



Metal-Based Nanopesticides for Seed Protection

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Abstract

It is essential to implement sustainable agricultural practices that protect seeds from pests and insects. The aim of the present study is to highlight the role of nanoparticles in the formulation of nanopesticides for seed and crop protection. Nanopesticides are more effective than conventional pesticides in controlling crop pests. Nanopesticides not only improve the dispersion of pesticides, but also increase their bioavailability by facilitating the release of their beneficial components.

Keywords: Nanopesticides, Pathogen, Protection, Seed.

Introduction

Seeds and grains are vital components of sustainable food systems. Seed quality can be affected by seed-borne diseases and destroyed by insects and other pests. To control and prevent various pests, diseases and nutritional deficiencies, various pesticides are used in seed treatment (Nile et al., 2022). Nanotechnology has proven to be a modern tool to overcome the shortcomings of traditional pesticide preparation and application techniques. Formulations that contain nano-dimensional active pesticide ingredients with entirely new properties are called nanopesticides (Tauseef and Uddin, 2024). Therefore, the aim of this study is to highlight the role of nanoparticles in the formulation of nanopesticides for seed and crop protection.

Materials and methods

The present article has been prepared by studying and reviewing the published literature on the role of nanopesticides for seed protection

Results and Discussion

Nanomaterials such as silver, gold, iron oxide, titanium oxide, copper, and zinc oxide, etc. have been used as nanopesticides. Nanopesticides are more effective than conventional pesticides in controlling crop pests. Nanopesticides not only improve the dispersion of pesticides, but also increase their bioavailability by facilitating the release of their beneficial components. The molecular mechanisms of nanopesticides for seed protection include inhibition of cell wall synthesis, depolarization of cell membranes, inhibition of protein synthesis, inhibition of amino acid synthesis, and inhibition of metabolic pathways of pests and microorganisms (Roseline et al., 219).

Conclusion

Therefore, the smart nanopesticides can overcome the limitations of conventional methods in promoting plant growth.

References

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