

**Mini Review**

# Are Biofungicides a Means of Plant Protection for the Future?

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## Abstract

Biofungicides are prepared based on living micro/organisms or on matters prepared from them. They are based on the antagonism of fungal pathogens and their antagonists. Their effect depends on weather conditions (temperature and moisture) in comparison with chemical fungicides which are effective in all conditions but they let the residues in plants, animals, and men. The future of agriculture will be pure food without chemicals.

Biofungicides are means of plant protection that act against phytopathogenic fungi.

They are either antagonistic micro/organisms or the substances isolated from them. Phytofungicides are substances of plant origin and nanobiofungicides are nanoparticles manufactured from biological substances [1].

This is the main difference in contrast to fungicides which use chemicals.

Chemicals are effective in all weather conditions but they leave residues (non-target effect of fungicides) that enter the body organs of humans and animals, and these residues are dangerous to consumers [2] as they can be the trigger of human and animal diseases (cancer, etc.) [2,3].

The use of systemic fungicides has increased in recent decades despite the development of resistance [2].

Today's boom of biofungicides in the world is an expression of the desire for healthy food.

Antagonistic fungi reduced the growth and sporulation of phytopathogenic fungi and fumonisin production in *Fusarium* spp. [4].

The growth reduction property and sporulation of mycotoxin production must be monitored both in phytopathogenic fungi and in their antagonists [3].

Biopreparations are the means of the future because it will be possible to change the genome of antagonists. Biofungicide production includes: 1) laboratory investigation and discovery of effective micro/organisms, 2) Laboratory tests, 3) small parcel tests 4) semi-production tests 5) production tests [5].

## More Information

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The production of biofungicides requires special factories-based on biological production and equipped with mycological laboratories to control cleanliness and sterility [5].

The effectiveness of biofungicides is determined by the influence of invasiveness on the phytopathogenic micro/organism and its interrelationship with the soil microflora [6].

We still do not know the basic functions of soil microflora in the environment. The interplay of different metabolic processes in soil is also unknown. We need to develop new technologies based on new knowledge.

Whether it is possible to replace chemical protection with biological struggle is a matter of discussion. The effectiveness of biological control depends on the weather and its impact is lower than that of chemical control, which works under all conditions. In severe drought, the application of biofungicides is impossible [6].

Biological control of phytopathogenic fungi using biofungicides may be the basic process of plant treatment in the future and new knowledge will create better conditions for further findings. New laboratories based on molecular methods with special equipment will be introduced to alter the genome of antagonistic microorganisms for their higher effect.

This could be used to develop new biofungicides that will be specific to different groups of pathogens. The application technique must be fully automated [7].



The development of biofungicides requires the creation of special institutes. The application of biofungicides over large areas requires new application techniques. Moisture in the soil should be provided by a chemical reaction that produces water.

Nowadays, biofungicides have boomed in financial incomes and they are mainly used by gardening fans in small areas of gardens.

If we want to extend the use of biofungicides to large areas of fields, we need to produce highly effective biofungicides that are not expensive. Economic production makes it possible to change the chemical control for the biological one.

## Conclusion

Current biofungicides could be used for treatment in small garden parcels. Their use in great areas depends on newly discovered technologies and automation.

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