Practices Supporting Sustainable Agronomy
Learning Objectives

• Describe the sustainability benefits of several widespread agronomic systems and practices.
• Understand the challenges of those systems and practices.
• Explain the synergistic value of incorporating more than one system or practice into a farming operation.
• Communicate the adviser’s role in helping the grower adapt these systems and practices.
Some Widespread Practices That Improve Farm Sustainability

- 4R Nutrient Stewardship
  - Conservation Tillage
- Cover Crops
- Crop Rotation

Grounded in science
Technology neutral
Outcomes-focused
Systems Approach

• Create synergy
• Leverage multiple management techniques
• Better outcomes simultaneously employing two or more

Diagram:
- 4R Nutrient Stewardship
- Crop Rotation
- Cover Crops
- Conservation Tillage

Synergy
4R Nutrient Stewardship

Chapter 1
4R Nutrient Stewardship

Framework for achieving

- Greater crop productivity
- Increased profitability
- Enhanced environmental protection and soil health
- Improved sustainability
The 4R’s

Right Source  Right Rate  Right Time  Right Place
4R Best Management Practices (BMPs)

- Increase nutrient use efficiency
- Match nutrient supply with crop demand and minimize losses from field
- BMPs are determined by
  - Crop
  - Soil
  - Climate
  - Management and field history
Precision Agriculture + 4R

- Avoid application skips and overlaps
- Site specific variable rate accounts for variation in field
- Boosts nutrient use efficiency
- Technologies:
  - GPS
  - Soil sampling
  - Satellite imaging
  - Crop sensors and yield monitors
  - Variable-rate fertilizer application
Maximum Benefits

4R + Cover Crops + No Till = Better Nutrient Use Efficiency
Discussion
Cover Crops
Chapter 2
Cover Crops

- Improve health of production system
- Planted after cash crop harvested
- Killed, but not removed
- Use in U.S. is increasing

Cover Crop Use in the U.S.
Benefits of Cover Crops

Continuous roots and vegetative soil cover

• Improve soil health
  • Increase soil organic matter
  • Decrease erosion
• Protect water quality
  • Less runoff
  • Scavenge nutrients
• Improve water management

Photo: Lynda Richardson, NRCS
Benefits of Cover Crops

- Support biodiversity
  - Pollinators
  - Predators/parasitoids
- Reduce pesticide requirements by suppressing pests
  - Weeds
  - Nematodes and other soil-borne pathogens
Challenges to Growing Cover Crops

- Geography
- Crop Rotation
- Selecting seed species/mixes
- Planting
- Management
- Termination

Growers need YOUR expert advice
Adviser’s Role

• Offer sound agronomic advice
• Manage grower expectations
• Manage entire cropping system
• Requires broad agronomic expertise
Discussion
Conservation Tillage
Chapter 3
Conservation Tillage

Any method of soil cultivation that leaves the previous crop’s residue on the field before and after planting.

30% - 70% soil surface covered
Types of Conservation Tillage

Strip till  No till

Each requires different equipment and management

Mulch till  Ridge till

Photos: Lynn Betts, NRCS
Benefits of Conservation Tillage

- Fewer equipment passes
- Less energy consumed
- Reduced fuel and maintenance costs
- Improved soil water holding capacity
- Reduced irrigation water requirements
- Cooler soil – lower evapotranspiration
- Cost savings from less water and energy to pump
Benefits of Conservation Tillage (continued)

- Reduces erosion
- Conserves soil organic matter
- Less soil compaction

SOIL HEALTH

- Protects water quality
- Wildlife habitat
Conservation Tillage Challenges

- Learning curve can be steep
- Increased reliance on herbicides to manage weeds
- Cold soil may delay germination
- Wet soil prone to compaction
Discussion
Cover Rotation

Chapter 4
Crop Rotation

Agronomic practice of using biological, chemical, and physical properties of successive crops to improve crop growth, soil health, and farmer economic viability.
Crop Rotation

- May include fallow and cover crops in addition to cash crops
- Complementary and synergistic mix of species
- Considers available labor and equipment
- Accounts for local soil and climate conditions
Benefits of Crop Rotation

- Higher yields
- Lower input costs
- Greater profitability

- Reduce pest pressure
- Improve soil tilth and bulk density
Crop Rotation Challenges

• Added management complexity
  • Planting
  • Weed management
  • Irrigation
  • Harvest
• Careful financial planning
  • Inputs
  • Price
  • Markets
  • Equipment
Discussion
Other Practices

Chapter 5
Other Practices: Precision Irrigation

Conserve water by providing irrigation at the right time, rate, and location

- Monitoring technology
- Moisture sensors
- Weather stations
- Variable rate application
Other Practices: Conservation Drainage

Remove excess water from fields without compromising downstream water quality

- Water control structures
- Wood chip bioreactors
- Alteration of drainage ditch systems
Other Practices: Conservation Buffers

Install permanent vegetation that

• Slows water runoff
• Provides wildlife habitat
• Stabilizes riparian areas

Photo: NRCS
Other Practices: Integrated Pest Management (IPM)

Use a variety of methods to prevent and manage pests
- Set action thresholds
- Monitor and identify pests
- Use preventative measures
- Control using least risky options
Discussion
Review

• Growers need your help.
• Not every practice works in every situation.
• A combination or practices and systems has a synergistic effect.
• There are many more practices not covered in this module.
Thank you!

Sustainability Programming for Ag Retailers and CCAs (SPARC)

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