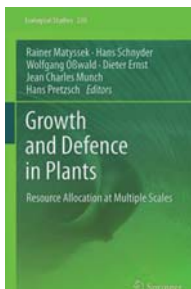


Recenzie – Reviews**MATYSSEK, R., SCHNYDER, H., OSSWALD, W., ERNST, D., MUNCH, J.C., PRETZSCH, H. (editors):
Growth and Defence in Plants. Resource Allocation and Multiple Scales**

Ecological Studies Volume 220, published by Springer-Verlag, Berlin Heidelberg, ISBN 978-642-30645-7, 470 pages.

Issues related to different growth strategies in specific plants including forest trees as well as their ability to cope with unfavorable conditions are gradually becoming very important. The main reason for the high relevancy of this is related to climate change which brings certain extensional risks to

plant communities. Thus, the book “Growth and Defence in Plants: Resource Allocation and Multiple Scales” with its aims and content seems, at first sight, very valid and useful for researchers in a variety of scientific branches.

The book was prepared by a large number of scientists mostly from Germany. The editors of the publication are six excellent scientists, namely: Prof. Rainer Matyssek, Prof. Hans Schnyder, Prof. Wolfgang Osswald, Dr. Dieter Ernst, Prof. Jean Charles Munch, and Prof. Hans Pretzsch. In the introduction the editors write: “Resource manager – this might be the profession of a plant, if one assigns one. The resources to be managed are carbon, nutrient elements, water and energy. Management here means distribution of resources to vital needs and to arrange with (i.e. acclimate to) the environment. Such needs imply to stay operational and competitive, to survive abiotic and biotic stress, to augment biomass and to reproduce.” They indicate some growth and development processes in plants in the context of “growth-differentiation balance hypothesis” (GDB). Even though the GDB has existed for about 60 years, some aspects relating to the hypothesis are still not fully explained and considerable opportunities for further study are apparent. The authors postulated the main aims of the book as follows:

- gather a timely understanding of resource allocation and its regulation in herbaceous and woody plant systems, linking molecular with biochemical and physiological process levels,
- clarify allocation control as an intrinsic component of plant-plant, plant-pathogen and plant-mycorrhizosphere interactions,
- integrate ontogeny and contrasting growth scenarios into spatio-temporal scaling,
- clarify extents of common underlying mechanisms in resources allocation across plant types, ontogeny and growth scenarios,
- evaluate the potential for advances mechanistic and ecophysiological theory development as one result of the integrative analyses and hypotheses testing in relation to GDB.”

The book is composed of three main chapters, specifically: “Mechanisms of Resources Allocation in Plants and Stands”, “Unifying Theory in Resources Allocation?”, and “Outlook”. Each

chapter contains sub-chapters which were written by a variety of authors.

The first chapter contains 13 sub-chapters. The sub-chapter by *D. Ernst et al.*: “Common Links of Molecular Biology with Biochemistry and Physiology in Plants under Ozone and Pathogen Attack” opens issues related to processes in plant bodies evoked by increased levels of ozone and some pathogenic organisms. *W. Osswald et al.* focus on host-parasite interactions and trade-offs between growth- and defence-related metabolism under changing environments. *Kolosova and Bohlmann* show results related to conifer defense against insects and fungal pathogens and *Hampp et al.* focused on the rhizosphere of plants, specifically on molecular interactions between microorganisms and roots. The actual problems on stores as substrate sources of respiration in terms of nitrogen stress and day length were analyzed by *Lehmeier et al.* Novel methodological approaches in tracing carbon fluxes (i.e. complexity in using of isotopes) are explained by *Schnyder et al.* Sub-chapters by *Leuchner et al.* and by *Göttlein et al.* concentrated exclusively on forestry issues. They focus on solar radiation as a driver for growth and competition in forest stands and, in due course, on site conditions and tree-internal partitioning in mature European beech and Norway spruce at the Kranzberger Forst. *Agerer et al.* analyzed factors influencing plant ectomycorrhizosphere with their interest mainly focused on the cost and benefit of symbiotic organisms. The results of case studies from “Kranzberger Forst” on growth and defence in European beech and Norway spruce are given in the sub-chapter written by *Häberle et al.* Also, a further three sub-chapters are focused on forest ecosystems. Specifically *Grams et al.* who explains growth and space use in competitive interactions between juvenile trees. *Pretzsch et al.* constructed allometric relations of tree crown structure. They conducted studies concerning the relevance of space occupation at the individual plant level and for self-thinning at the stand level. A further section produced by *Pretzsch et al.* explains principles of growth partitioning between trees in forest stands under stress conditions.

The second chapter “Unifying Theory in Resource Allocation” consists of an introductory section and five sub-chapters. The introduction describes the most important questions which scientists are facing in the field. Many phenomena are not fully explained and some models work on hypothetical bases. In the first sub-chapter, *Piesack et al.* explain mechanical modeling of soil-plant-atmosphere systems. Statistical modeling based on information about various plant growth strategies and existing scenarios are analyzed by *Castell et al.* Further, *Gayler et al.* deal with modeling the defensive potential of plants. *Rötzer et al.* present simulation results at the individual and stand level related to effects of stress and defence allocation on tree growth. *Matyssek et al.* interests lies in the possibilities of predicting plant resource allocation. They suggest that

some existing theories presented as not relevant or valid are only so under certain conditions. Thus, new theories based on experimental studies could be conceived.

The last chapter “Outlook” was written by Prof. *Matyssek* and highlights the main conclusions of the results and outlooks for future research and also implements the scientific findings. The author points out that better understanding of growth processes and the abilities of plants to defend against harmful agents or unfavorable conditions might help humans to support ecological stability of a variety of ecosystems. He mentions that the “prominent intention of the book was the reconsideration of research strategies towards a mechanistic and ecologically relevant understanding of the plants resource husbandry”. I think that the mission of the publication was fulfilled fully.

The publication is richly illustrated (126 pictures, 29 in color), containing many tables. It is on a very good scientific and graphic level. It is a valuable source of information for plant scientists, ecologists, eco-physiologists, plant pathologists, molecular biologists, agronomists, forest scientists, plant breeders and modelers. The book can also help university lecturers and advanced students. The publication is made in two modifications –soft- and hard-cover. The approximate price of the book is 160 Euros.

Bohdan KONÓPKA^{1,2}

¹*National Forest Centre - Forest Research Institute Zvolen,
T. G. Masaryka 2175/22, SK – 960 92 Zvolen,
e-mail: bkonopka@nlcsk.org*

²*Czech University of Life Sciences Prague, Faculty of Forestry
and Wood Sciences, Kamýcká 129, CZ – 165 21 Praha 6 – Suchbátka*