

## Managing Agricultural Greenhouse Gases, 1st Edition

Foreword (Steve Shafer, Michael Jawson)

Preface (Ron Follett, Alan Franzluebbers, Mark Liebig)

Acknowledgments

Contributors

Executive Summary (Mark Liebig, Alan Franzluebbers, Ron Follett)

### Section One: Agricultural Research for a Carbon-Constrained World

1. Agriculture and climate change: Mitigation opportunities and adaptation imperatives (Mark A. Liebig, Alan J. Franzluebbers, and Ron F. Follett)
2. GRACEnet: Addressing policy needs through coordinated cross-location research (Charles L. Walthall, Steven R. Shafer, and Michael D. Jawson)

### Section Two: Agricultural Management and Soil Carbon Dynamics

3. Cropland management in the eastern United States for improved soil organic C sequestration (Curtis J. Dell and Jeffrey M. Novak)
4. Soil carbon sequestration in central USA agroecosystems (Cynthia A. Cambardella, Jane M. F. Johnson, and Gary E. Varvel)
5. Agricultural management and soil carbon dynamics: Western U.S. croplands (Harold P. Collins, Maysoun M. Mikha, Tabitha T. Brown, Jeffrey L. Smith, David Huggins, and Upendra M. Sainju)
6. Soil carbon dynamics and rangeland management (Justin D. Derner and Virginia L. Jin)
7. Soil organic carbon under pasture management (Alan J. Franzluebbers, Lloyd B. Owens, Gilbert C. Sigua, Cynthia A. Cambardella, and Richard L. Haney)
8. Sustainable bioenergy feedstock production systems: Integrating C dynamics, erosion, water quality and greenhouse gas production (Jane M. F. Johnson and Jeffrey M. Novak)

### Section Three: Agricultural Management and Greenhouse Gas Flux

9. Cropland management contributions to GHG flux: Central and eastern U.S. (Michel A. Cavigelli and Timothy B. Parkin)
10. Management to reduce greenhouse gas emissions in western U.S. croplands (Ardell D. Halvorson, Kerri L. Steenwerth, Emma C. Suddick, Mark A. Liebig, Jeffery L. Smith, Kevin F. Bronson, and Harold P. Collins)
11. Greenhouse gas flux from managed grasslands in the U.S. (Mark A. Liebig, Xuejun Dong, Jean E.T. McLain, and Curtis J. Dell)
12. Mitigation opportunities for life cycle greenhouse gas emissions during feedstock production across heterogeneous landscapes (Paul R. Adler, Stephen J. Del Grosso, Daniel Inman, Robin E. Jenkins, Sabrina Spatari, and Yimin Zhang)
13. Greenhouse gas fluxes of drained organic and flooded mineral agricultural soils in the United States (Leon Hartwell Allen, Jr.)

### Section Four: Model Simulations for Estimating Soil Carbon Dynamics and Greenhouse Gas Flux from Agricultural Production Systems

14. DayCent model simulations for estimating soil carbon dynamics and greenhouse gas fluxes from agricultural production systems (Stephen J. Del Grosso, William J. Parton, Paul R. Adler, Sarah C. Davis, Cindy Keough, and Ernest Marx)
15. COMET2.0 – Decision support system for agricultural greenhouse gas accounting (Keith Paustian, Jill Schuler, Kendrick Killian, Adam Chambers, Steven DelGrosso, Mark Easter, Jorge Alvaro-Fuentes, Ram

- Gurung, Greg Johnson, Miles Merwin, Stephen Ogle, Carolyn Olson, Amy Swan, Steve Williams, and Roel Vining)
16. CQESTR simulations of soil organic carbon dynamics (H.T. Gollany, R. F. Follett, and Y. Liang)
  17. Development and application of the EPIC model for carbon cycle, greenhouse-gas mitigation, and biofuel studies (R.C. Izaurralde, W.B. McGill, and J.R. Williams)
  18. The general ensemble biogeochemical modeling system (GEMS) and its applications to agricultural systems in the United States (Shuguang Liu, Zhengxi Tan, Mingshi Chen, Jinxun Liu, Anne Wein, Zhengpeng Li, Shengli Huang, Jennifer Oeding, Claudia Young, Shashi B. Verma, Andrew E. Suyker, Stephen Faulkner, and Gregory W. McCarty)

#### **Section Five: Measurements and Monitoring: Improving Estimates of Soil Carbon Dynamics and Greenhouse Gas Flux**

19. Quantifying biases in non-steady state chamber measurements of soil-atmosphere gas exchange (Rodney T. Venterea and Timothy B. Parkin)
20. Advances in spectroscopic methods for quantifying soil carbon (James B Reeves, III, Gregory W. McCarty, Francisco Calderon, and W. Dean Hively)
21. Micrometeorological methods for assessing greenhouse gas flux (R. Howard Skinner and Claudia Wagner-Riddle)
22. Remote sensing of soil carbon and greenhouse gas dynamics across agricultural landscapes (C.S.T. Daughtry, E.R. Hunt Jr., P.C. Beeson, S. Milak, M.W. Lang, G. Serbin, J.G. Alfieri, G.W. McCarty, and A.M. Sadeghi)

#### **Section Six: Economic and Policy Considerations Associated with Reducing Net Greenhouse Gas Emissions from Agriculture**

23. Economic outcomes of greenhouse gas mitigation options (David W. Archer and Lyubov A. Kurkalova)
24. Agricultural greenhouse gas trading markets in North America (D.C. Reicosky, T. Goddard, D. Enerson, A.S.K. Chan, and M.A. Liebig)
25. Eligibility criteria affecting landowner participation in greenhouse gas programs (Robert Johansson, Greg Latta, Eric White, Jan Lewandrowski, and Ralph Alig)

#### **Section Seven: Looking Ahead: Opportunities for Future Research and Collaboration**

26. Potential GRACEnet linkages with other greenhouse gas and soil carbon research and monitoring programs (John M. Baker and Ronald F. Follett)
27. Elevated CO<sub>2</sub> and warming effects on soil carbon sequestration and greenhouse gas exchange in agroecosystems: A review (Feike A. Dijkstra and Jack A. Morgan)
28. Mitigation opportunities from land management practices in a warming world: Increasing potential sinks (J.L. Hatfield, T.B. Parkin, T.J. Sauer, and J.H. Prueger)
29. Beyond mitigation: Adaptation of agricultural strategies to overcome projected climate change (Ronald F. Follett)

#### **Index**