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Titolo	Plant Biomechanics : From Structure to Function at Multiple Scales / / edited by Anja Geitmann, Joseph Gril
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ISBN	3-319-79099-4
Edizione	[1st ed. 2018.]
Descrizione fisica	1 online resource (IX, 441 p. 140 illus., 115 illus. in color.)
Disciplina	572.572
Soggetti	Botanical chemistry Plant anatomy Plants - Development Forest products Plant physiology Biophysics Plant Biochemistry Plant Anatomy/Development Wood Science & Technology Plant Physiology Biological and Medical Physics, Biophysics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Organ and Tissue Mechanics -- Wood cell wall structure and organization in relation to mechanics -- Modelling, evaluation and biomechanical consequences of growth stress profiles inside tree stems -- Bending stress in plant stems: Models and assumptions -- Tree mechanics and wind loading -- Growth, Morphogenesis & Motion -- The mechanics of leaf growth on large scales -- Twisting growth in plant roots -- Plants at bodybuilding: development of plant "muscles" -- Modeling plant morphogenesis: An introduction -- Mechanical conflicts in growth heterogeneity -- Folding, wrinkling and buckling in plant cell walls -- Structural principles in the design of hygroscopically moving plant cells -- Using modeling to understand the hygromechanical and hysteretic behavior of the S2 cell wall layer of

wood -- Molecular Underpinnings of Cell Wall Mechanics -- Calcium-pectin chemistry and biomechanics: Biological background and mathematical modelling -- Cell wall expansion as viewed by the creep method -- Tensile testing of primary plant cells and tissues.+- Water Transport, Mechanosensing & Biomimetics -- Water motion and sugar translocation in leaves -- Molecular mechanisms of mechanosensing and mechanotransduction -- Biomechanics and functional morphology of plants – inspiration for biomimetic materials and structures.

Sommario/riassunto

This book provides important insights into the operating principles of plants by highlighting the relationship between structure and function. It describes the quantitative determination of structural and mechanical parameters, such as the material properties of a tissue, in correlation with specific features, such as the ability of the tissue to conduct water or withstand bending forces, which will allow advanced analysis in plant biomechanics. This knowledge enables researchers to understand the developmental changes that occur in plant organs over their life span and under the influence of environmental factors. The authors provide an overview of the state of the art of plant structure and function and how they relate to the mechanical behavior of the organism, such as the ability of plants to grow against the gravity vector or to withstand the forces of wind. They also show the sophisticated strategies employed by plants to effect organ movement and morphogenesis in the absence of muscles or cellular migration. As such, this book not only appeals to scientists currently working in plant sciences and biophysics, but also inspires future generations to pursue their own research in this area.