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REVIEW

Fungicide–albumin interactions: unraveling the complex relationship—a comprehensive review

Nisar Ahmad Malik[1] · Nighat Nazir[1] · Mehak Manzoor[1] · Faizan Gull[1]

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Abstract
This review will give an insight into the interactions of serum albumins, which are proteins found in the blood, with fungicides. There are molecular interactions between several fungicides and two serum albumin proteins: human serum albumin (HSA) and bovine serum albumin (BSA). The main objective of this review is to through some light on the interactions of the fungicides with serum albumins and to highlight their toxicity level. The interactions of serum albumins with fungicides are complex and can be affected by the properties of the proteins themselves. This review provides valuable insight into the interactions between serum albumins and fungicides, which can help to know the efficacy and mechanism of fungicides and may help in designing new fungicides with low or no toxicity.

Keywords *Serum albumins* · Bovine serum albumin · Human serum albumin · Fungicides · BSA/HSA–fungicide interactions

Introduction

Fungicides are pesticides designed to target and destroy the fungi that cause significant diseases in plants or other animals. Chemical or biological agents known as fungicides stop the growth of fungi or their spores. Fungicides of today merely suppress fungal development for a few days or weeks without killing them. Understanding how fungicides work and how hazardous they are is crucial because people and domesticated animals come into contact with them through several applications. To prevent fungus from forming on tubers, fruits, and vegetables while they are being stored, fungicides are directly applied to ornamental plants, trees, field crops, cereals, and turf grasses in agriculture (Osweiler et al. 1985).

Although some fungicides are also used as molluscicides, fungicides are commonly utilized in veterinary medicine as an antibacterial/antiseptic treatment for foot rot disease. Fungicides are frequently used in industry to keep goods safe during transport, prevent wood from rotting, limit fungal development in paper pulps, and safeguard domestic carpet and fabric. However, due to accidents, carelessness, or intentional use, household fungicides pose a major threat to pets and animals. Animal poisoning is uncommon due to the wide spectrum of fungicides used in agriculture, food processing, and storage. The inappropriate use of fungicides and disregard for safety precautions are likely to blame for a disproportionate number of irritating wounds to the skin, mucous membranes, and dermal sensitization. The use of fungicides (Table 1) in combination with other pesticides, transporters, or solvents is common, and the combined effects of these substances may be more dangerous than the sum of their parts (Osweiler et al. 1985).

Commonly used fungicides

Azoxystrobin: It is a systemic broad-spectrum fungicide having preventive characteristics (Fig. 1).

Uses: It exhibits good efficiency against mold illness in cabbage and suppresses spore germination and mycelial proliferation (Survilienė et al. 2010) (Dane and Dalgiç 2005).

Permitted concentration/maximum residual limit: 5 mg/kg.

✉ Nisar Ahmad Malik
nisarchmjmi@gmail.com;
nisar.malik@islamicuniversity.edu.in

[1] Department of Chemistry, Islamic University of Science and Technology, Awantipora, Pulwama, Jammu and Kashmir, India

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