

Contents

Contributors	vii
Preface	xi
Overview	xiii
I Methods	1
1 The two forms of crop models	3
<i>D. Wallach</i>	
2 Evaluating crop models	11
<i>D. Wallach</i>	
3 Uncertainty and sensitivity analysis for crop models	55
<i>H. Monod, C. Naud and D. Makowski</i>	
4 Parameter estimation for crop models	101
<i>D. Makowski, J. Hillier, D. Wallach, B. Andrieu and M.-H. Jeuffroy</i>	
5 Data assimilation with crop models	151
<i>D. Makowski, M. Guérif, J.W. Jones and W. Graham</i>	
6 Representing and optimizing management decisions with crop models	173
<i>J.E. Bergez, F. Garcia and D. Wallach</i>	
7 Using crop models for multiple fields	209
<i>D. Leenhardt, D. Wallach, I. Le Moigne, M. Guérif, A. Bruand and M.A. Casterad</i>	
II Applications	249
8 Introduction to Section II	251
<i>J.W. Jones, D. Makowski and D. Wallach</i>	
9 Fundamental concepts of crop models illustrated by a comparative approach	257
<i>N. Brisson, J. Wery and K. Boote</i>	
10 Crop models with genotype Parameters	281
<i>M.-H. Jeuffroy, A. Barbottin, J.W. Jones and J. Lecoer</i>	
11 Model-assisted genetic improvement of crops	309
<i>C.D. Messina, K.J. Boote, C. Löffler, J.W. Jones and C.E. Vallejos</i>	
12 Parameterization and evaluation of a corn crop model	337
<i>D. Wallach</i>	
13 Evaluation of a model for kiwifruit	349
<i>F. Lescourret and D. Wallach</i>	

14	Sensitivity and uncertainty analysis of a static denitrification model <i>B. Gabrielle</i>	359
15	Sensitivity analysis of PASTIS, a model of nitrogen transport and transformation in the soil <i>E. Garnier</i>	367
16	Sensitivity analysis of GENESYS, a model for studying the effect of cropping Systems on gene flow <i>N. Colbach and N. Molinari</i>	377
17	Data assimilation and Parameter estimation for precision agriculture using the crop model STICS <i>M. Guérif, V. Houlès, D. Makowski and C. Lauvernet</i>	391
18	Application of Extended and Ensemble Kalman Filters to soil carbon estimation <i>J.W. Jones and W.D. Graham</i>	399
19	Analyzing and improving corn irrigation strategies with MODERATO, a combination of a corn crop model and a decision model <i>J.-E. Bergez, J.-M. Deumier and B. Lacroix</i>	409
20	Managing wheat for ethanol production: a multiple criteria approach <i>C. Loyce, J.P. Rellier and J.M. Meynard</i>	419
	Appendix. Statistical notions	429
	Answers to Exercises	437
	Index	441