Preface

Horticulture Today was created as a comprehensive, modern, and visually engaging introduction to the study of horticulture. The authors wrote *Horticulture Today* to provide learners with a broad range of horticultural knowledge while also raising awareness of careers and workplace skills essential for success in today's green industry. To support these goals, the authors have included SAE for ALL inspirational profiles, along with supplemental activities, including interactive sidebars, Historical and STEM Connections, and Career Connections throughout the text.

The organization and content coverage of *Horticulture Today* were developed with valuable insights from a panel of expert reviewers, prioritizing the National Agriculture, Food, and Natural Resources Standards. The textbook content also aligns with various state standards and is correlated to the Horticulture-Landscaping credential offered by NOCTI and the Plant and Soil Science 1 and 2 YouScience® Industry Certifications. *Horticulture Today* is presented in thirty-four chapters and seven sections to help readers develop a fundamental understanding of plant science and build on that knowledge with subsequent topics.

Chapters one and two introduce students to the horticulture industry and business management. Chapter three focuses on worker and tool safety, which is emphasized with safety notes throughout the text.

The second group of chapters focuses on horticultural biology. Chapter four is dedicated to taxonomy, while chapters five through seven cover fundamental biology along with plant growth and development. Readers will gain an understanding of basic plant biology as well as how environmental factors can be used to influence plant growth. Chapters eight and nine discuss plant nutrition, soils, and media. This highly illustrated section provides detailed coverage of deficiencies, sustainable practices, building soil health, and stewardship. The third group of chapters is dedicated to plant propagation—ranging from traditional to modern micropropagation techniques.

The fourth group covers a wide range of horticultural practices, from greenhouse operations to field cultivation of fruits, vegetables, and ornamental plants. Readers will learn about practices ranging from traditional methods to modern practices such as hydroponics. The fifth section focuses on design practices in the landscaping, floriculture, and turfgrass industries. It offers hands-on, step-by-step instructions, installation procedures, and management practices. The sixth section provides detailed coverage of integrated pest management (IPM), including chapters on insects, diseases, weeds, and pesticide safety and management.

The final chapters focus on developing leadership, communication, and business skills useful for both school and work. Chapters thirty-one and thirty-two focus on how FFA and SAE for ALL support fundamentals in leadership skills and experiential learning. Chapter thirty-four aims to help students enhance communication and critical thinking skills necessary to compete in today's green industry.

We hope you enjoy our presentation on horticulture for our modern society and continue to learn and grow as you pursue a career in the horticulture industry or hone your skills as a home gardener.

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About the Authors



Jodi Songer Driedger

Jodi Songer Driedger

Ms. Driedger has 25 years of teaching experience in agricultural education. She has developed and created curricula for courses in horticulture, sustainable agriculture, forestry, and environmental and natural resources at both the high school and collegiate levels. Ms. Driedger holds a bachelor's degree in horticulture science from Michigan State University and a master's in agricultural education from North Carolina State University. Ms. Driedger has advised many student teachers and observed and learned what young teachers, especially those with limited horticultural knowledge, need to instruct agricultural education courses. Ms. Driedger employs hands-on learning while teaching students in the horticultural sciences department at North Carolina State University, where she is the Director of Undergraduate Programs. With Ms. Driedger's instruction, students have designed and installed award-winning gardens at the state fair and maintained ornamental and edible landscapes in the horticulture field lab at the NCSU Horticultural Field Lab. While in the high school classroom for 20 years, she was a National Board Certified Teacher and a National FFA Teacher Ambassador Mentor.



Elizabeth Driscoll

Elizabeth Driscoll

Ms. Driscoll is a 4-H Subject-Matter Specialist across the departments of Crop and Soil Sciences, Entomology and Plant Pathology, and Horticultural Science and Soil at North Carolina State University with the North Carolina Cooperative Extension. She has spent over 18 years connecting youth and educators to issues in agriculture and natural resources in meaningful ways. Ms. Driscoll's 4-H Grow For It program focuses on creating resources and hands-on projects that encourage curiosity, inspire critical thinking and problem solving, foster a positive science self-image, connect kids to good food, and nurture environmental stewards of the land through gardening and agriculture.

With a bachelor's and master's degree in horticultural science from Michigan State University, she actively translates agricultural research from land-grant universities into practical, inquiry-based curricular resources to support county-based 4-H youth programs. Serving over 350 cooperative extension county field faculty in agriculture, horticulture, 4-H, and family and consumer sciences, Ms. Driscoll employs a strong train-the-trainer approach to engage audiences in their own innovative delivery of agricultural programs for youth. She leads multiple pre-college youth programs, including the Horticultural Science Summer Institute and the Resource Conservation Workshop. Additionally, Ms. Driscoll collaborates with colleagues in the North Carolina Cooperative Extension and numerous local partners to connect children with healthy food in schools through school gardens, garden-enhanced food and nutrition education, and access to local food through farm-to-cafeteria projects.

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New to This Edition

Goodheart-Willcox understands the importance of the three-circle model of instruction used in Agriculture Education, and we know the value of Supervised Agricultural Experiences (SAEs)! During the revision of this title, the authors interviewed industry professionals for new SAE for ALL Inspiration features at the beginning of every chapter, providing students with SAE ideas and a glimpse into their exciting potential future in the horticulture industry! With this feature, we highlight current and former students of agriculture education, as well as industry icons!

In addition to the new SAE for ALL Inspiration features and the exciting new design, the third edition of *Horticulture Today* includes a new chapter on hydroponics and new and updated Career Connections with salaries and job outlooks for the next decade. The authors have also included new hands-on activities that promote teamwork and leadership skills, as well as activities on harvest and storage issues for keeping produce fresh.

The new edition of *Horticulture Today* features new and revised end-of-chapter questions and activities, including Analyze and Apply, Critical Thinking, and STEM and Academic Activities. New SAE for ALL Opportunities provide creative ideas for all types of SAE projects and a quick check-in for SAE progress.

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Reviewers

The author and publisher would like to thank the following industry and teaching professionals for their valuable input in the development of *Horticulture Today*.

Julie Anderson
Liberty High School
Frisco, TX

Crystal Aukema
Oxford Academy and Central School
Oxford, NY

Cody Beus
Palmer High School
Palmer, AK

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Naaman Forest High School
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Jamie Propson
Mishicot High School
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Melissa Riley
Georgia Agriculture Education
Fort Valley, GA

Camber Starling
Heritage High School
Wake Forest, NC

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Acknowledgments

The author and publisher would like to thank the following companies, organizations, and individuals for their contributions of resource material, images, or other support in the development of *Horticulture Today*. In addition, the authors would like to thank their family and friends for their support in this endeavor, as well as their colleagues and key industry contributors for their valuable input in the development of *Horticulture Today*.

Agricultural Research Service, Bugwood.org
Alan Erwin, Panther Creek Nursery
Alberto Pantoja, USDA ARS, Bugwood.org
Alisha Ray, NCSU Greenhouse Operations Manager
Allison Jennings, Regional Agricultural Education Coordinator
Amanda Thomsen, Kiss My Aster, Horticultural Marketing
A.M. Leonard Horticultural Tool and Supply Co.
Dr. Andrea Weeks, George Mason University
Baker Creek Heirloom Seeds, www.rareseeds.com
Dr. Barbara Fair, North Carolina State University
Benny Mazur, US Forest Service
Bert Cregg, Michigan State University
Dr. Brian Schulker, Global Business Development Manager for Growing Media
Cary Rivard, Kansas State University
Charles Collins, Hydroponics and Aquaponics Grower and Educator
Christopher D. Hart
Clemson University—USDA Cooperative Extension, Bugwood.org
Cody Schueneman, Metrolina Greenhouses, Director of Growing
David Bradley, Nash Produce Director of Business Development and Operations
Debbie Hamrick
Diana Whitt, Plantworks Nursery Production and Materials Manager
Doug Muller, Hudson Valley Seed Company
Forest Pathology, USDA FS, Bugwood.org/Rocky Mountain Research Station
Gary K. England, University of Florida, IFAS Extension
Gavin Sulewski, International Plant Nutrition Institute
Graham Goodenough, Seederman Seeders
Hannah Ross Clarke, Wylde Floral Design
H.J. Larsen, Bugwood.org
Home and Garden Information Center, University of Maryland Extension
Dr. Hsuan Chen, NCSU Department of Horticulture
Jarred Driscoll, North Carolina Department of Agriculture and Consumer Services
Jazmin Albarran, Seed Your Future, Executive Director
Dr. Jordan Booth, Senior Director, Course Consulting Service, US Golf Association
Joseph O'Brien, USDA Forest Service, Bugwood.org
J. Prabhakaran, International Plant Nutrition Institute
Kyle Mayberry, Biltmore Estate, Director of Agriculture and Natural Resources
Lauren Jolly Photography
Lisa White
Marko Penning, Penning Freesia B.V.
Mark Weathington, J.C. Raulston Arboretum
Mary Ann Hansen, Virginia Polytechnic Institute and State University, Bugwood.org
Mary Beth Miller, Carolina Farm Stewardship Association
Mary Burrows, Montana State University, Bugwood.org
Dr. Matt Bertone, NCSU Director of the Plant and Disease Insect Clinic
Dr. Matthew Vann, North Carolina State University
Dr. Melinda Knuth, North Carolina State University
Michael L. Parker, North Carolina State University
Michelle and Java Bradley, Java's Composting
National FFA Organization
New York State IPM Program at Cornell University
Nicole Youngblood, Extension Agent
North Carolina Department of Agriculture and Consumer Services
Nursery, Inc. Apex, North Carolina
Olivier Pichard
Pam Winegar
Paul Driedger, Ecogreen Landscaping
Paul Young, Agricultural Education, National FFA Teacher Ambassador
Pennsylvania Department of Conservation and Natural Resources–Forestry, Bugwood.org
Randy Beaudry, Michigan State University
Randy Cyr, Greentree, Bugwood.org
Dr. Ricardo Hernandez, NCSU Controlled Environment Agriculture
Riverbend Nursery
Robin Hawley, Sokol Blosser Winery
Rocky Mountain Research Station/Forest Pathology, USDA Forest Service, Bugwood.org

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Roger Hanagriff, The AET Record Book
Rosemarie Robson, Robson's Farm LLC
Savannah Toal, Plant Savvy Interiorscaping
Sean Stokes, Design and Build Division Manager for GreenView Partners
Dr. Sharon Williamson, NSCU Research Specialist and Laboratory Manager
Shep Eubanks, University of Florida, IFAS Extension
S. Moroni, International Plant Nutrition Institute
Solexx and the Greenhouse Catalog
Spectrum Products, Inc.
Dr. Suzanne O'Connell, University of Georgia
Dr. Terri Long, NCSU Department Head of Plant and Microbial Biology
Tony Avent, Plant Delights
T. Yamada, International Plant Nutrition Institute
UC Fruit Report
University of Arkansas Forest Entomology Lab, University of Arkansas, Bugwood.org
University of Delaware, Carvel
University of Georgia Plant Pathology, Bugwood.org
University of South Florida Herbarium
V. Arunachalam, International Plant Nutrition Institute
Walt Webb, Farm Manager, Lewis Farms
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Whitney Cranshaw, Bugwood.org
William Jacobi, Colorado State University, Bugwood.org
William M. Brown Jr., Bugwood.org
Worth Williams, Phyllatech, Inc., Worthington Farms
YardGreen, Inc.
Yuan-Min Shen, Taichung District Agricultural Research and Extension Station, Bugwood.org

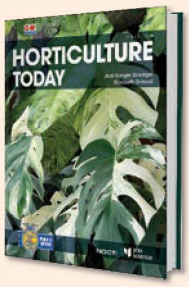
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TOOLS FOR STUDENT AND INSTRUCTOR SUCCESS

Student Tools

Student Text

The *Horticulture Today* textbook provides an exciting, full-color, and highly illustrated learning resource. The textbook is available in a print or online version.



Lab Workbook

The Lab Workbook that accompanies *Horticulture Today* provides hands-on practice with questions and lab activities. Each Lab Workbook chapter corresponds to the text chapters and reinforces key concepts and applied knowledge.

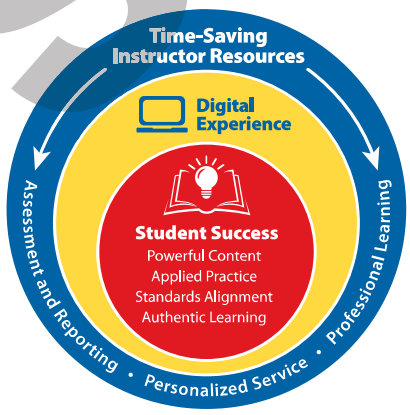
G-W Digital Companion

- E-flash cards and vocabulary exercises allow interaction with content to create opportunities to increase achievement
- Labeling activities offer students opportunities to practice vocabulary
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EduHub LMS-Ready Content

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Guided Tour

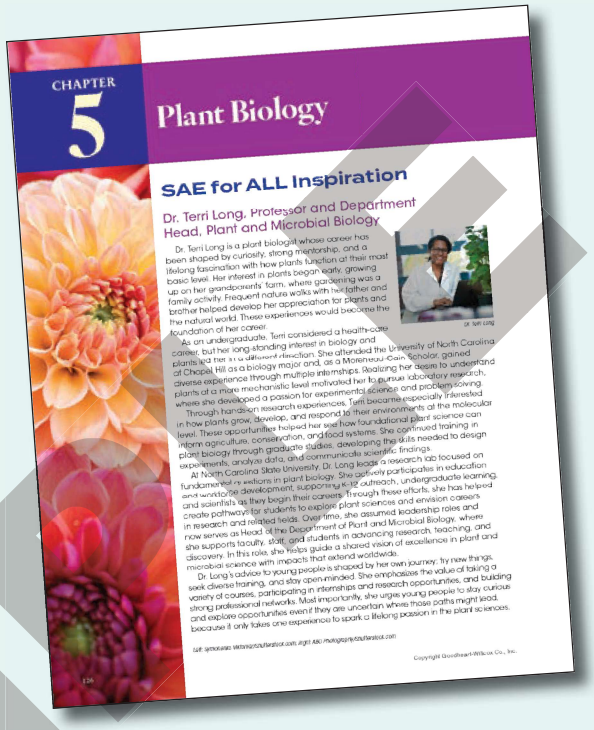
The instructional design features student-focused learning tools to help students succeed. This visual guide highlights the features designed for the textbook.

SAE for ALL Inspiration features open every chapter and provide students with relevant examples and insight into where their SAEs can take them!

Essential Questions provoke deep thought, lively discussion, and new understanding.

Before You Read literacy integration activities at the beginning of each lesson encourage the development of confidence and skill in literacy and learning.

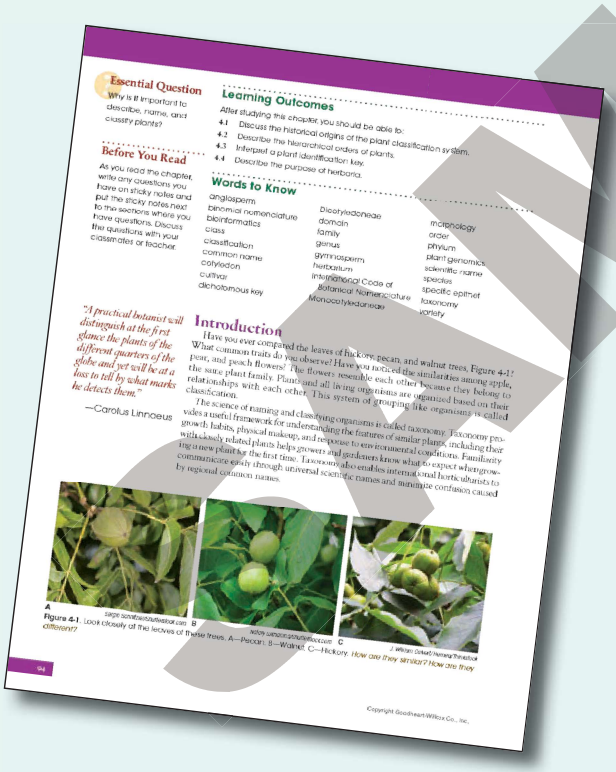
Learning Outcomes clearly identify the knowledge and skills to be obtained when the chapter is completed. These outcomes are labeled and correlated to related assessment elements to facilitate reporting and remediation.


CHAPTER 5

Plant Biology

SAE for ALL Inspiration

Dr. Terri Long, Professor and Department Head, Plant and Microbial Biology


Essential Question

Why is it important to describe, name, and classify plants?

Before You Read

As you read the chapter, write any questions you have on sticky notes and put the sticky notes next to the sections where you have questions. Discuss the questions with your classmates or teacher.

Learning Outcomes

After studying this chapter, you should be able to:

4-1 Discuss the historical origins of the plant classification system.

4-2 Describe the hierarchical orders of plants.

4-3 Interpret a plant identification key.

4-4 Describe the purpose of herbaria.

Words to Know

angiosperm, binomial nomenclature, bioinformatics, class, classification, common name, cotyledon, cultivar, dichotomous key, Dicotyledoneae, domain, family, genus, gymnosperm, herbarium, International Code of Botanical Nomenclature, Monocotyledoneae, morphology, order, phylum, plant genomics, scientific name, species, specific epithet, taxonomy, variety

"A practical botanist will distinguish at the first glance the plants of the different quarters of the globe and yet will be at a loss to tell by what marks he detects them."

—Carolus Linnaeus

Introduction

Have you ever compared the leaves of hickory, pecan, and walnut trees, Figure 4-1? What common traits do you observe? Have you noticed the similarities among apple, pear, and peach flowers? The flowers resemble each other because they belong to the same plant family. Plants and all living organisms are organized based on their relationships with each other. This system of grouping like organisms is called classification.

The science of naming and classifying organisms is called taxonomy. Taxonomy provides a useful framework for understanding the features of similar plants, including their growth habits, physical makeup, and response to environmental conditions. Familiarity with closely related plants helps growers and gardeners know what to expect when growing a new plant for the first time. Taxonomy also enables international horticulturists to communicate easily through universal scientific names and minimize confusion caused by regional common names.

Figure 4-1 Look closely at the leaves of these trees. A—Pecan. B—Walnut. C—Hickory. How are they similar? How are they different?

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Words to Know list the key terms to be learned in the chapter.

Introduction provides an overview and preview of the chapter content.

Caption Questions help the students connect the text to the art, while encouraging active reading and critical thinking.

Illustrations have been designed to clearly and simply communicate the specific topic. Illustrations have been completely replaced and updated for this edition. Photographic images have been updated to show the latest equipment.

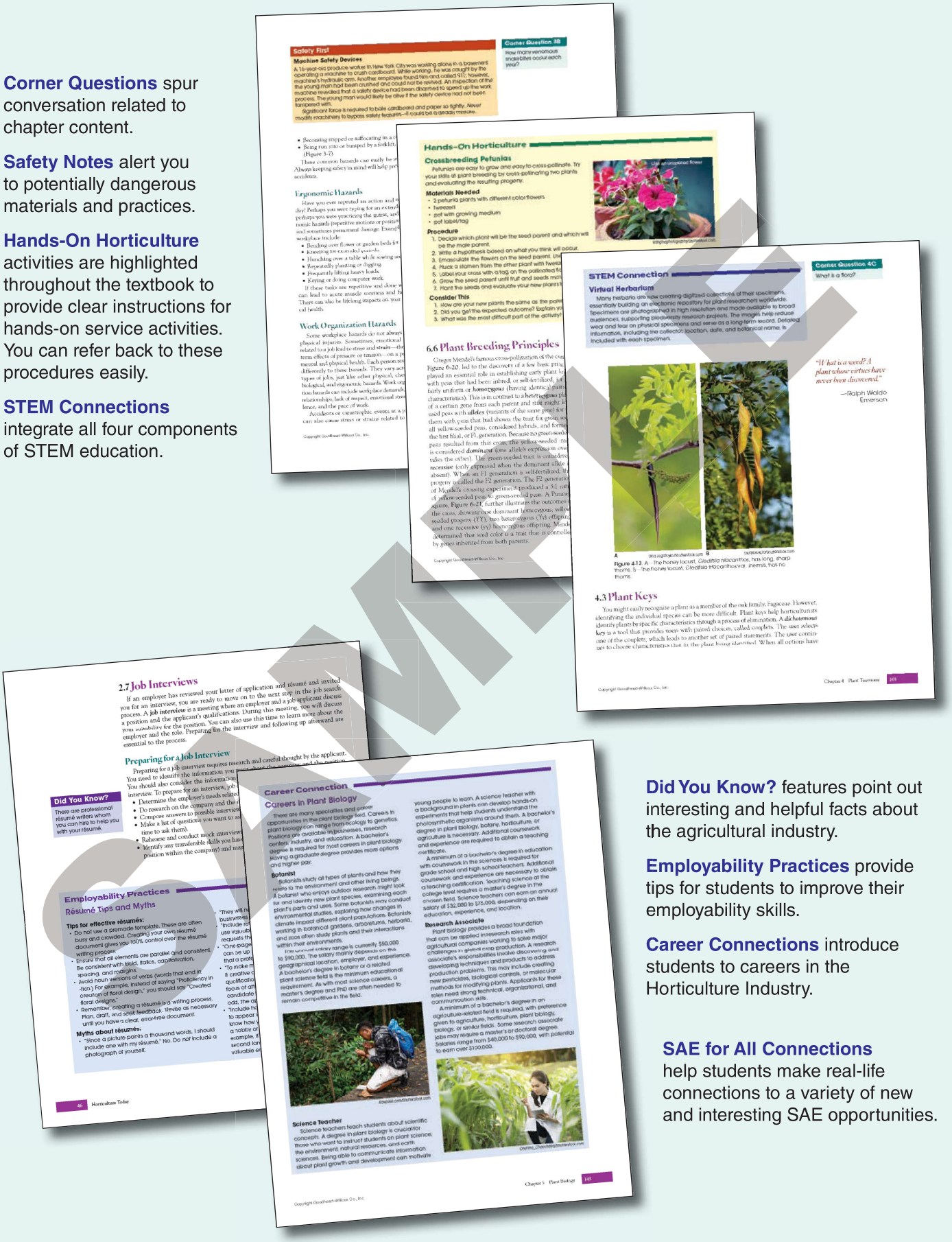
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Corner Questions spur conversation related to chapter content.

Safety Notes alert you to potentially dangerous materials and practices.

Hands-On Horticulture activities are highlighted throughout the textbook to provide clear instructions for hands-on service activities. You can refer back to these procedures easily.

STEM Connections integrate all four components of STEM education.



Did You Know? features point out interesting and helpful facts about the agricultural industry.

Employability Practices provide tips for students to improve their employability skills.

Career Connections introduce students to careers in the Horticulture Industry.

SAE for All Connections help students make real-life connections to a variety of new and interesting SAE opportunities.

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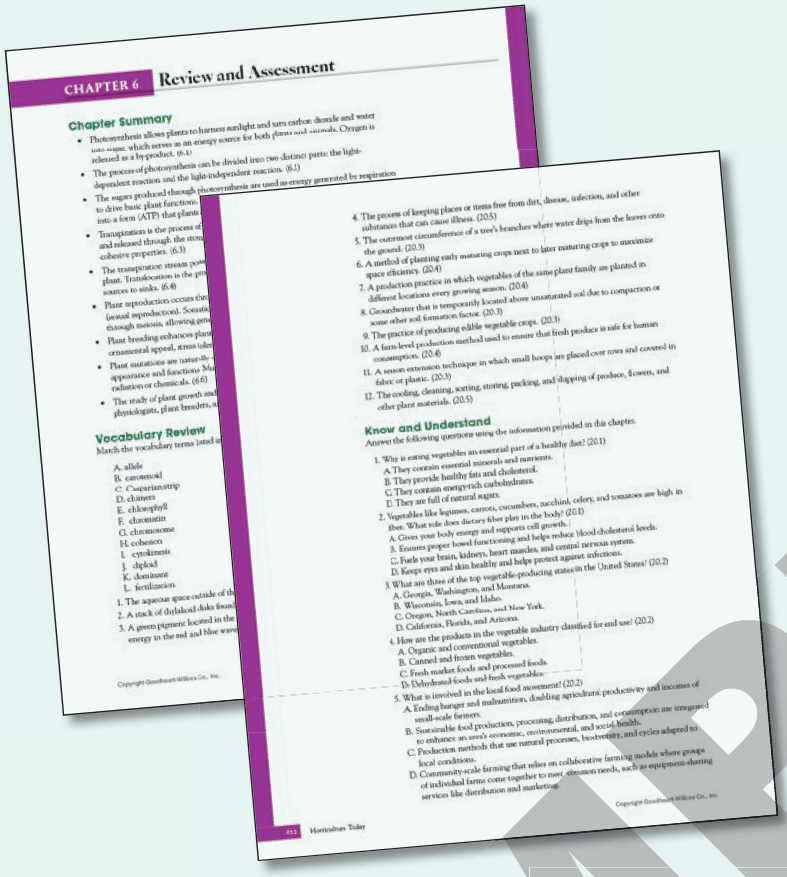


Identification Glossaries include plants, equipment, pests, disorders, diseases, and weeds from the CDE Identification lists in full color and in one location.

FFA Connections introduce students to the exciting world of FFA opportunities, including Career Development Events in various agricultural areas.

Going Green features highlight key items related to sustainability, energy efficiency, and environmental issues.

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Chapter Summary feature provides an additional review tool for you and reinforces key learning objectives.

Vocabulary Review matching activities reinforce vocabulary development and retention. All key terms are included in the text glossary and are connected to numerous online review activities.

Know and Understand questions enable you to demonstrate knowledge, identification, and comprehension of chapter material.

Apply and Analyze questions extend learning and develop your abilities to use learned material in new situations and to break down material into its parts.

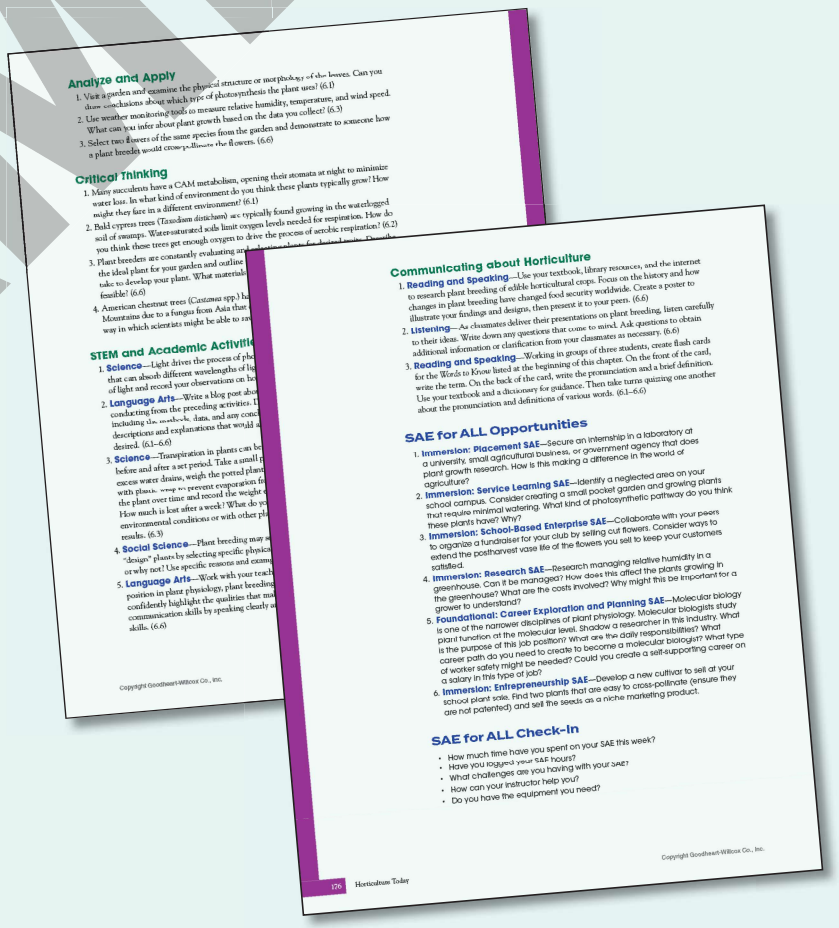
Critical Thinking questions develop higher-order thinking and problem-solving abilities.

Communicating about Horticulture questions and activities help integrate reading, writing, listening, and speaking skills while extending your knowledge on the chapter topics.

STEM and Academic Activities are provided in the areas of science, technology, engineering, math, social science, and language arts to extend your learning and help you analyze and apply knowledge.

SAE for ALL Opportunities help students make real-life connections to a variety of new and interesting SAE opportunities.

SAE for ALL Check-In reminds students to review and record their progress with their SAEs.



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Credentialing Partners and Support

Goodheart-Willcox appreciates the value of industry credentials, certifications, and accreditation. We are pleased to partner with leading organizations to support students and programs in achieving credentials. Integrating industry-recognized credentialing into a career and technical education (CTE) program offers numerous benefits for both the student and the institution. By achieving third-party certificates, students gain confidence, have proof of a measurable level of knowledge and skills, and earn a valuable achievement to include in their résumés. For educators and administrators, industry-recognized credentials and accreditation validate learning, enhance the credibility of programs, and provide valuable data to measure student performance and help guide continuous program improvement.

Horticulture Today is correlated to the Horticulture-Landscaping credential offered by NOCTI and to the Plant and Soil Science 1 and 2 YouScience® Industry Certifications.

NOCTI Certifications

Goodheart-Willcox is pleased to partner with NOCTI and Nocti Business Solutions (NBS), a leading provider of industry certification solutions for skill verification across the nation. With over 55 years of experience, NOCTI/NBS is a valuable partner both within the CTE community and industry to improve America's workforce. Goodheart-Willcox has created correlations between select products and the standards and competencies that are the basis for NOCTI/NBS credentials, to the benefit of states, instructors, and students working toward NOCTI/NBS credentials.

NOCTI/NBS certifications (knowledge-based and skill-based) are developed by national teams of subject matter experts as part of the process that meets personnel accrediting standards and requirements under ISO 17024, resulting in credentials measuring skills and competencies critical for learner success outside the classroom. NOCTI/NBS offers test development, test delivery, and psychometric services to support skill verification, using the latest tools and methods to provide relevant and helpful solutions for workforce development. For more information about NOCTI, visit www.nocti.org.

YouScience® Industry Certifications

Goodheart-Willcox is pleased to partner with YouScience®, correlating select Goodheart-Willcox titles to YouScience® Industry Certifications to the benefit of states, instructors, and students working to achieve them. YouScience® is the leading technology provider dedicated to solving the skills and exposure gap crisis for students and employers.

YouScience® Industry Certifications, part of the YouScience Brightpath academic and career guidance platform, offer students entry- to mid-level certifications that act as tangible proof of their skills and knowledge. For more information about YouScience, including a complete listing of their Industry Certifications, please visit https://www.youscience.com/certifications/.

To see how *Horticulture Today* correlates to credentialing and certification standards, visit the Correlations tab at https://www.g-w.com/horticulture-today-2028.

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Brief Contents

1 The Horticulture Industry. 2
2 Horticultural Business Management. 30
3 Worker and Tool Safety. 60
4 Plant Taxonomy. 92
5 Plant Biology. 126
6 Plant Growth and Development. 152
7 Environmental Conditions for Growth. 178
8 Soils and Media. 206
9 Plant Nutrition. 236
10 Seed Propagation. 264
11 Stem and Leaf Propagation. 290
12 Layering and Division. 312
13 Grafting and Budding. 334
14 Tissue Culture: Micropropagation. 358
15 Greenhouse Operation and Maintenance. 376
16 Greenhouse Production. 404
17 Hydroponics. 432
18 Alternative Growing Methods. 454
19 Nursery Production. 470
20 Vegetable Production. 496
21 Fruit and Nut Production. 526
22 Landscape Design. 558
23 Floral Design. 588
24 Interior Plantscaping. 614
25 Landscape Installation and Maintenance. 638
26 Turfgrass Management. 664
27 Integrated Pest Management. 696
28 Insects. 724
29 Disease Management. 752
30 Weeds. 784
31 Pesticide Management and Safety. 806
32 Agricultural Leadership. 828
33 Experiential Learning: SAE. 852
34 Communication and Information Literacy in Horticulture. 880

SAMPLE

Contents

CHAPTER 1

The Horticulture Industry 2

1.1 What Is Plant Science? 5

Botany 5
Agronomy 6
Forestry 6

1.2 Edible and Ornamental Horticulture 7

Olericulture 7
Pomology 8
Viticulture 9
Floriculture 9
Nursery and Landscape Industry 10
Interiorscaping 13
Turfgrass Industry 13

1.3 Organic and Sustainable Production 15

Organic Edibles 15
Sustainable Agriculture 16

1.4 Eating Local 17

Harvesting 17
Locavores 17
Farmers Markets 17
Community-Supported Agriculture 18

1.5 The Green Industry 19

Biological and Environmental Impacts 20
Aesthetic Impacts 20
Economic Impacts 21
Future of the Industry 21

1.6 Continuing Education 21

Horticulture Organizations 22

CHAPTER 2

Horticultural Business Management 30

2.1 Small Businesses 32

2.2 Strategic Business Plans 33

Strategic Environment 33
Internal Resources 35
Vision and Mission Statements 36

2.3 Principal Strategy 37

Performance Standards 38

2.4 Marketing and Advertising 38

The Marketing and Advertising Process 38
The Four Ps of Marketing 39

2.5 Professionalism 42

Professional Traits and Behaviors 42
Unprofessional Traits and Behaviors 42

2.6 Career Documents 43

Letter of Application 43
Résumé 44

2.7 Job Interviews 46

Preparing for a Job Interview 46
Taking Part in the Job Interview 48
Interview Follow-Up 49

2.8 School-to-Career Plan 50

Choosing a Path 50

CHAPTER 3

Worker and Tool Safety 60

3.1 Early American Labor 62

Industrial Revolution 62
Fair Labor Standards Act 63

3.2 Safety and Health Agencies 63

Centers for Disease Control and Prevention 63
National Institute for Occupational Safety and Health 64
Occupational Safety and Health Administration 64
United States Department of Labor 64

3.3 Safety Hazards 65

Physical Hazards 66
Chemical Hazards 66
Biological Hazards 67
Ergonomic Hazards 69
Work Organization Hazards 69

SAMPLE

3.4 Preventing Accidents....70
ABCs of Accident Prevention....70

3.5 Workplace Safety Documents....71
Safety Data Sheets....71
Pesticide Labels....71

3.6 Practicing Safety....71
SAFE Working Conditions....71

3.7 Maintaining Tools and Equipment....72
Checking and Maintaining Equipment....73
Maintaining Tools....74

3.8 Labor Laws....74
Minimum Wage and Hours Worked....75
Job Duties for Workers Under 18....75
Young Worker Responsibility....76
Taking Action....76

CHAPTER 4
Plant Taxonomy 92

4.1 History of Plant Taxonomy....95
4.2 A Botanical Classification System....95
Domain....97
Kingdom....97
Phylum....97
Class....99
Order....100
Family....100
Genus....101
Species....101
Variety....102
Cultivar....102

4.3 Plant Keys....103
4.4 Herbaria....104

CHAPTER 5
Plant Biology 126

5.1 Study of Botany....128
Botany Disciplines....129

5.2 Plant Cells....129
Cell Membrane....129
Cell Nucleus....130
Chloroplasts and Other Plastids....130
Mitochondria....130
Vacuoles....131
Oil Bodies....131
Endoplasmic Reticulum....131
Ribosomes....131
Golgi Bodies....131
Lysosomes....131
Cytoskeleton....132

5.3 Plant Tissues....132
Meristem....132
Epidermis....133
Periderm....133
Phloem....133
Xylem....133
Parenchyma and Collenchyma....134
Sclerenchyma....135

5.4 Plant Parts and Their Functions....135
Roots....135
Stems....136
Leaves....137
Flowers....141
Fruits....142
Seeds....144

CHAPTER 6
Plant Growth and Development 152

6.1 Photosynthesis....154
Light-Dependent Reaction....156
Light-Independent Reaction....157

6.2 Respiration....158
ATP Production....158

6.3 Transpiration....160
Carbon Dioxide Entry....160
Water Uptake and Nutrient Access....160
Factors Affecting Transpiration....161
Temperature....161

SAMPLE

6.4 Movement of Solutes 162
Active Uptake of Inorganic Nutrients 162
Translocation of Sugars through Phloem 163

6.5 Reproduction 163
Cellular Division 164
Sexual Reproduction 165

6.6 Plant Breeding Principles 167
The Plant Breeding Process 168
Plant Mutations 168
Modern Plant Breeding Technologies 169

CHAPTER 7
Environmental Conditions for Growth 178

7.1 Light 180
Light Quality 180
Light Quantity 182
Photoperiod 182

7.2 Optimizing Light Quantity 185
Plant Spacing and Orientation 185
Greenhouse Design 186
Greenhouse Covers 186
Supplemental Lighting 186
Plant Selection 187

7.3 Temperature 188
Q10 Temperature Coefficient 188
Plant Responses to Temperature 190
Thermoperiod 192
Degree-Days 192
Soil Temperatures 193

7.4 Managing Temperatures 193
Site Selection 193
Season Extension 194
Overhead Irrigation 195
Localized Heating 196
Wind Machines 196

7.5 Water 196
Root Zone 197
Consumption Rates 197
Irrigation 197

CHAPTER 8
Soils and Media 206

8.1 What Is Soil? 209

8.2 Soil Formation 209
Soil-Forming Factors 209
Horizons 210

8.3 Physical Properties of Soil 210
Soil Texture 210
Soil Structure 211
Soil Color 216

8.4 Biological Properties of Soil 216
Microorganisms 216
Soil-Dwelling Insects 217
Burrowing Organisms 217

8.5 Chemical Properties of Soil 217
Soil pH 219
Soil Testing 219

8.6 Soilless Media 221
Garden or Native Soil 221
Soilless Media 223

8.7 Mulch 224
Inorganic Mulches 224
Organic Mulches 225

8.8 Containers 227
Size 227
Durability 227
Drainage Capability 228

CHAPTER 9
Plant Nutrition 236

9.1 Essential Elements 238
Hydrogen (H) 238
Carbon (C) 239
Oxygen (O) 239
Primary Macronutrients 239
Secondary Macronutrients 241
Micronutrients 243

9.2 Mineral Nutrient Uptake 245
Nutrient Cycle 246

SAMPLE

Nitrogen Cycle . . . 247
Nutrient Mobility . . . 248
Soil pH . . . 248

9.3 Nutrient Sources . . . 248

Soil and Tissue Analysis . . . 248
Organic Materials . . . 249
Inorganic Fertilizers . . . 251

9.4 Fertilizer Calculations . . . 253

Phosphorus (P) . . . 253
Potassium (K) . . . 253

9.5 Methods of Fertilizer Application . . . 254

Broadcasting . . . 254
Banding . . . 254
Side Dressing . . . 254
Fertigation . . . 254
Slow-Release Fertilizer . . . 255
Soil Injection . . . 255
Foliar Application . . . 255

CHAPTER 10

Seed Propagation . . . 264

10.1 Seed Morphology and Development . . . 266

Stages of Seed Development . . . 266
Apomixis . . . 267

10.2 Seed Germination . . . 268

Germination Rates . . . 268
Environmental Conditions for Germination . . . 268

10.3 Seed Dormancy . . . 270

Seed Coat Dormancy . . . 270
Chemical Dormancy . . . 270
Morphological Dormancy . . . 271
Physiological Dormancy . . . 271

10.4 Seed Propagation Techniques . . . 273

Field Seeding . . . 273
Field Nurseries . . . 275
Greenhouse Production . . . 276

10.5 Seed Selection . . . 279

Landraces . . . 280
Wild Populations . . . 280
Hybrids . . . 281
Transgenic Cultivars . . . 281

10.6 Seed Production . . . 281

Plant Variety Protection Act . . . 282
Seed Saving . . . 282
Seed Storage . . . 283

CHAPTER 11

Stem and Leaf Propagation . . . 290

11.1 Biological Principles of Leaf and Stem Propagation . . . 292

Preformed Roots . . . 293
Wound-Induced Roots . . . 293
Adventitious Shoot and Bud Formation . . . 293

11.2 Plant Material Used for Stem and Leaf Cuttings . . . 294

Hardwood Cuttings . . . 295
Semi-Hardwood Cuttings . . . 299
Softwood Cuttings . . . 300
Herbaceous Cuttings . . . 300
Leaf Cuttings . . . 300
Leaf-Bud Cuttings . . . 301
Root Cuttings . . . 301

11.3 Hardening Off . . . 302

11.4 Rooting Medium . . . 302

11.5 Plant Growth Regulators . . . 303

Auxin . . . 303
Cytokinins . . . 304

CHAPTER 12

Layering and Division . . . 312

12.1 Layering in Propagation . . . 314

12.2 Layering Techniques . . . 316

Simple Layering . . . 316
Compound Layering . . . 316
Air Layering . . . 317
Mound Layering . . . 318
Trench Layering . . . 318

SAMPLE

12.3 Natural Layering 319
Tip Layers 319
Runners 319
Stolons 319
Offsets 319
Suckers 320
12.4 Crown Division 320
12.5 Division and Separation of Geophytes 321
Bulbs 322
Corms 324
Tubers 324
Rhizome 325
Pseudobulb 326

CHAPTER 13
Grafting and Budding 334
13.1 Benefits of Grafting 336
13.2 Successful Grafting 337
Rootstock and Scion Compatibility 337
Vascular Cambia Alignment 338
Graft Union Protection 338
Post-Graft Care 338
Timing Grafting 338
13.3 Selecting Scion Wood 338
13.4 Types of Grafts 339
Whip-and-Tongue Grafting 339
Splice Grafting 339
Cleft Grafting 341
Wedge Grafting 342
Saddle Grafting 343
Hole Insertion Grafting 344
Bark Grafting 345
Bridge Grafting 346
Inarch Grafting 346
Approach Grafting 347
Side-Veneer Grafting 348
Micrografting 348
13.5 Budding 349
Patch Budding 349
Chip Budding 350
T-Budding 351
Successful Budding Tips 351
Aftercare 351

CHAPTER 14
Tissue Culture: Micropropagation 358
14.1 History 360
14.2 Advantages and Disadvantages 362
Labor and Equipment Costs 362
Supply and Demand 362
Genetic Diversity 362
14.3 Environmental Requirements 363
14.4 Growth Media 364
14.5 Stages of Micropropagation 364
Stage 0: Selection and Cultivation of Stock Plants 365
Stage 1: Initiation or Establishment 365
Stage 2: Multiplication 366
Stage 3: Rooting 367
Stage 4: Acclimatization 367
14.6 The Future of Tissue Culture and Micropropagation 368

CHAPTER 15
Greenhouse Operation and Maintenance 376
15.1 Greenhouse Planning 378
Site Location 378
Crops to Be Cultivated 380
Climate 380
Greenhouse Orientation 381
Operating Costs 381
Market Opportunities 381
15.2 Greenhouse Structures 382
Even-Span Greenhouse 382
Uneven-Span Greenhouse 382
Lean-To Greenhouse 382

SAMPLE

Quonset Greenhouse . . . 383
Gothic Arch Greenhouse . . . 383
Ridge-and-Furrow Greenhouse . . . 383
Sawtooth Greenhouse . . . 383
Cold Frame . . . 383
High Tunnel . . . 383
Hotbed . . . 384

15.3 Greenhouse Components . . . 384

Covering Materials . . . 384
Fans . . . 385
Louvers, Shutters, and Vents . . . 386
Evaporative Cooling . . . 387
Heating Systems . . . 387
Floors . . . 388
Benches . . . 389
Irrigation . . . 390
Additional Greenhouse Equipment . . . 392

15.4 Maintaining Structures and Equipment . . . 395

Structural Maintenance . . . 395
Greenhouse Equipment Maintenance . . . 396

CHAPTER 16

Greenhouse Production . . . 404

16.1 Environmental Requirements . . . 406

Light . . . 406
Air . . . 408
Nutrients . . . 408
Temperature . . . 411
Water . . . 412
Pest Control . . . 414

16.2 Crop Inputs . . . 415

Media . . . 415
Plant Growth Regulators . . . 416
Containers, Trays, Tags, and Labels . . . 416

16.3 Plant Materials . . . 418

Seeds . . . 418
Unrooted Cuttings . . . 419
Plugs and Liners . . . 420
Bare Root . . . 421
Bulbs and Tubers . . . 421

16.4 Greenhouse Crops . . . 422

Container Plants . . . 423
Foliage Plants . . . 423
Vegetables and Herbs . . . 424
Cut Flowers . . . 424
Bedding Plants . . . 424
Perennial Plants . . . 425

CHAPTER 17

Hydroponics . . . 432

17.1 Hydroponics . . . 434

History of Hydroponics . . . 435
Hydroponic Systems . . . 437
Wick System . . . 437
Ebb-and-Flow System . . . 437
Drip System . . . 437
Nutrient Film Technique System . . . 437
System Components . . . 438
Aggregate Forms . . . 439
Crops . . . 440

17.2 Aquaponics . . . 441

History of Aquaponics . . . 441
System Components . . . 443
Growing in an Aquaponics System . . . 443

17.3 Controlled Environment Agriculture . . . 444

History of CEA . . . 444
Local Production . . . 444
CEA Inputs . . . 445
CEA Plant Material . . . 446
Future of CEA . . . 447

CHAPTER 18

Alternative Growing Methods . . . 454

18.1 Vertical Gardening . . . 456

Support Structures . . . 456

SAMPLE

Fence Lines . . . 456
Walls . . . 456
Trellising . . . 458
Staking . . . 458
Cages . . . 459
Pockets . . . 459
Living Wall . . . 459
Plant Material . . . 461
Planting and Cultivation . . . 461

18.2 Rooftop Gardening . . . 462

Intensive System Rooftop Gardens . . . 462
Extensive System Rooftop Gardens . . . 462
Installation . . . 463
Cultivation and Maintenance . . . 463
Plant Material . . . 464

CHAPTER 19

Nursery Production . . . 470

19.1 Market Niche . . . 472

Site Selection . . . 472
Crops . . . 472
Nurseries . . . 473
Landscapers . . . 473
Licensing and Shipping Regulations . . . 474
Market Outlook . . . 474

19.2 Production Methods . . . 474

Container-Grown Production . . . 474
Field-Grown Production . . . 476
Pot-in-Pot Production . . . 479
Production Method Advantages and Disadvantages . . . 481

19.3 Sustainable Nursery Production . . . 482

Water Management . . . 483
Nutrient Management . . . 487
Substrate Management . . . 488
Environmental Management . . . 488

CHAPTER 20

Vegetable Production . . . 496

20.1 Vegetables for Health . . . 498

Health Benefits . . . 498
Nutrients Found in Vegetables . . . 499

20.2 Vegetable Markets in the United States . . . 500

Fresh Market Foods and Processed Food . . . 500
US Vegetable Farms . . . 501
Seasonal Production . . . 501
Local Food Market Growth . . . 502

20.3 Environmental Factors . . . 502

Site Selection . . . 502
Water . . . 503
Soil . . . 505
Nutrient Management . . . 505
Temperature . . . 506
Season Extension . . . 507

20.4 Production Methods . . . 512

Spacing . . . 512
Crop Rotation . . . 512
Integrated Pest Management . . . 513
Good Agricultural Practices . . . 514
Plant Material . . . 515

20.5 Postharvest Handling and Storage . . . 517

Handling . . . 517
Storage . . . 517

CHAPTER 21

Fruit and Nut Production . . . 526

21.1 Fruits for Health . . . 528

Health Benefits . . . 528
Nutrients . . . 529

21.2 Fruit Markets in the United States . . . 529

21.3 Small Fruits . . . 530

Site Selection . . . 530
Site Preparation . . . 531
Planting . . . 533
Maintenance . . . 534
Harvest . . . 535

21.4 Tree Fruits and Nuts . . . 536

Site Selection and Preparation . . . 538
Planting . . . 539

SAMPLE

Pruning and Training . . . 539
Nutrient Management . . . 543
Pest Management . . . 543
Harvesting and Storage . . . 544

21.5 Vine Fruits . . . 544

Site Preparation and Planting . . . 545
Planting . . . 545
Training and Trellising . . . 546
Nutrient Management . . . 549
Pest Management . . . 550
Harvest and Storage . . . 550

CHAPTER 22

Landscape Design . . . 558

22.1 The Design Process . . . 560

Landscape Design Steps . . . 560
Drawing Board or Computer-Aided Design . . . 564
Symbols . . . 564

22.2 Elements and Principles of Landscape Design . . . 564

Line . . . 565
Form . . . 565
Texture . . . 566
Medium . . . 567
Color . . . 567
Balance . . . 567
Perspective . . . 568
Proportion . . . 568
Repetition . . . 569
Emphasis . . . 569
Unity . . . 569

22.3 Tools of Landscape Design . . . 570

Measurement Tools . . . 570
Drawing Instruments . . . 570
Paper . . . 572

22.4 Xeriscaping Design . . . 573

Planning and Design . . . 573
Soil Analysis and Amendments . . . 573
Plant Selection . . . 574
Turf Use . . . 574
Efficient Irrigation . . . 574
Mulch . . . 576
Maintenance . . . 576

22.5 Water Garden Landscape Design . . . 577

Rain Gardens . . . 577
Bodies of Water . . . 578
Container Water Gardens . . . 579
Water Features . . . 579
Aquatic Plants . . . 580
Water Garden Maintenance . . . 580

CHAPTER 23

Floral Design . . . 588

23.1 Principles and Elements of Design . . . 590

Principles of Design . . . 590
Elements of Design . . . 594

23.2 Types of Floral Design . . . 597

Geometric Designs . . . 597
Line-Mass Continuum Designs . . . 598

23.3 Containers, Tools, and Mechanics . . . 599

Containers . . . 599
Tools . . . 599
Ribbon . . . 600
Bows . . . 602
Mechanics . . . 602

23.4 Flower Arrangements . . . 605

Corsages and Boutonnieres . . . 605
Bouquets . . . 606
Holiday Centerpieces . . . 606
Wreaths . . . 607

CHAPTER 24

Interior Plantscaping . . . 614

24.1 Interior Plantscaping . . . 616

Health-Care Facilities . . . 616
Hotels . . . 617
Shopping Malls . . . 617
Offices . . . 617
Restaurants . . . 617
Homes . . . 617
Botanical Gardens and Zoos . . . 618

24.2 Design Principles . . . 619

Elements of Design . . . 619

SAMPLE

Principles of Design 620
The Process of Design 622

24.3 Environmental Requirements 623

Temperature 623
Humidity 623
Water 625
Light 626
Potting Media 627
Plant Nutrition 628

24.4 Plant Management 628

Grooming 628
Training and Pruning 629
Insect Pests 629
Diseases 630

CHAPTER 25

Landscape Installation and Maintenance 638

25.1 Landscape Design Plans 640

Title Block 641
North Arrow 641
Legend 641
Specifications 641
Drawing Scale 642

25.2 Site Preparation 642

25.3 Hardscape Installation 644

Brick Patios and Pathways 644
Retaining Walls 645
Water Features 647

25.4 Planting the Design 648

Plant Material 648
Timing of Planting 649
Preparing the Hole and Planting 650
Wrapping and Staking 650

25.5 Landscape Maintenance 651

Watering 652
Fertilizing 652
Pruning 653
Edging 655
Mulching 655

25.6 Landscaping Business 656

Establishing a Business 656
Products and Services 656
Identifying Customers 657
Assessing Competition 657
Evaluating Risks 657

CHAPTER 26

Turfgrass Management 664

26.1 Turfgrass Industry 667

Turf Industry 667
Benefits 668
Turf Sustainability 668
Turf Applications 669

26.2 Turfgrass Morphology and Types 670

Turf Morphology 670
Types of Turf 673

26.3 Lawn Establishment 675

Turf Selection and Timing 675
Planting Methods 676
Irrigation 678
Mowing 679
Integrated Pest Management for Lawns 679

26.4 Turf Maintenance 680

Irrigation 680
Fertilization 681
Mowing 683
Aeration 685
Thatch Control 685
Integrated Pest Management for Turf 685

26.5 Turf Renovation 686

Turf Failure 686
When to Renovate 686
Pests and Turf Renovation 686
Seeding 687
Plugging 687
Sprigging 688
After Care 688

SAMPLE

CHAPTER 27
Integrated Pest Management 696

27.1 Creating an IPM 698
27.2 Pests 699
Weeds 699
Insects 700
Nematodes 700
Plant Pathogens 701
Other Invertebrate Pests 702
Vertebrates 703
27.3 Control Measures 703
Sanitation 703
Habitat Modification 703
Plant Material 704
27.4 Inspection and Monitoring 704
Scouting 704
Pest Identification 708
Recordkeeping and Evaluation 709
27.5 Action Thresholds 709
27.6 Corrective Actions 709
Physical and Mechanical Controls 710
Biological Controls 711
Chemical Controls 713

CHAPTER 28
Insects 724

28.1 Taxonomy 726
28.2 Anatomy 727
Exoskeleton 727
The Head 727
The Thorax 730
The Abdomen 732
Internal Systems 733
28.3 Growth and Development 733
The Egg and the Embryo 733
Metamorphosis 734
28.4 Chemical Signals 735
Sex Pheromones 735
Aggregation Pheromones 736
Alarm Pheromones 736
Territorial Pheromones 736
Allomones 736
28.5 Agricultural Pests and Beneficials 738
Feeding Behaviors and Plant Damage 738
Reproduction Rate 739
Invasive Insects 739
Beneficial Insects 739
Advancements in Entomology Research 741
28.6 Collecting Insects 741
Preserving Insects 742

CHAPTER 29
Disease Management 752

29.1 Disease Development 755
Disease Triangle 755
29.2 Organisms That Cause Disease 757
Viruses 757
Bacteria 757
Fungi and Fungal-Like Organisms 757
Organisms Detrimental to Plants 757
29.3 Types of Disease 759
Testing for Disease 759
Two Types of Plant Disorders 759
Sick Plants Versus Injured Plants 760
29.4 Disease Cycle 760
Inoculation 760
Entry 761
Establishment, Growth, and Reproduction 761
Dissemination 761
29.5 Signs and Symptoms of Disease 762
Wilting 762
Abnormal Tissue Color 762
Defoliation 762
Abnormal Increase in Tissue Size 763
Dwarfing 763
Replacement of Host Plant Tissue 763
Necrosis 763

SAMPLE

29.6 Managing Plant Diseases 764
Cultural Practices 764
Genetically Resistant Plants 764
Beneficial Organisms 764
Quarantines 765
Chemical Applications 765

29.7 Disease Index 765
Anthracnose 766
Blights 766
Cankers 768
Club Root 768
Damping-Off 768
Galls 768
Leaf Blister and Leaf Curl 768
Leaf Spot 769
Mildews 769
Molds 769
Root-Knot Nematodes 770
Rots 770
Rusts 771
Scab 771
Smuts 771
Viruses 771
Wilts 771

CHAPTER 30
Weeds 784

30.1 Definition of a Weed 786
Impact of Weeds 786
Costs of Weeds 787

30.2 Weed Characteristics 787
Weed Seeds 787
Environmental Conditions for Weeds 788
Benefits of Weeds 789

30.3 Weed Biology 789
Annuals 790
Biennials 790
Perennials 790
Parasitic Weeds 790

30.4 Weed Identification 791
Grassy Weeds 791
Sedges 792
Broadleaf Weeds 793

30.5 Weed Management 793
Prevention 793
Mechanical Control 793
Cultural Control 794
Biological Control 794
Chemical Control 795
Digital Tools for Weed Control 796

CHAPTER 31
Pesticide Management and Safety 806

31.1 Types of Pesticides 808
Insecticides 809
Miticides 809
Herbicides 809
Fungicides 809
Nematicides 810
Molluscicides 810
Biopesticides 810

31.2 Pesticide Formulations 812
Ingredients 812
Aerosol Sprays 812
Dust 813
Wettable Powders 813
Granular Pellets 813
Liquid Concentrates 813
Emulsifiable Concentrates 813

31.3 Pesticide Labels 813
A Legal Document 814
Sections of a Pesticide Label 814

31.4 Pesticide Application 816
Pesticide Applicator Certification 816
Selecting Personal Protective Equipment 817
Determining the Correct Amount to Use 817
Mixing a Pesticide 817
Applying Pesticides 818
Restricted Entry Interval 819

31.5 Toxicity 819
Types of Toxicity 820
Lethal Dose 820
Lethal Concentration 820
Toxicity Categories 820

SAMPLE

Pesticide Poisoning . . . 820
First Aid . . . 821

31.6 Storage and Disposal . . . 822
Disposal . . . 822

CHAPTER 32

Agricultural Leadership . . . 828

32.1 Leadership Characteristics . . . 830
32.2 Develop a Leadership Path . . . 831
Create a Vision and Set Goals . . . 831
Become Self-Confident and Healthy . . . 832
Reduce Procrastination and Foster Initiative . . . 832
Get Organized . . . 832
Further Your Education . . . 833
Leadership Development . . . 833

32.3 Agricultural Leadership Organizations for Youth . . . 834
4-H . . . 834
National Junior Horticulture Association . . . 835

32.4 National FFA Organization . . . 835
History of the National FFA Organization . . . 836
FFA Emblem and Motto . . . 836
FFA Structure . . . 838
Leadership Development in FFA . . . 838
FFA Program of Activities . . . 841
Chapter, State, and National FFA Activities . . . 843

32.5 Supervised Agricultural Experience . . . 846

CHAPTER 33

Experiential Learning: SAE . . . 852

33.1 SAE and Agricultural Education . . . 854
SAE History . . . 855
SAE Purpose . . . 856

33.2 Types of SAEs . . . 857
Career Exploration and Planning . . . 857
Employability Skills for College and Career Readiness . . . 859
Personal Financial Management and Planning . . . 859
Workplace Safety . . . 859
Agricultural Literacy . . . 859
Immersion SAE . . . 859
Placement/Internship SAE . . . 860
Research: Experimental, Analysis, or Invention SAE . . . 862

33.3 The SAE Program Process . . . 865
Investigate . . . 866
Plan . . . 866
Coordinate . . . 869
Keep Records . . . 870

33.4 SAE Awards and Recognitions . . . 871
Agricultural Proficiency Awards . . . 871
Star Awards . . . 872

CHAPTER 34

Communication and Information Literacy in Horticulture . . . 880

34.1 Written Communication . . . 883
Purpose . . . 883
Audience . . . 884
Presentation . . . 884
Topic . . . 885
Thesis . . . 885
Project Plan . . . 887
Reviewing, Revising, and Proofreading . . . 888

34.2 Critical Thinking and Research . . . 889
Search . . . 889
Preview . . . 889
Find Evidence . . . 890
Annotate . . . 892
Summarize . . . 892
Evaluate . . . 892

SAMPLE

34.3 Plagiarism and Documentation. 894
Plagiarism 894
Documentation 895

34.4 Presentation Methods. 896
Presentation Types. 897
Communication with the Audience 898

34.5 Information Literacy. 899
Independent Learning 901
Social Responsibility 901

Answer Key for Corner Questions 908
Glossary 916
Index 938

SAMPLE

Feature Contents

SAE for ALL Inspiration

Debbie Hamrick 2
Dr. Melinda Knuth 30
Dr. Sharon Williamson, North Carolina State University 60
Dr. Andrea Weeks, Taxonomist 92
Dr. Terri Long, Professor and Department Head, Plant and Microbial Biology 126
Kyle Mayberry, Biltmore Estate 152
Walt Webb, Farm Manager, Lewis Farms 178
Dr. Brian Schulker, Business Development Manager, Growing Media Constituents 206
Michelle and Java Bradley, Java's Compost . . . 236
Doug Muller, Hudson Valley Seed 264
Mark Weathington, Arboretum Director 290
Nicole Youngblood, Extension Agent 312
Worth Williams, Phyllatech, Inc., and Worthington Farms 334
Dr. Hsuan Chen, North Carolina State University 358
Alisha Ray, North Carolina State University 376
Cody Schueneman, Metrolina Greenhouses . . . 404
Charles Collins, Hydroponics and Aquaponics Grower and Educator 432
Dr. Ricardo Hernandez, North Carolina State University 454
Diana Whitt, Plantworks Nursery Manager 470
David Bradley, Nash Produce. 496
Robin Hawley, Sokol Blosser Winery 526
Sean Stokes, GreenView Partners 558
Hannah Ross Clarke, Floral Designer and Grower 588
Savannah Toal, Plant Designer 614
Paul Driedger, Ecogreen Landscaping 638
Dr. Jordan Booth, Senior Director, Course Consulting Service, United States Golf Association 664
Mary Beth Miller, Carolina Farm Stewardship Association 696
Dr. Matt Bertone, Director, Plant and Disease Insect Clinic 724
Kristine Dyer, BioWorks 752
Jarred Driscoll, Regulatory Weed Specialist, North Carolina 784
Dr. Wayne Buhler, Pesticide Safety Specialist . . . 806
Paul Young and Allison Jennings 828
Jazmin Albarran, Seed Your Future 852
Amanda Thomsen, Horticultural Marketing 880

Career Connection

Careers in the Horticulture Industry 23
Writing Professional Emails 43
Résumé Tips and Myths 46
Job Interview Mistakes 47
Job Interview Practice Questions. 47
Professional Certifications in Horticulture 52
Careers in Horticulture Business 53
Careers in Horticulture Safety. 77
Careers in Plant Taxonomy 106
Careers in Plant Biology. 145
Careers in Plant Science 170
Careers in Environmental Horticulture 199
Careers in Soil Science 229
Careers in Plant Nutrition 256
Careers in Seed Propagation. 284
Careers in Stem and Leaf Propagation 305
Careers in Layering and Division 328
Careers in Grafting and Budding 352
Careers in Micropropagation 371
Greenhouse Structure Careers 398
Careers in Greenhouse Production 426
Controlled Environment Horticulture 448
Alternative Growing Methods in Horticulture . . . 465
Careers in Nursery Production 491
Careers in Olericulture 520
Careers in Pomology 551
Careers in Landscape Design 583
Careers in the Floriculture Industry 608
Interior Plantscaping Business and Careers 632
Careers in Landscape Installation and Maintenance 658
Careers in the Sports Turf Industry 689
Careers in Integrated Pest Management 714
Careers in Entomology 744
Careers in Disease Management 772
Careers in Weed Management 797
Careers in Pesticide Management and Safety 823
Careers in Agricultural Leadership and Education 847
Careers in Agricultural Business and Government 873
Seed Your Future® 900
Careers in Horticultural Communications 902

SAMPLE

Hands-On Horticulture

Which Horticultural Science Is It? . . . 5
Tool Maintenance . . . 74
Botanical Illustration . . . 99
Flower Dissection . . . 140
Crossbreeding Petunias . . . 167
Going Bananas . . . 188
Water Movement through Soil . . . 215
Taking a Soil Test and Reading a Soil Report . . . 218
Seed Germination . . . 272
Interpreting Seed Labels and Packets . . . 279
Landscape Cuttings . . . 298
Lily Bulb Scaling . . . 321
Planting Geophytes . . . 327
Glitter Germs . . . 368
Subirrigation at Home . . . 392
Planting Seeds by Hand . . . 419
Planting Bare Root Plants . . . 420
Plant Cultivation . . . 436
Hypertufa Pots . . . 484
Nutrient Analysis . . . 486
Sustainable Media . . . 489
Growing Microgreens . . . 501
Constructing a 5′ × 4′ Low Tunnel with PVC . . . 511
Ripening Avocados . . . 537
Installing a Dry Creek Bed . . . 581
Increasing the Shelf Life of Bouquets . . . 591
Tying a Bow . . . 601
Homemade Floral Preservative . . . 604
Planting a Terrarium . . . 624
Turfgrass Morphology . . . 671
Turf Soil Testing Protocol . . . 677
Sharpening Lawn Mower Blades . . . 684
Weed Seed Banks . . . 706
Bug Aspirators . . . 737
Edible Weeds . . . 792
Biopesticide Application . . . 818
Alligator Alley . . . 842
Shipwrecked . . . 857
SOLAR System . . . 887
Using Social Media Safely and Responsibly . . . 890

Ag Ed, FFA, and SAE Connections

Agriscience Fair . . . 299
Floriculture Career Development Event . . . 592
Timeline of FFA Historical Events . . . 837
Creed Speaking . . . 845
Agricultural Communications . . . 858
Agriscience Fair Categories . . . 862
Beekeeping SAE . . . 863
SAE Grants . . . 864
What to Know about Presentations . . . 896
Extemporaneous Speaking . . . 897
Information Literacy . . . 899

Going Green

Turf Painting . . . 13
Market Baskets or Bags . . . 17
Living Roofs . . . 18
Biodiesel . . . 20
Conventional Foods' Carbon Footprint . . . 21
Drip Irrigation . . . 36
Electric Lawn Mowers . . . 72
The Many Uses of Bark . . . 134
LED Lighting . . . 185
Cover Crops . . . 214
Biochar . . . 221
Coconut Coir vs. Peat Moss . . . 224
Mulchmat . . . 225
Bioplastic Sleeves . . . 227
Garbage Can Garden . . . 318
High Tunnels in Organic Gardening . . . 384
Burning Biomass to Fuel Greenhouses . . . 390
Energy Efficient Poinsettia Production . . . 394
Greenhouse Curtains . . . 396
Rainwater Catchment . . . 412
Container Recycling Programs . . . 417
Shipping Container CEA . . . 445
The New York City High Line . . . 458
America's Greenest Bathroom . . . 460
Modular Green Roof Systems . . . 463
A Ring of Fire . . . 477
Human Waste as Fertilizer . . . 487
Certified Organic Growers . . . 504
Warren County High School Garden Club . . . 514
Parasitic Wasps . . . 532
Lawn Mowers . . . 577
Permeable Hardscapes . . . 643
Stormwater Management . . . 647
Lighting in the Garden . . . 648
Efficient Watering . . . 651
Tree Gators . . . 652
Organic Weed Control . . . 680
Herbicides . . . 681
Subsurface Drip . . . 682
Using Baking Soda to Treat Plant Fungi . . . 758
Natural Fungicides . . . 767
Organic Chemical Herbicides . . . 795
Controlling Snails and Slugs . . . 811
Efficiently Tracking Your SAE Hours . . . 870
Recycling Paper . . . 892

SAMPLE

History Connection

Cesar Chavez 64
Father of American Botany: Asa Gray 101
Marie Clark Taylor 132
George Washington Carver 159
J.C. Raulston 301
The Tree Circus 349
Percy Julian, Pioneer Research Chemist 410
Hydroponics on Wake Island 436
Frederick Law Olmsted (1822–1903) 561
Thomas Jefferson's Monticello and Poplar Forest 651
Sheep on the White House Lawn 678
Irish Potato Famine 759
Skull and Crossbones 815

STEM Connection

How Does a Fruit Grow Underground? 6
DNA and Plant Names 96
Virtual Herbarium 103
Increase in CO_2 Levels May Increase Plant Production 155
Induced Mutations in Plant Breeding 169
Plants Producing Light? 184
Growing Strawberries in the Winter 194
Using the Soil Triangle 222
Mulch and Soil Nutrition 226
Carnivorous Plants 241
A Helpful Fungus among Us 246
Love in a Puff 267
Laser Seed Scarification 271
Svalbard Global Seed Vault 273
Squirting Cucumbers 274
Spiny or Spineless? 295
Healing Herbaceous Grafts 342
Ketchup 'n' Fries Plant 344
Cincinnati Zoo's CREW CryoBioBank® 369
Static Pressure 387
Moles of Light 408
Automated Irrigation Sensors 414
Calculating Growing Space 418
What Are Microgreens and Sprouts? 421
Container Engineering 474
Iced Storage 518
Postharvest: Physiology and Technology 536
Espalier 542
The Saguaro Cactus 574
Smart Watering 575
Calculating Mulch 576
Fragrance 603
Bonsai 618
Biophilic Design 622
Rendering a Landscape Plan 642
Herbicide-Resistant Weeds, Palmer Amaranth 699
E. coli Outbreak Linked to Deer 701
Emerald Ash Borer 708
The Yucca Moth 730
Butterfly Scales 733
Viviparous Aphids 740
Papaya Ringspot Virus 765
The Beagle Brigade 766
Rose Picker's Disease 769
Cedar-Apple Rust 770
Seed Viability Experiment 788
Mistletoe 791
Chemicals from Flowers 809
Pesticides and Beneficials: The Wilsonville Bee Kill 816
Lethal Dose 819

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