Glyphosate Inhibits Keratinolytic Activity of Bacillus spp. Isolated from Wild Songbirds

Elizabeth Urbanski
Ohio Wesleyan University

Follow this and additional works at: https://digitalcommons.owu.edu/studentsymposium

Part of the Microbiology Commons

https://digitalcommons.owu.edu/studentsymposium/2018/poster_session/12

This Poster is brought to you for free and open access by the Student Scholarship at Digital Commons @ OWU. It has been accepted for inclusion in Student Symposium by an authorized administrator of Digital Commons @ OWU. For more information, please contact earutigl@owu.edu.
Abstract

Glyphosate is the most commonly used herbicide in the United States. It inhibits 5-enolpyruvylshikimate 3-phosphate (EPSP) synthase, which is responsible for amino acid biosynthesis primarily in prokaryotes and higher plants (Quinn 1982). Some Bacillus spp. produce keratinase enzymes, which degrade the keratin found in bird feathers. How does glyphosate affect feather degradation by Bacillus spp?

Introduction

• Glyphosate is the most commonly used herbicide in the United States.
• Glyphosate inhibits 5-enolpyruvylshikimate 3-phosphate (EPSP) synthase, which is responsible for amino acid biosynthesis primarily in prokaryotes and higher plants. (Quinn 1982)
• Some Bacillus spp. produce keratinase enzymes, which degrade the keratin found in bird feathers.

Materials and Methods

Figure 1. Kirby Bauer Test
Mueller-Hinton agar plate inoculated with a 0.5 McFarland standard of Bacillus isolate 3972 TB. Each disc corresponds to a different concentration of glyphosate. 1 = 8.44 µg/L, 2 = 84.4 µg/L, 3 = 844 µg/L.

Results

Feather Degradation by Bacillus Isolate 3972 TB
Feather Degradation by Bacillus Isolate 4021 TV
Feather Degradation by Bacillus Isolate 4158 TT

Figure 2. Feather degradation measured as absorbance.
Absorbance of each replicate for all three isolates was measured by microplate reader at 230 nm. Absorbance corresponds to the amount of oligopeptides present from feather degradation.

Discussion and Conclusions

• Glyphosate inhibits keratinolytic activity of Bacillus spp.
• Disruption of the shikimic acid pathway in Bacillus may account for inhibition of keratinolytic activity.
• Bird feathers are not damaged by glyphosate.
• Bacillus spp. sporulate when exposed to glyphosate in artificial, soil-free media.

Future Directions

• Repeat degradation experiments in media with soil to determine if decreased bioavailability of glyphosate affects the rate of feather degradation.

References


Acknowledgments

Research funding provided through an Ohio Wesleyan University Signature Project Grant and the Botany and Microbiology and Zoology Departments.