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# Bioremediation of Aflatoxins: Harnessing Microbial and Enzymatic Tools for Mycotoxin Degradation

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**Abstract**

Bioremediation, utilizing microorganisms and enzymes to degrade toxic pollutants, has proven an effective method of minimizing aflatoxin contamination. This article focuses on new developments in the microbial degradation of aflatoxins, explaining the function contributed by bacteria, fungi, and yeast strains to the degradation of such toxic compounds by enzymatic mechanisms. Individual enzymes such as cytochrome P450 monooxygenases, laccases, and peroxidases are essential to aflatoxin detoxification, catalyzing the conversion of aflatoxins into non-toxic metabolites. Microbial consortia synergistically degrading aflatoxins have also been shown with greater efficiency compared to individual species. Recent developments in enzyme engineering and synthetic biology may further improve the effectiveness of bioremediation by producing more stable and targeted enzymes for aflatoxin degradation. The review also takes into account the factors influencing the process of bioremediation, including environmental factors, nutrient availability, and microbial community dynamics. Besides, problems such as scalability and effectiveness of such methods in real field conditions are also addressed, with the solutions being microbial consortia and genetic engineering. A comprehensive review of the microbial and enzymatic methods of aflatoxin degradation has been given in this paper, highlighting their sustainability and eco-friendliness as effective alternatives to chemical detoxification processes.

**Keywords:** Bioremediation, aflatoxins, microorganisms, enzymes, degradation, detoxification.