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Nota di contenuto	Contents; Preface; Part I: Background; 1 What is a Crop Model?; Sugarcane Growth Model; Terms Used to Describe Models; Variables in Models; Classification of Mathematical Models; Models Are Not Reality!; Exercise; 2 Fundamental Guides in Constructing Crop Models; Definition of Objectives; Itemize Critical Assumptions; Quantitative Description of Hypotheses; Programming; Estimating Parameters; Model Evaluation; Exercise; 3 Evaluation of Model to Meet Objectives; Transparency; Robustness; Direct Evaluation of Robustness; Exercise; 4 Applications of Crop Models; Research Applications Crop Management ApplicationsEducational Applications; Exercise; 5 Status of Crop Modeling; Infancy; Juvenility; Adolescence; Maturity; The Future of Crop Modeling; Exercise; Part II: Potential Production Models; 6 Phenology - Temperature; Background; Basics; Parameter Estimation; Programming; Additional Notes; Exercises; 7 Phenology - Temperature and Photoperiod; Background; Basics; Photoperiod Function; Parameter Estimation; Programming; Exercises; 8 Phenology - Vernalization; Vernalization Model; Parameter Estimation; Programming; Exercises; 9 Crop Leaf Area; Background; Leaf Area Submodel

Crop LAIParameter Estimation; Programming; Additional Notes; Exercises; 10 Dry Matter Production; Background; Functions; Parameter Estimation; Programming; Exercises; 11 Dry Matter Distribution and Yield Formation; Background; Model; Parameter Estimation; Programming; Additional Notes; Exercises; 12 A Model for Potential Production; Model Structure; Structure of Excel File Containing the Model; Estimating Daily Solar Radiation; Sample Runs of the Model; Exercises; Part III: Water-limited Models; 13 Soil Water; Soil as a Reservoir for Water; Measuring Soil Water Limits
Estimating Soil Water LimitsSoil Water Limits from Databases; Exercises; 14 Soil Water Balance; Soil Water Balance Concept; Water Inputs; Water Removals; Required Parameters and Inputs; Programming; Additional Notes; Exercises; 15 Plant Responses to Soil Water Deficit and Excess; Defining Crop Stress Level; Dry-down Experiments; Modeling Effects of Water Deficit; Flooding Effects; Crop Termination Due to Water-deficit Stress; Exercise; 16 A Model for Water-limited Conditions; Model Structure; Structure of Excel File Containing the Model; Sample Runs of the Model; Exercises
Part IV: Nitrogen-limited Models17 Plant Nitrogen Budget; N and Crop Production; Background and Basics of Plant N Budget; Plant N Budget During Vegetative Growth; Plant N Budget During Seed Growth; Plant N Budget in Legumes; Parameterization; Programming; Exercises; 18 Soil Nitrogen Balance; Soil N Balance; Available N in Soil Solution; N Inputs; N Losses; Required Inputs; Programming; Exercises; 19 A Model for Nitrogen-limited Conditions; Model Structure; Structure of Excel File Containing the Model; Sample Runs of the Model; Exercises; Appendices
Appendix I: A Practical Guide for Model Troubleshooting

Sommario/riassunto

Model studies focus experimental investigations to improve our understanding and performance of systems. Concentrating on crop modelling, this book provides an introduction to the concepts of crop development, growth, and yield, with step-by-step outlines to each topic, suggested exercises and simple equations. A valuable text for students and researchers of crop development alike, this book is written in five parts that allow the reader to develop a solid foundation and coverage of production models including water- and nitrogen-limited systems.