Consider the Alternative

Western SARE

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USDA United States Department of Agriculture
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Situation

Concerns over environmental degradation, natural resource consumption, human health risks, and economic decline associated with industrial agriculture have led to the emergence of alternative, low-input farming practices in fertility, tillage, and pest management.

Alternative farming methods typically use a blend of traditional practices and innovative ecological principles to enhance the long-term sustainability of agroecosystems while maintaining productivity and short-term profitability.

To support growers who transition to alternative production methods, information on organic and low-input farming obtained in long-term field studies is needed.

Research and Education Grant

Title: Transition from Conventional to Low-Input or Organic Farming Systems: Soil Biology, Soil Chemistry, Soil Physics, Energy Utilization, Economics, and Risk

Project Number: SW99-008

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Cooperative Extension: Karen Klonsky (Economics), Tom Lanini (Weed Science), Jeff Mitchell (Soil Quality), Steve Temple (Agronomy), Tom Kearny (Grains), Gene Miyao (Vegetable Crops)

Farmers: Jim Durst, Bruce Rominger, Scott Park, Tony Turkovich, Ed Sills Staff: Peter Brostrom, Don Stewart (Production Managers), Leisa Huyck (Research Manager)

SARE Grant: $153,962

Objectives

- Compare pests, soil characteristics, crop yield and quality, and profitability among four farming systems with different levels of reliance on non-renewable resources
- Evaluate existing and/or novel sustainable and organic practices
- Distribute information generated by the project

Actions

Organizational Structure and Management

The project, termed 'Sustainable Agriculture Farming Systems (SAFS)', was a combined effort of University researchers, farm advisors, and farmers, and included the following features:

- Multidisciplinary
- Group leadership
- Consensual decision-making

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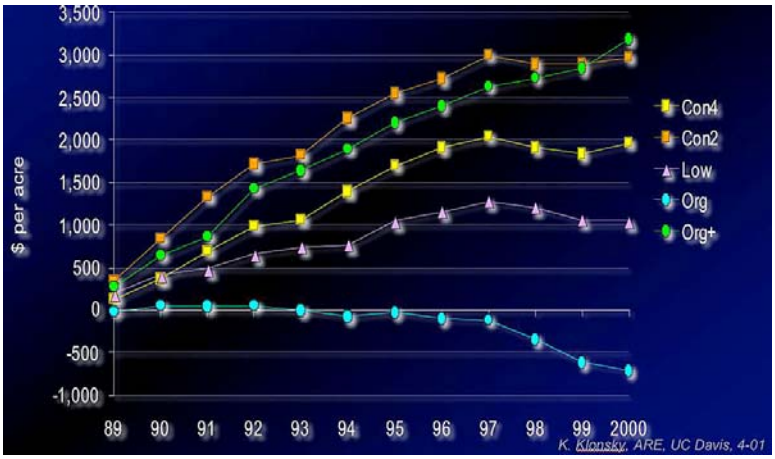
Tomato was the rotation's most profitable crop..

CONSIDER THE ALTERNATIVE

- Use of 'best farmer management' practices
- Systems oriented



Cumulative net returns for the farming systems.

Farming Systems

The crop rotations and management practices were maintained for a total of 12 years on 56 1/3-acre plots that allowed use of full-scale equipment. The three 4-year, 5 cash crop rotations included tomato-safflower-corn- wheat or hay, followed by double-crop beans. Farm management was:

- conventional (synthetic fertilizer, pesticides)
- low-input (cover crops, synthetic fertilizer at reduced rates, IPM, pesticides if needed)
- organic (cover crops, composted manure, organic IPM)

The fourth system, a 2-year tomato-wheat rotation, was managed conventionally.

Data Analysis

Data on crop production, pests, and soil quality were collected for research as well as adaptive management purposes. Each system's economic performance was quantified by simulating economic performance of a 2000 -acre farm based on actual costs of inputs and labor within this region and crop yields measured in the experiment.

Results

Some findings in the large number of studies carried out within the overall context of this project:

Cover crops

Infiltration in the winter cover cropped systems (low-input and organic) was twice as high as in the winter fallow systems. The presence of cover crops during the rainy season significantly decreased runoff as a percentage of rainfall.

Above is a conventional field under winter fallow. The field below is organic, low input with cover crops.

Soil food web

Arthropods, pathogens, and nematodes were found to play a relatively small role in influencing yields.

Weed management

The economic feasibility of reducing pesticides depends on the crop. In corn, mechanical cultivation could substitute for a 50% reduction in pesticides, but in tomato, such a reduction would increase pest management costs by 50% due to the dependence on hand hoeing.

Nitrogen storage and loss

The long-term balance of nitrogen (N) inputs and outputs, and soil N storage indicated average annual unaccounted for losses of 40 to 45 kg N ha-1 in the conventional systems. In the organic and low-input systems, these losses were 9 and 3 kg N ha-1, respectively.

Profitability and energy use efficiency

The 2-year conventional and the organic rotations were the most profitable systems due to the greater frequency of tomato in the former and the organic price premium in the latter. Energy use was lowest in the low-input and highest in the conventional systems.

Western SARE
Sustainable Agriculture Research & Education

SARE's mission is to advance—to the whole of American agriculture—innovations that improve profitability, stewardship, and quality of life by investing in groundbreaking research and education.

The Western Region, one of four SARE regions nationwide, is administered through Utah State University.

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