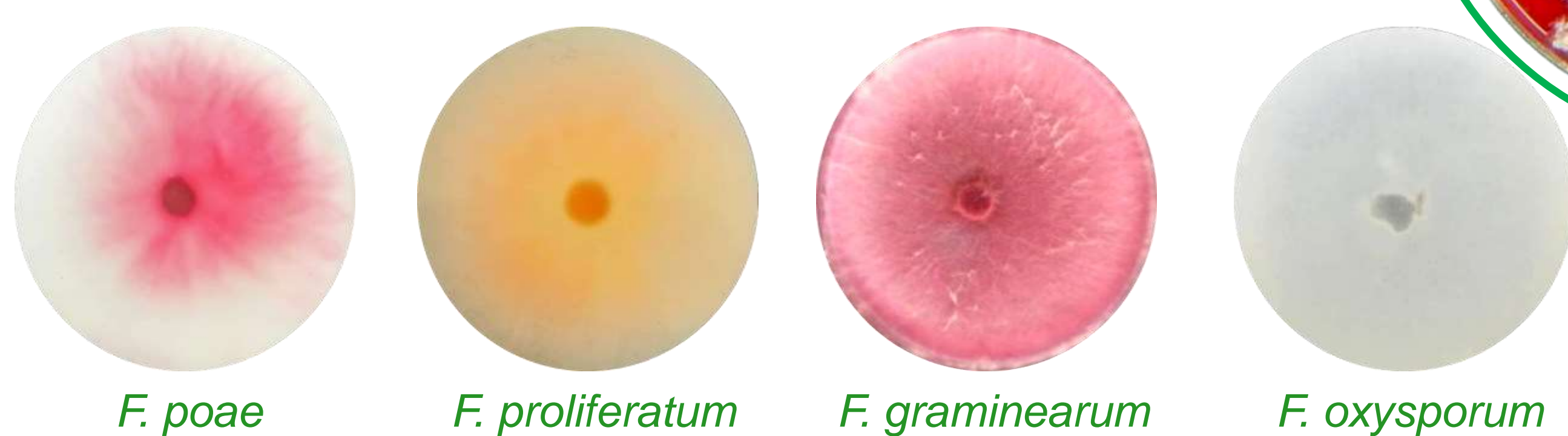


Fig. 3. Tested *Fusarium* strains

Among all tested pathogens, strain BHC 3.2 showed the strongest antagonistic effect against *F. poae* with inhibition over 45%, while inhibition of other tree tested pathogen strains was lower than 35%. The production of siderophores was not recorded for BHC 3.2, while the production of IAA was 3.69 µg/mL.

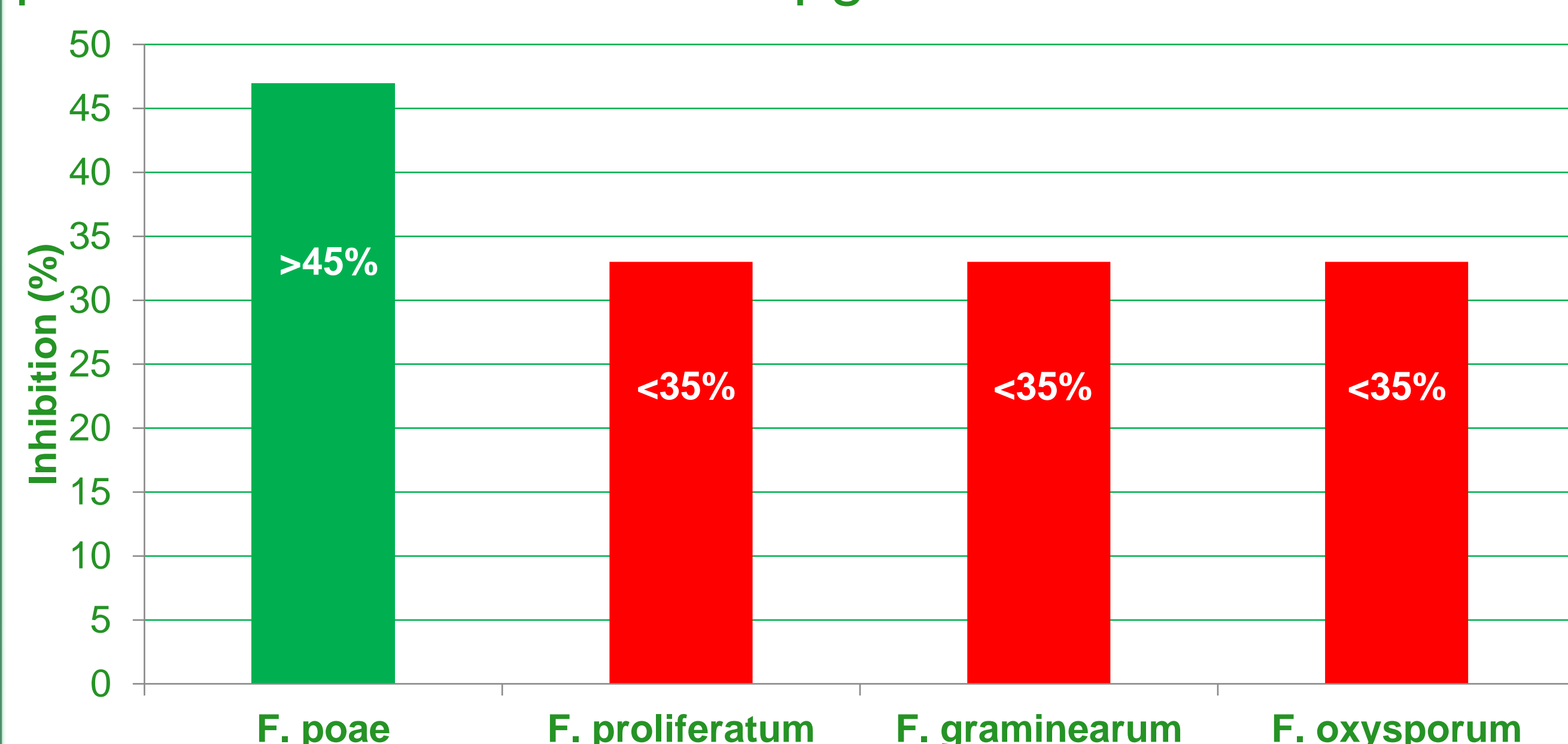


Fig. 4. Inhibition of *Fusarium* species

## CONCLUSION

Previous studies have demonstrated that *Bacillus mycoides* possesses the potential to reduce the severity of *Fusarium* infections in various crops. Building on this foundation, the results of the present research emphasize the practical applicability of the *Bacillus mycoides* BHC 3.2 strain in the formulation of biofertilizers. This approach presents a promising and environmentally sustainable strategy for the biological control of plant pathogens, potentially reducing reliance on chemical pesticides and contributing to more resilient agricultural systems.

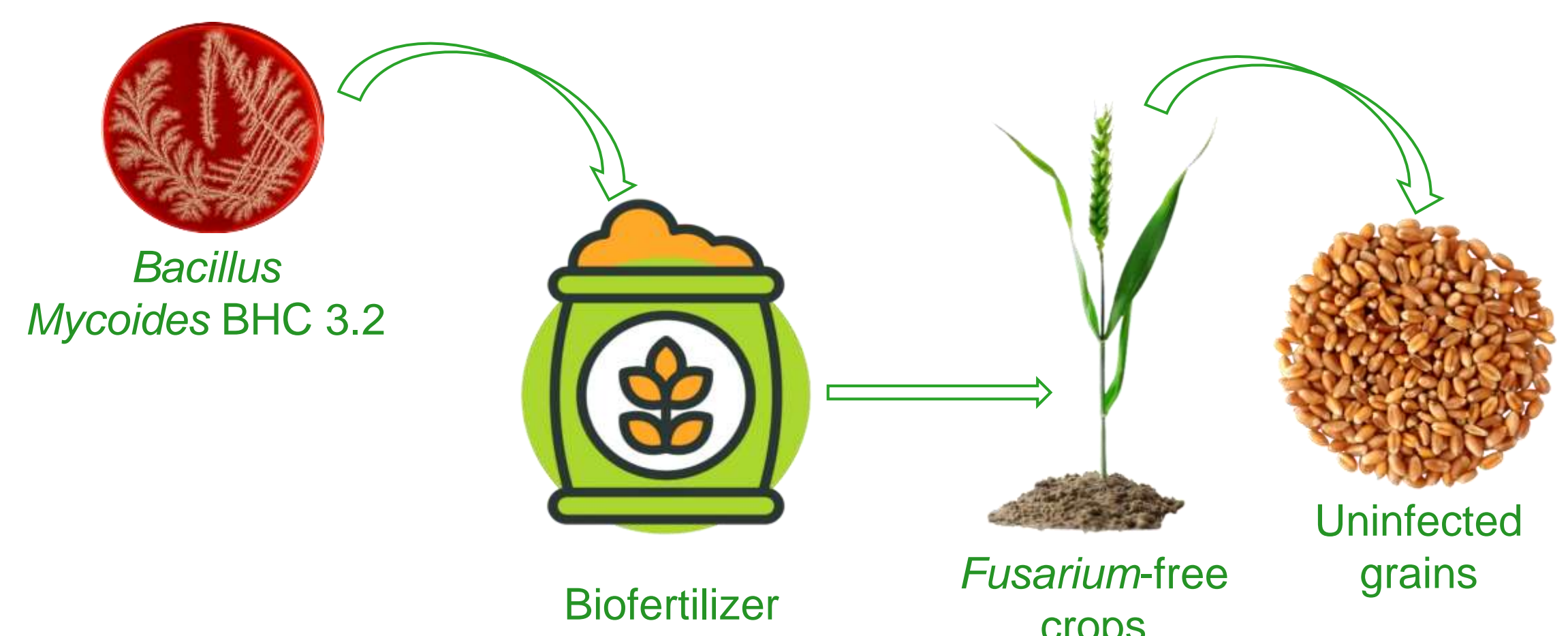


Fig. 5. *Fusarium* suppression in crops via *Bacillus mycoides*-based biofertilizer