Integrated Farming Systems for Sustainable Production

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We’ve achieved a lot, but we must all do a better job.

This is our chance, maybe only chance, to really achieve sustainability.
Sustainable Farming Systems must integrate:

- Soil Quality
- Water Quality
- Nutrient and Salinity Management
- Cropping Systems, incl. Cover Crops
- Irrigation Water Management and Systems
- Integrated Pest Management
- Livestock and Wildlife
- Energy and Air Quality
- Economics
- Whole Farm Planning
- Watershed, Marketing Opportunities
Potential Benefits of Sustainable Systems: Water Resource

- Conserved surface and ground water quantity and quality
- Increased efficiency, higher yields
- Reduced pumping costs
- Water losses minimized (evaporation, runoff and deep percolation)
Potential Benefits of Sustainable Systems: Soil Resource

- Improved soil quality (greater yields, more crop biomass/residues, improved soil structure, organic matter)
- Reduced wind and water erosion
- Proper salinity and nutrient management (reduced use of soil amendments, reduced runoff and leaching)
Potential Benefits: Plant Resource

- Crop production costs reduced
- Increased crop yield and quality
- Reduced pest incidences (e.g. weeds, insects, diseases)
- Available water quantity and quality meet specific requirements of crop (consumptive use, leaching)
Other Potential Benefits

• Reduced overall on-farm energy use
• Increased beneficial use and recycling of nutrients
• Protection of resources by planned judicious use of water and all inputs
• Record keeping is used as a tool in decision-making and management of current and future resources
Achieving Sustainable Farming

- Whole System (Ecosystem, Field, Farm, Watershed)
- Resource Opportunities
- Think Critically
- Use Problem-Posing/Solving Approach
Think Resource Efficient
Think On-site and Off-site
Effects
Plan Creatively and
Flexibly
Technology Exchange not
Transfer
Producers need to demand quality service. NRCS, in addition to NMSU, CES, and other agencies, must help develop sustainable farming systems. Need interdisciplinary teams including producer.

Producers are the drivers of sustainable farming as we develop/exchange technologies, case studies, field trials, on-farm demonstrations, farmer-to-farmer networks.
Achieving Sustainable Farming

1. Keep energy flow through the integrated system.

2. Integrate chemical, biological, and physical.

3. Improving soil quality is basis for improving soil, water, air, plant, and animal resources.
Sustainable Farming – Diversify Enterprise

- Market outside commodity supply
- Emphasize direct marketing and specialty markets
- Form cooperative
- Add value through on-farm processing
Sustainable Farming – Build Soil Quality

- Minimize or eliminate tillage
- Apply nutrients according to soil, plant, tissue tests and nutrient budget
- Increase on-farm nutrient cycling, plant species diversity
- Maintain ground cover year round by using cover crops and mulches and by leaving crop residues in field
- Manage/protect soil organisms to preserve biodiversity
- Rotational grazing, prescribed grazing
Sustainable Farming – Develop Conservation Plan

- Use integrated approach to inventory resources and develop conservation plan for whole farm
- Choose and apply conservation practices, technologies, approaches to address identified resource concerns and take advantage of opportunities
- Not only think outside the box but step outside the box
Prevent pest problems by building healthy, biologically active soil, creating habitat for beneficial organisms, and choosing appropriate plant cultivars/rotations.

Tolerate, don't eradicate.

There is no silver bullet.

Treat the causes of pest outbreaks, not the symptoms.

If you kill the natural enemies, you inherit their job.

Pesticides are not a substitute for good farming.
Sustainable Farming – Maximize Biodiversity

- Integrate crop and livestock production
- Use hedgerows, insectary plants, cover crops, etc. to attract beneficial insects, bats, and birds
- Plant trees and perennial crops
- Abandon monocropping in favor of crop rotations, intercropping and polycultures
- Manage pastures to support diverse selection of forage plants
- Plant cover crops
Sustainable Farming – Other Considerations

- Take an inventory; think about every field, pasture, stream, well, etc.
- What are the natural resources on my farm? In my watershed?
- What crops can I grow?
- Have I minimized runoff and leaching?
- Am I using crop rotations for nutrient cycling and to reduce disease/pest problems?
- What type of livestock/wildlife do I have or would I like on my farm?
Sustainable Farming – Other Considerations

- Have I taken a soil test?
- Have I taken an irrigation water test?
- Have I taken plant tissue tests?
- How is my soil quality? Soil fertility, Aggregate stability, active organic matter; visual indicators, including erosion, weeds, blowing soil, sediment deposition, crop or plant quality and production, earthworms
Besides using crop residues and cover crops, what other practices can I apply to build soil quality? To recycle nutrients? To use water efficiently?

Which practices would contribute to an environmentally and economically sound farm?

Am I making the best use of compost, animal manure, legumes as nutrients for plants?

How can I conserve/produce energy or reduce energy use?
Sustainable Farming Workshops

- Share resources, including Integrated Water Management Handbook on NRCS website: http://www.nm.nrcs.usda.gov, click on Irrigation

- Evaluate site-specific conditions, including chemical, biological and physical

- Build soil quality and improve overall farming system
Sustainable Farming Workshops

- Promote user friendly integrated management and technology exchange

- Reduce overall on-farm energy use, inputs, production costs, pest incidences, pumping costs, water loss, soil loss.

- More economical, sustainable farming enterprise

- Healthier watershed and community
On Farm Demos/
Case Studies:

Please take the picture, this thing weighs a lot.
Farming Goal

- To produce high quality crops through implementation of agro-ecological principles.
Larry Sanchez Farm
Located in Adelino

South Field:
- 3.1 Acres
- Dovey Fescue

North Field:
- 5.3 Acre
- Dovey/Alfalfa Mix

Field 2
- Vegetable Garden
Irrigation Water Management

• Flood Irrigation: Concrete Lined Ditch- 8 CFS

• Land Leveling to correct slope on soils

• Irrigation Timing

• Farming Practices
Organic Matter

• Chicken Manure
• Cover Crop
• Stubble
• Soil Sampling
• Minimum Till
REDUCED TILLAGE FIELD
SOILS

GE=Gila Loam, Slightly Saline

GK=Gila Clay Loam
PRODUCING PLANTS WITH HIGH NUTRIENTS
PRODUCING PLANTS WITH HIGH NUTRIENTS

• Amendments in soils to improve physical properties

• Trials that Plant Materials Center assisted with finding highest producing grass

• Working the soil
Before and After
Bailing Hay
Harvest

Before

After
Measuring
Santa Fe - Raised Beds, Drip, Diversity, Manure, Compost, Cover Crops, Transitioning to Organic
Carlsbad - Integrated Water Management/Nutrient Management Field Trial/Demonstration
Golden: Double Dug, Composting, Mulching
Las Cruces: Cover Crops, Residue Management, Salinity Management, Integrated Water/Nutrient Management
Deming: Wind Erosion/Herbaceous Wind Barriers Field Trials/Demonstrations
Residue Management/Soil Quality Field Trials/Demonstrations
Keys to Achieving Sustainable Farming

- Use integrated systems approach (ecosystem, whole farm, watershed)
- Problem-posing, problem-solving
- Actively seek resource, watershed, marketing opportunities
- Resource efficient and resource conserving
- Technology “exchange” vs. “transfer”
- Develop whole farm conservation plan creatively and flexibly, step outside the box
- Consider on-site and off-site effects
- Focus on keeping energy flow through the integrated system
- Reemphasize biological factors, improve biodiversity
- Improving soil quality is key to improving soil, water, air, plant, and animal resources
- Case studies, field trials, on-farm research/demonstrations, farmer-to-farmer networks
- Interdisciplinary teams including producers and partners
- Farmers need to demand quality service
- Recordkeeping is tool in decision-making and management of current and future resources
- Need user friendly fact sheets, brochures on integrated systems