Caemmerer, S. von: **Biochemical Models of Leaf Photosynthesis.** (Techniques in Plant Science No. 2). - CSIRO Publishing, Collingwood 2000. 165 pp. USD 42.00. ISBN 0-643-06379-X.

Increasing concerns about global climate change have revived research interests in leaf photosynthetic models to predict and assess changes in photosynthetic CO_2 assimilation in changing environments. This book deals with the photosynthetic processes on the leaf level. The models presented here are based on the underlying biochemical processes of photosynthesis and were designed to help in the interpretation of leaf gas-exchange measurements. They can be also used as sub-models for predicting canopy photosynthesis or environmental changes.

The first chapter is devoted to kinetics of fully activated ribulose-1,5-bisphosphate carboxylase/oxygenase (Rubisco), kinetics of Rubisco activation, and derivation of rate equations for activated enzyme and for enzyme activation. The C_3 photosynthesis models are discussed in the second chapter. These are mostly based on the model firstly described by Farquhar *et al.* (1980). The chapter deals with stoichiometry of C_3 photosynthesis, rate equations for CO_2 assimilation, CO_2 partial pressure in the chloroplasts, CO_2 response curves, light response curves, temperature responses, and long-term effect of environment on photosynthesis. The chapter also contains examples of applications of the models to the analysis of transgenic plants with altered photosynthetic properties. While the first two chapters covers CO_2 fixation during C_3 photosynthesis, in the third one the chlorophyll fluorescence and O_2 exchange characteristics are considered. The combined measurements of CO_2-exchange and chlorophyll fluorescence have added new insights into the relationship between the chloroplast electron transport rate and carbon metabolism and this chapter focuses on these applications. The production of danger reactive oxygen species by Mehler reaction is also mentioned. C_4 photosynthesis requires the coordinated functioning of mesophyll and bundle-sheath cells and is characterized by a CO_2 concentrating mechanism. The complexity inherent in the two compartments of the C_4 photosynthetic mechanism is necessarily reflected in the complexity of accurate C_4 models. The biochemical model presented in the fourth chapter in based on models of Berry and Farquhar (1978), Peisker (1979), and Caemmerer and Furbank (1999). The last chapter is focused on C_3-C_4 intermediate photosynthesis and the model presented in this chapter is a synthesis of the earlier models of Peisker (1985, 1986) and Caemmerer (1989, 1992).

The book is a comprehensive presentation of the most widely used photosynthetic models. The author is a world authority in this field which is reflected on high scientific level of the book. In addition, the challenging topic is presented in understandable form due to a readable text accompanied by numerous figures. The book can be warmly recommended to researchers and advanced students in the field.

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