



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



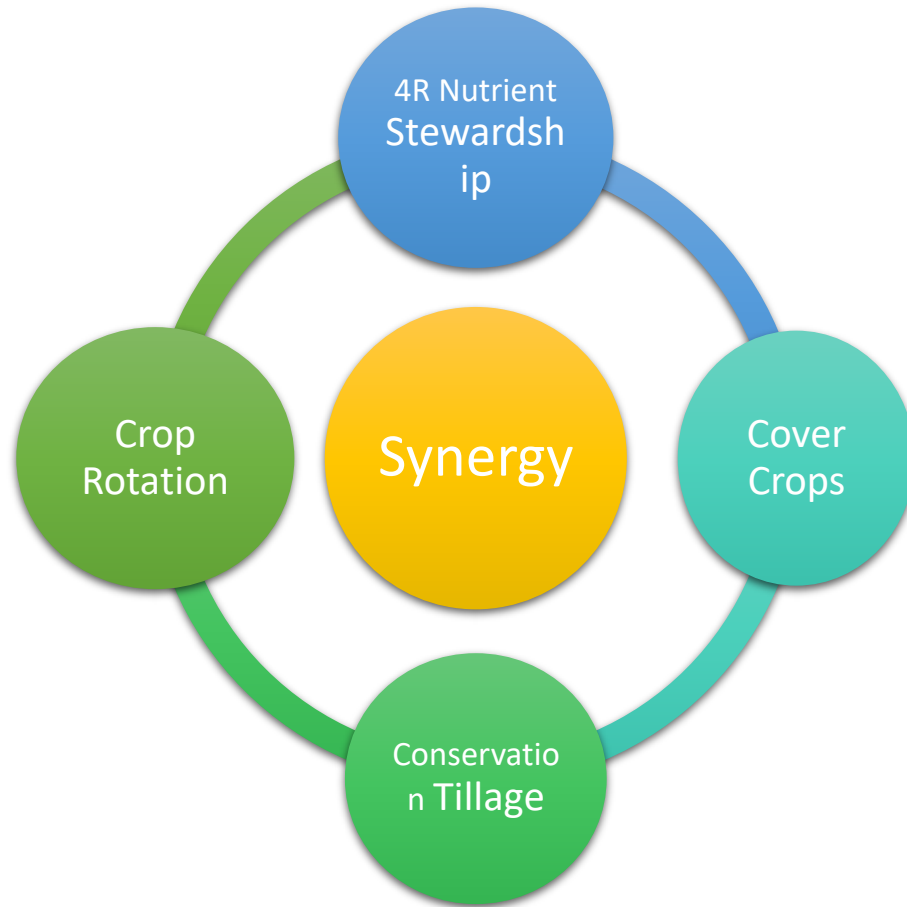
Technology
neutral



Outcomes-
focused

Systems Approach

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



4R Nutrient Stewardship

Chapter 1

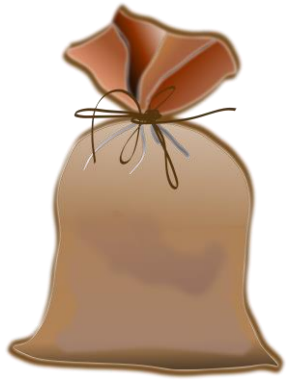
4R Nutrient Stewardship

Framework for achieving

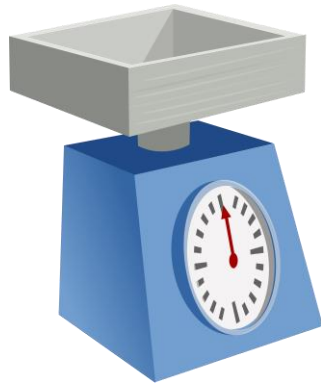
- Greater crop productivity
- Increased profitability
- Enhanced environmental protection and soil health
- Improved sustainability



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

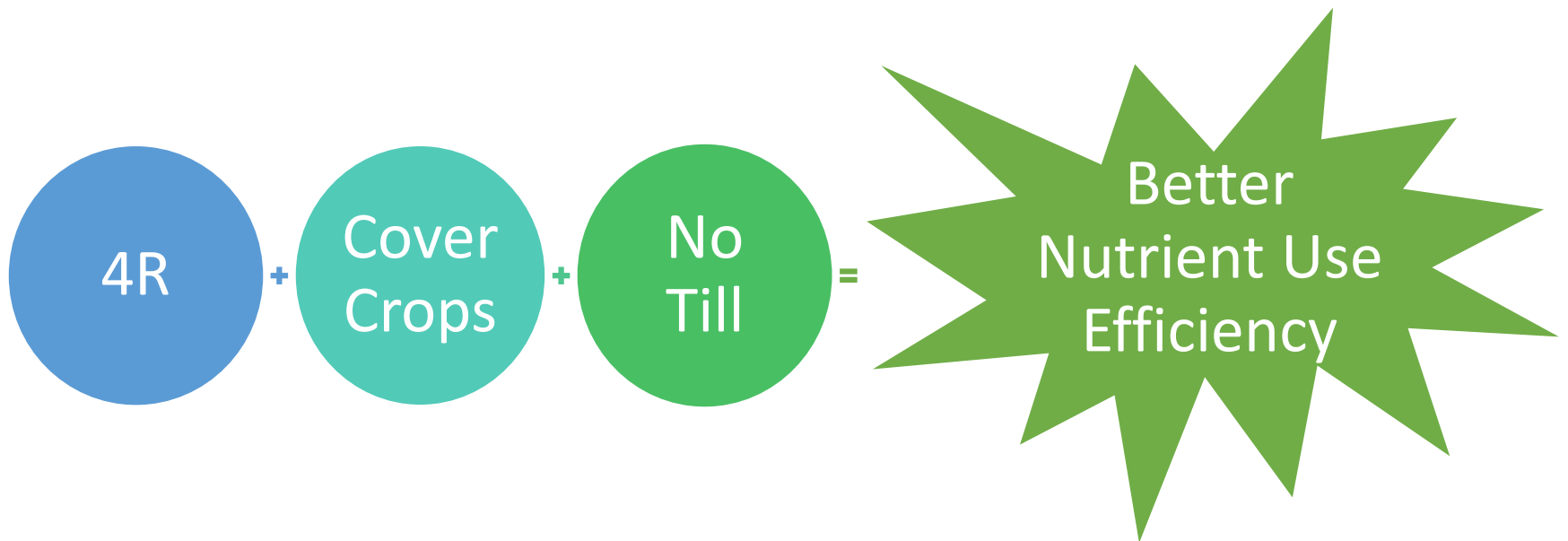


Precision Agriculture + 4R

- 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



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

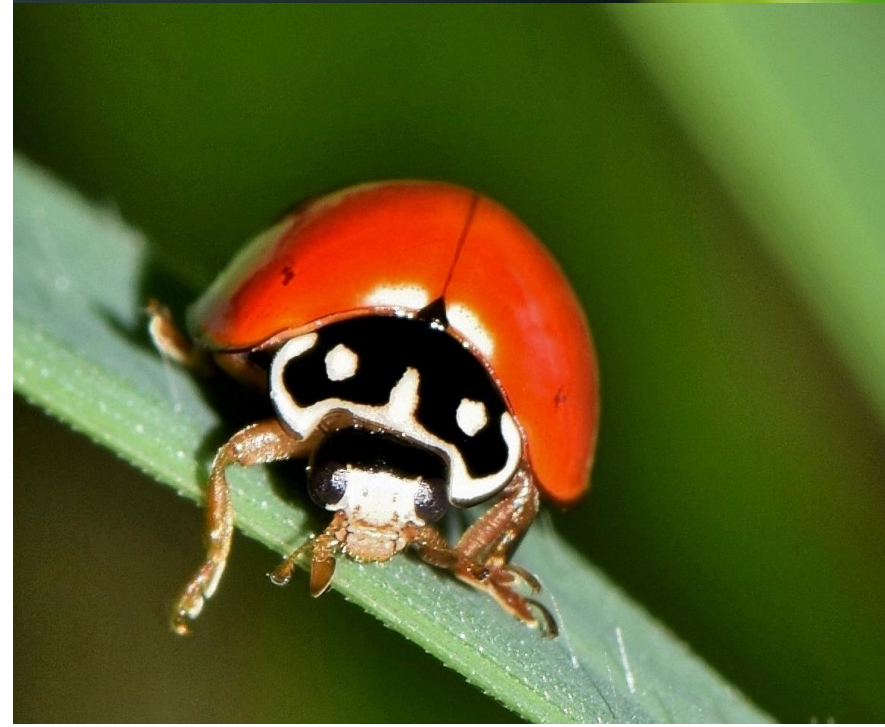
- Improve soil health
 - Increase soil organic matter
 - Decrease erosion
- Protect water quality
 - Less runoff
 - Scavenge nutrients
- Improve water management



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

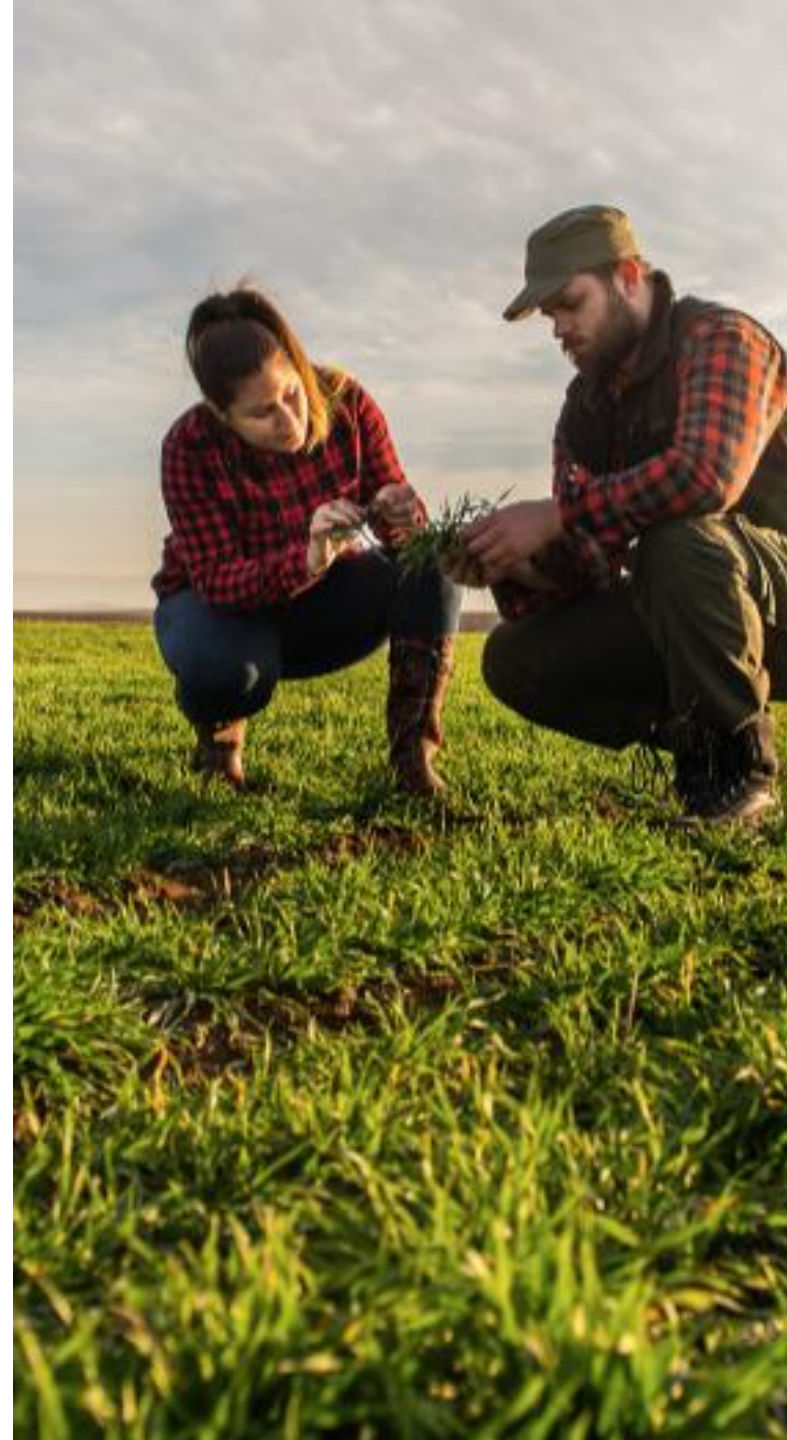
- Geography
- Crop Rotation
- Selecting seed species/mixes
- Planting
- Management
- Termination

**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



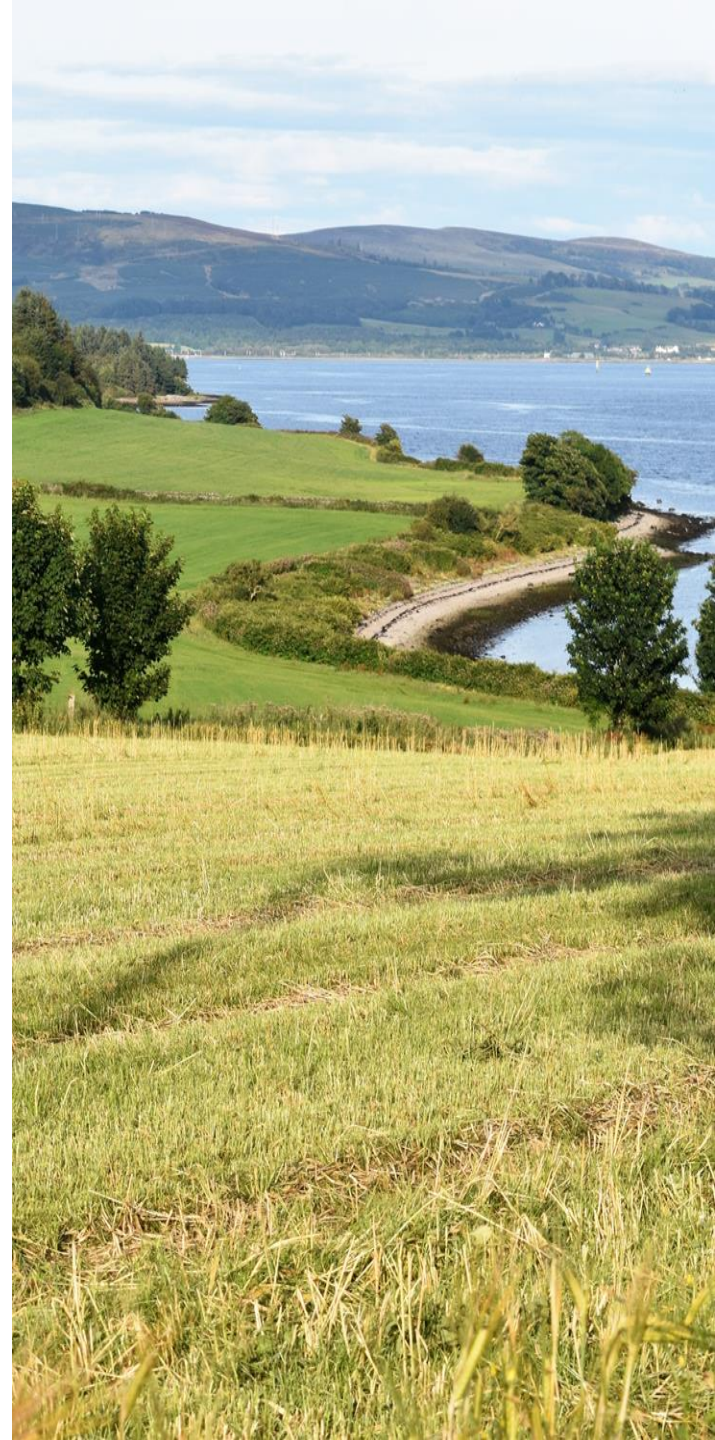
Benefits of Conservation Tillage

- 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



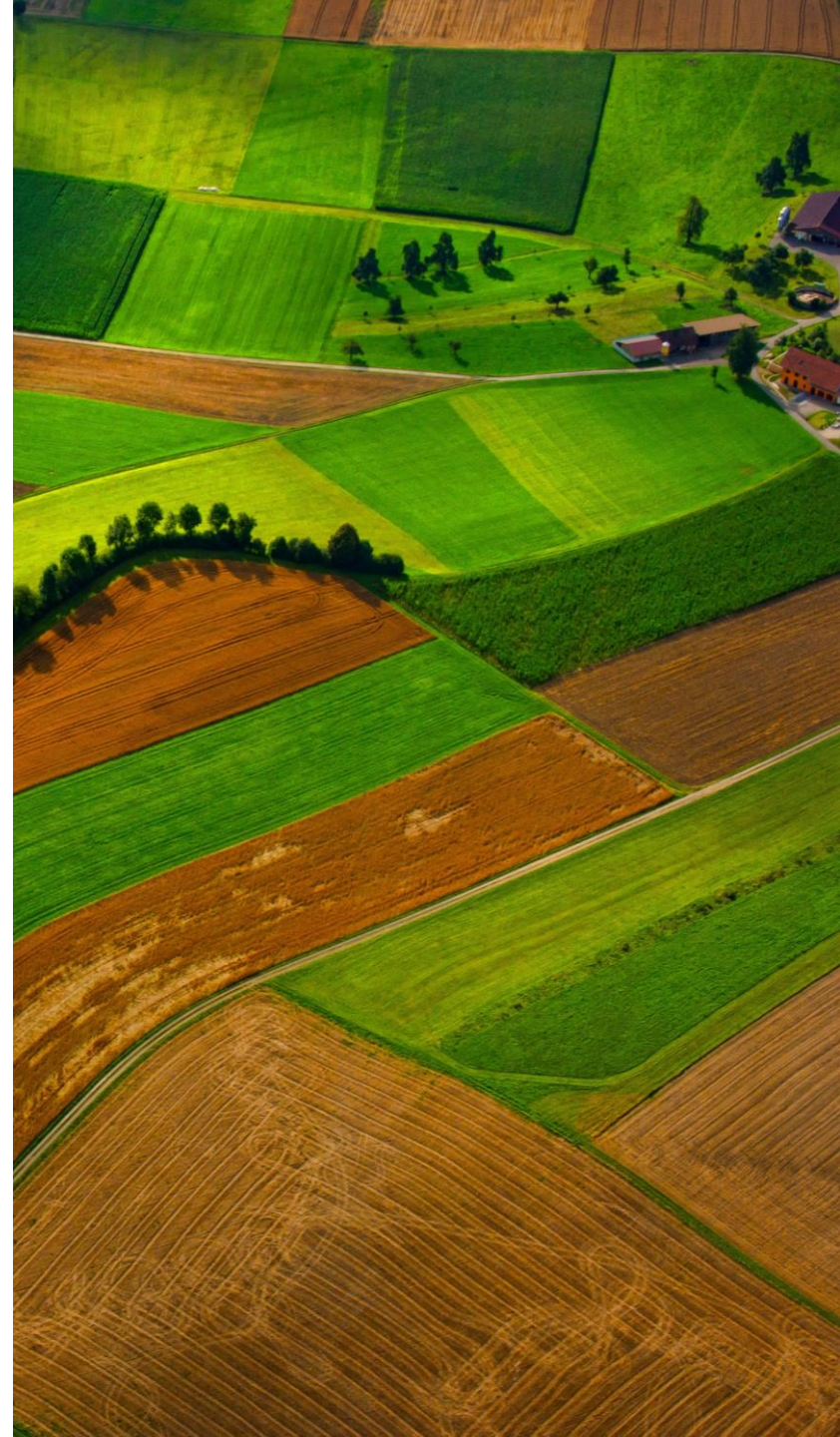
Discussion

Cover Rotation

Chapter 4

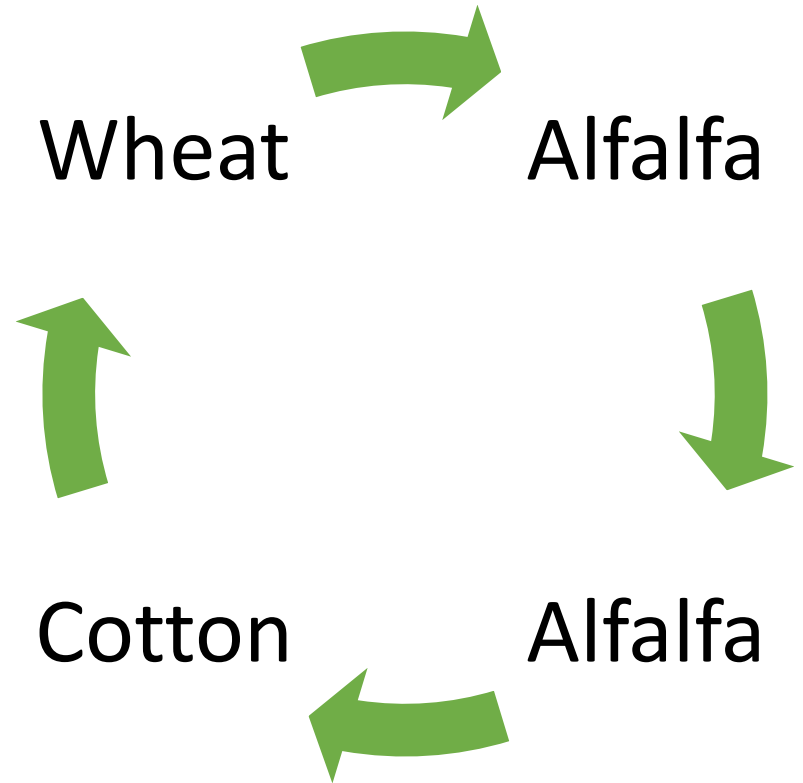
Crop Rotation

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

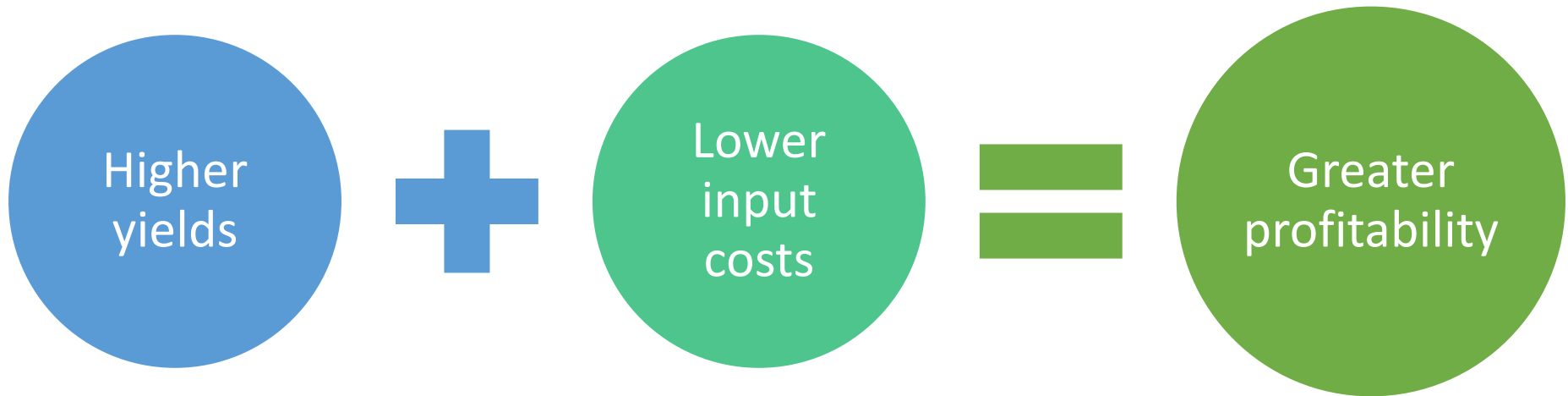


Crop Rotation

- 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



- 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



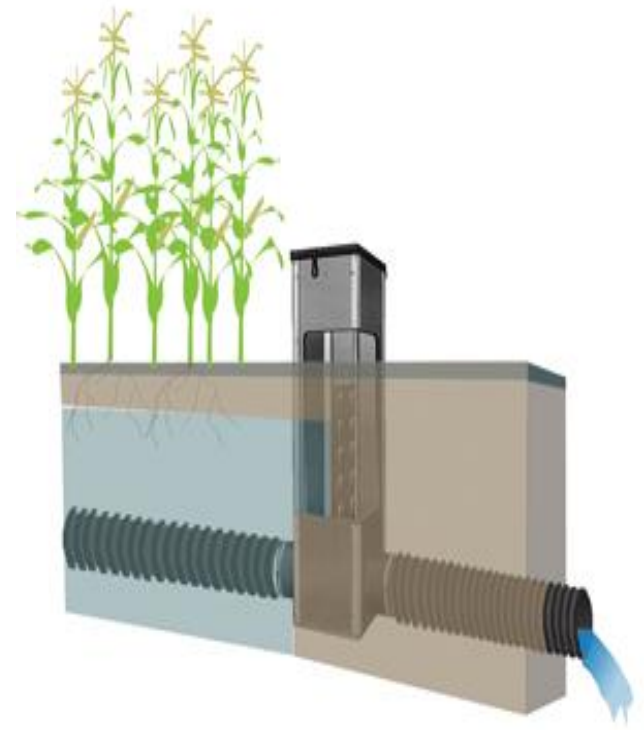
Photos: NRCS



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



Photo: Marlin E. Rice, Iowa State University
MARLIN E. RICE

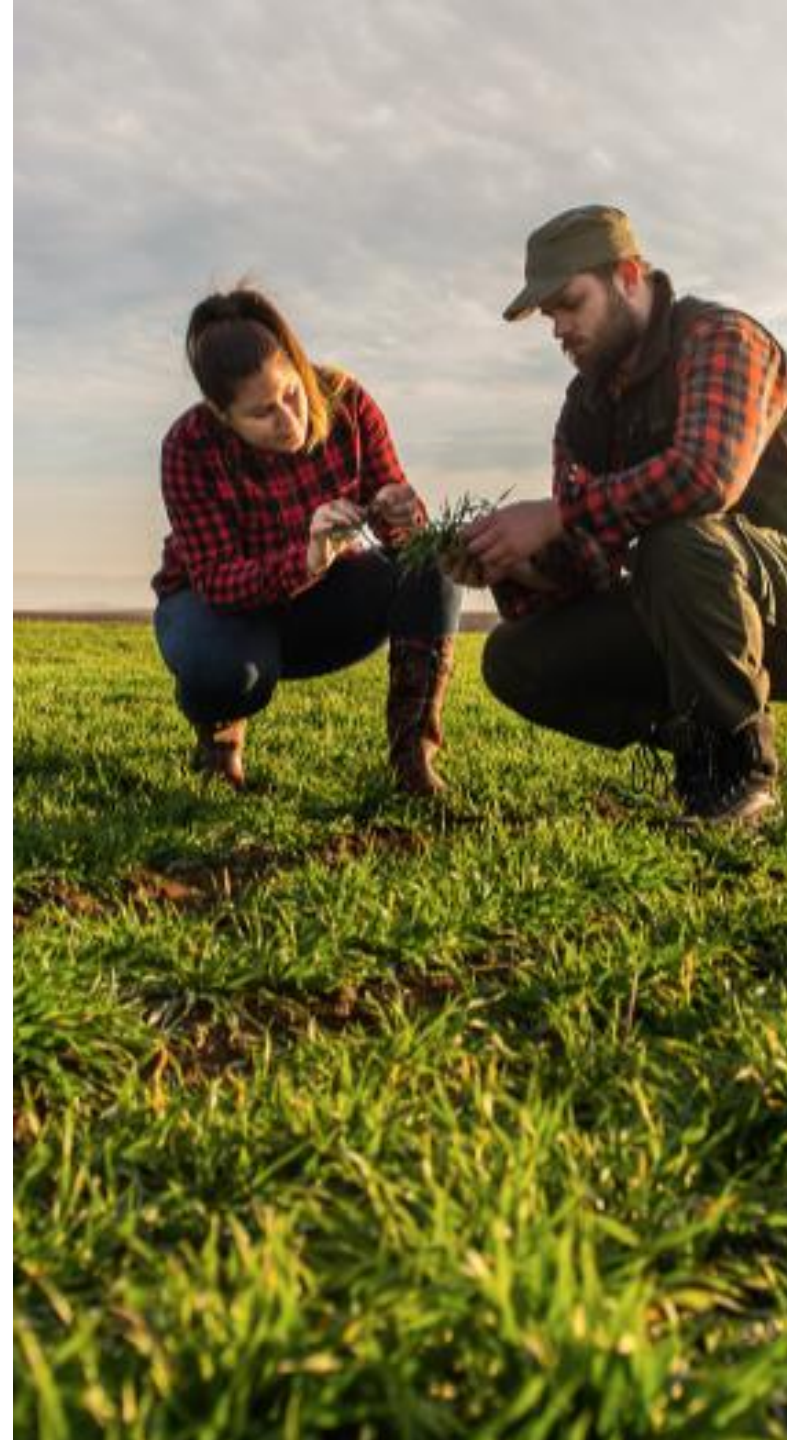


Photo: Marcy Sousa,
University of California

Discussion

Review

- Growers need your help.
- Not every practice works in every situation.
- A combination of 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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