

Precision Farming BASICS

A Comprehensive Updated Textbook for Teaching and Extension Efforts

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Introduction

Across the United States:

- 1) precision agricultural technologies are being rapidly adopted by farmers;
- 2) producers are increasing their reliance on information age technologies and agricultural industries are making strategic investments to take advantage of new economic opportunities; and
- 3) many farmers are purchasing precision technologies but are challenged with full implementation.

Introduction

Today precision agricultural technologies are:

- limited by the lack of a workforce
- technology literate, creative, innovative, fully trained in their discipline,
- able to utilize and interpret information gained from information-age technologies to make smart management decisions,
- and have the capacity to convert locally collected information into practical solutions.

Introduction

The goal of this textbook is to equip those in or entering the workforce with the knowledge needed to make practical and knowledgeable decisions regarding the use and adoption of precision farming technologies.

Background

As part of a grant entitled Precision Farming Workforce Development: Standards, Working Groups, and Experimental Learning Curricula funded through a USDA Higher Education Challenge Grants Program was to develop a Precision Farming Basics Manual.

David Clay

Project Director

South Dakota State University

Clay et al., 2014

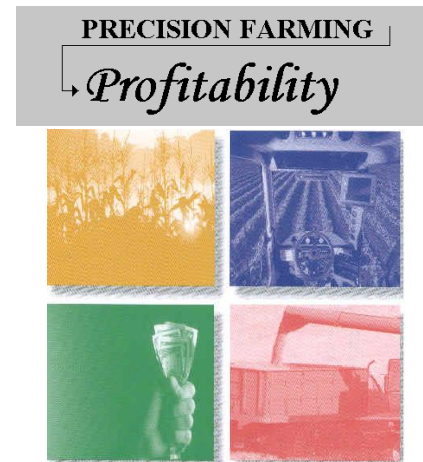
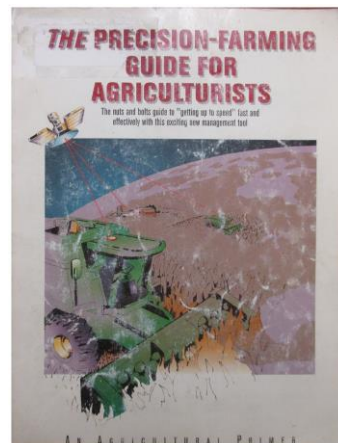
Background

The textbook will be suitable for supplementing both traditional and distance classes.

Background

The textbook's contents were based on two dated texts:

- The Precision-Farming Guide for Agriculturalists – published through John Deere
- Precision Farming Profitability - Purdue University



Background

Additionally the textbook's contents were based on:

- Site-Specific Management Guidelines - each Guideline addresses a specific issue related to site-specific soil and crop management. Currently there are 45 titles in the series, which can be accessed from the list below. Started in 1999, last guideline published in 2008. These are still available through IPNI.



Background

Additionally the textbook's contents were based on:

- Outline from initial eXtension planning meeting to coordinate a Precision Ag Community of Practice held in 2008 coordinated by John Nowtaski, North Dakota State University.



A Part of the Cooperative Extension System

Content of the Textbook

Each of the 15 chapters of the textbook will contain:

- 1) learning objectives;
- 2) a descriptions of a real-world problem that the technology is designed to reduce;
- 3) a discussion of the technology,
- 4) student problems using the technology; and
- 5) experiential and team activities.

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- **Chapter 1 – Precision Ag Basics** – Kent Shannon – University of Missouri, Ken Sudduth – USDA-ARS University of Missouri, and David Clay – South Dakota State University
- **Chapter 2 - Understanding and Identifying Variability** – Sharon Clay – South Dakota State University and Newell Kitchen – USDA-ARS University of Missouri
- **Chapter 3 - Positioning Systems – GPS / GNSS** - Tim Stombaugh – University of Kentucky
- **Chapter 4 – GIS** – Tom Mueller – John Deere

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- **Chapter 5 – Yield Monitoring and Mapping** – Wesley Porter – University of Georgia (Randy Taylor – Oklahoma State University)
- **Chapter 6 – Soil Variability Measurement and Management** – Dave Franzen – North Dakota State University
- **Chapter 7 – Pest Measurement and Management** – Sharon Clay - South Dakota State University with Wade French, USDA-ARS, and Fabina Mathew, South Dakota State University
- **Chapter 8 – Remote Sensing** – Richard Ferguson, University of Nebraska

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- **Chapter 9 – Soil and Crop Sensing** – Slava Adamchuk – McGill University
- **Chapter 10 – Electronics and Control Systems** – Aaron Franzen, Lead with Dan Humburg - South Dakota State University
- **Chapter 11 - Variable Rate Application** - Ajay Sharda – Kansas State University with Joe Luck, University of Nebraska
- **Chapter 12 – Precision Ag Data Management** – John Fulton – Ohio State University

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- **Chapter 13 – On-Farm Trials** – Peter Kyveryga – OnFarm Network – Iowa Soybean Association
- **Chapter 14 - Environmental Implications of Precision Agriculture** – Joy Abit, Oklahoma State University; IPNI, Steve Phillips, co- author
- **Chapter 15 – Economics of Precision Ag** – Terry Griffin – Kansas State University

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Additional Chapters / Appendix

- **Appendix A (Chapter 16) – Glossary of Precision Agriculture Terms** – Kent Shannon
- **Appendix B (Chapter 17) – Videos / Multimedia of Precision Ag Technologies** – Brian Arnall – Oklahoma State University, Newell Kitchen – USDA-ARS, and Karina Kitchen, University of Missouri

Example Video produced
by Karina Kitchen, University of Missouri



Summary

- Delivery of the textbook will be made available through the American Society of Agronomy (ASA) on-line digital library.
- The expected completion date of the textbook is by the end of 2016 or sooner.
- Currently, 5 chapters have been submitted for review.

Summary

- After textbook is completed, it will be tested in precision ag curriculums being taught at the University of Nebraska, Oklahoma State University, and Colorado State University.
- Pre and post assessments will be made to identify strengths and weaknesses of the new curricula.
- This will be compared to a control group at the University of Missouri and South Dakota State University.

Precision Farming BASICS

- a new precision agriculture textbook for use in undergraduate and extension education.
- each of the 15 chapters will include: learning objectives, descriptions of real-world examples, discussion of the technology, student problems, video examples.
- book will primarily be available online as an e-book published by the American Society of Agronomy.
- part of a project funded through USDA entitled “Precision Farming Workforce Development: Standards, Working Groups, and Experimental Curricula.”

David Clay

Project Director

South Dakota State University

Kent Shannon

Textbook Coordinator / Editor

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