

Book review

F. L. PFLEGER AND R. G. LINDERMAN ED.:

Mycorrhizae and plant health.

— (10)+344 p. APS Press, St. Paul, Minnesota, 1994. — The book is in the library of the Society.

This book is dedicated to the phenomenon of mycorrhiza, a symbiotic association common in the majority of vascular plant taxa, dealing with its effects on plant pathology, physiology and ecology. It presents excellent reviews of respected specialists in the field of mycorrhizal research, based on the contributions at a symposium entitled "A Reappraisal of Mycorrhizae in Plant Health", held in Portland, Oregon, in 1992.

There is widespread agreement among plant and soil scientists, that mycorrhizae can support plant growth and health due to the various mechanisms of action. This is reflected here in 14 thematically distinct chapters of the book.

The first two chapters describe the possibilities of the use of ecto— and endomycorrhizal fungi as agents active in the suppression of plant diseases. The use of inoculum of mycorrhizal fungi as a biologically active agent effective against certain plant diseases is highly desirable in agroecosystems because it provides a possibility to avoid the application of some conventional pesticides, which could accumulate in plant products and thus influence human health.

The role of mycorrhizas in the reclamation of sites disturbed by mining activities is discussed in the chapters 3 and 4. In this field, mycorrhizal symbiosis plays an essential role in the stabilization of newly formed plant cover in disturbed areas and probably increases the diversity in plant communities.

Arbuscular endomycorrhizal fungi are common inhabitants of arable soils, which make comprehensive information about mycorrhizae in agroecosystems necessary. The chapters 5 and 6 present information on the effect of cultural practices and pesticides on mycorrhizal fungi. Such research is still not sufficiently supported and developed, even though there is a potentially high practical impact of the data obtained in this field.

Chapter 7 displays the aspects of atmosphere-ecosystem relationships and their effects on mycorrhizae.

The role of mycorrhizae (of vesicular arbuscular and ecto— types) in biogeochemical cycles is mentioned in the Chapters 8 and 9. It is difficult to recognize the "checkpoints" in biogeochemical processes, so that our knowledge of the contribution of mycorrhiza in these processes is limited both conceptually and experimentally. External hyphae represent a relatively large carbon sink and mobilize some nutrients in the soil. In particular the stabilization of organic matter in soil, enhanced by mycorrhizal fungi due to their involvement in aggregation processes might be important. It can be stated that mycorrhizal symbiosis has a potential to alter soil chemistry and, consequently, the flux of matter in the biosphere.

There is an increasing interest in mycorrhizal associations (association of mycorrhizal fungus with a host plant) because these are capable, under certain conditions, to increase plant growth and yield significantly. The reasons for this effect are the enhancement of nutrients and water uptake and the increasing tolerance to various stresses. The questions of possible practical use of such beneficial effects through inoculations with mycorrhizal fungi and problems connected with inoculum production are discussed in chapters 10 and 11.

Chapter 12 is dedicated to the biosystematics of arbuscular mycorrhizal fungi, a difficult discipline limited by an unclear species concept in this group. This discipline studies the variability (e.g. morphological and functional) of different taxa and is therefore of practical importance.

Molecular and genetic tools (Chapter 13) are increasingly used to explore the mechanisms involved in the initialization and development of the colonization of a host root by a mycorrhizal fungus. Some mycorrhizal fungi are difficult to cultivate, even in association with a host, so that the use of such enhanced techniques are highly desired in order to obtain basic information on the studied objects.

Plant growth and health in all ecosystems depends on the maintenance of an optimum physical structure, and an optimum biological and chemical equilibrium. Soil is, at present, drastically disturbed by a human activities: cultivation, compaction, removal of organic residues, application of pesticides and fertilizers and changes in water regime. This often results in a decrease in ecosystem productivity and stability. At the same time, agricultural and forestry practices lower the potential for mycorrhizae to be effective due to population reduction, reduced biodiversity or shifts in species composition in soil.

In spite of our insufficient knowledge of the role of mycorrhizae in natural ecosystems and agro-ecosystems, we do however know that they represent the stabilizing factor influencing plant health and increasing plant population diversity. The belief that mycorrhizae greatly influence plant health has been supported by the many examples presented in the book. It may encourage the further research in the field of mycorrhiza biology. The use of the newly developed techniques will produce more important results needed for practical exploitation of mycorrhizae in a much wider range in future.

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