

Transition Experiences Among California Farmers

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Introduction

California's farmers are currently facing tremendous challenges. On one hand, they have established themselves as producers of a wide array of high quality commodities. On the other hand, they are now expected to continue that tradition with minimal environmental and social impact. Particular challenges facing farmers include conservation of agricultural resources, quality of groundwater and surface waters, dependence on non-renewable (petroleum-based) inputs, as well as the health and safety of farm workers. In the meantime, the cost of inputs increases, the number of pest control materials becomes more and more restricted, water supplies dwindle from on-going drought and increased urban demands, and farm-gate prices are low. How can farmers and farming communities remain viable in view of these constraints?

Many California farmers are modifying the way they farm and embracing new opportunities to produce food and fiber. They are combining information, imagination, and determination, with new management perspectives to develop production systems that meet the demands of society, that address their own concerns for the natural environment, and that provide the economic security needed for their family and business. In making such a transition, farmers are moving toward sustainable agricultural practices.

This paper is based on information from a soon-to-be released book from the University of California Sustainable Agriculture Research and Education Program that chronicles the experiences of California farmers during their transition. The publication is a guide to the process of change. It is designed to stimulate thought, discussion, and creative action throughout the agricultural community. Information for this publication was gathered from written materials including technical journals, popular publications, and books from across the United States and Europe. Added to this written information were the experiences of interviewed growers in various stages of transition and representing a wide range of farming systems throughout California.

What Is Transition?

The term transition refers to the passage or progress from one position or stage to another (The American College Dictionary). The very definition implies movement, and underscores the idea of continual change and development. Agricultural transitions are fluid and dynamic processes. Most farmers are moving toward a set of personal and business goals, rather than a single target, point or place. Many successful transitions begin with small steps which are slowly integrated into the whole-farm system. Although it is possible to implement an abrupt or "cold-turkey" transition, these conversions tend to be quite disruptive and difficult to manage.

This California study identified the following three key transition phases: 1) the human element, 2) information handling and planning, and 3) management of the farming system. A graphic illustration of the relationships among these elements is presented in Figure 1. Since farming is a dynamic and cyclical process, the image of a wheel was selected for this graphic. The farmer as decision-maker forms the crucial center hub of the transition. There are a variety of ways to begin or end the process, and since each farm is unique, each farmer develops personal as well as farm goals. It is not possible to move through a transition by a "recipe." The grower's own knowledge and flexibility provide the creativity necessary to manage these diverse agricultural systems. Moving outward and giving structure to the hub is the "planning circle." This circle illustrates a process that can be used to develop a farm transition plan. The spokes and rim complete the diagram and describe the many interactions that take place among resources, social and economic pressures with the farmer as the decision-maker.

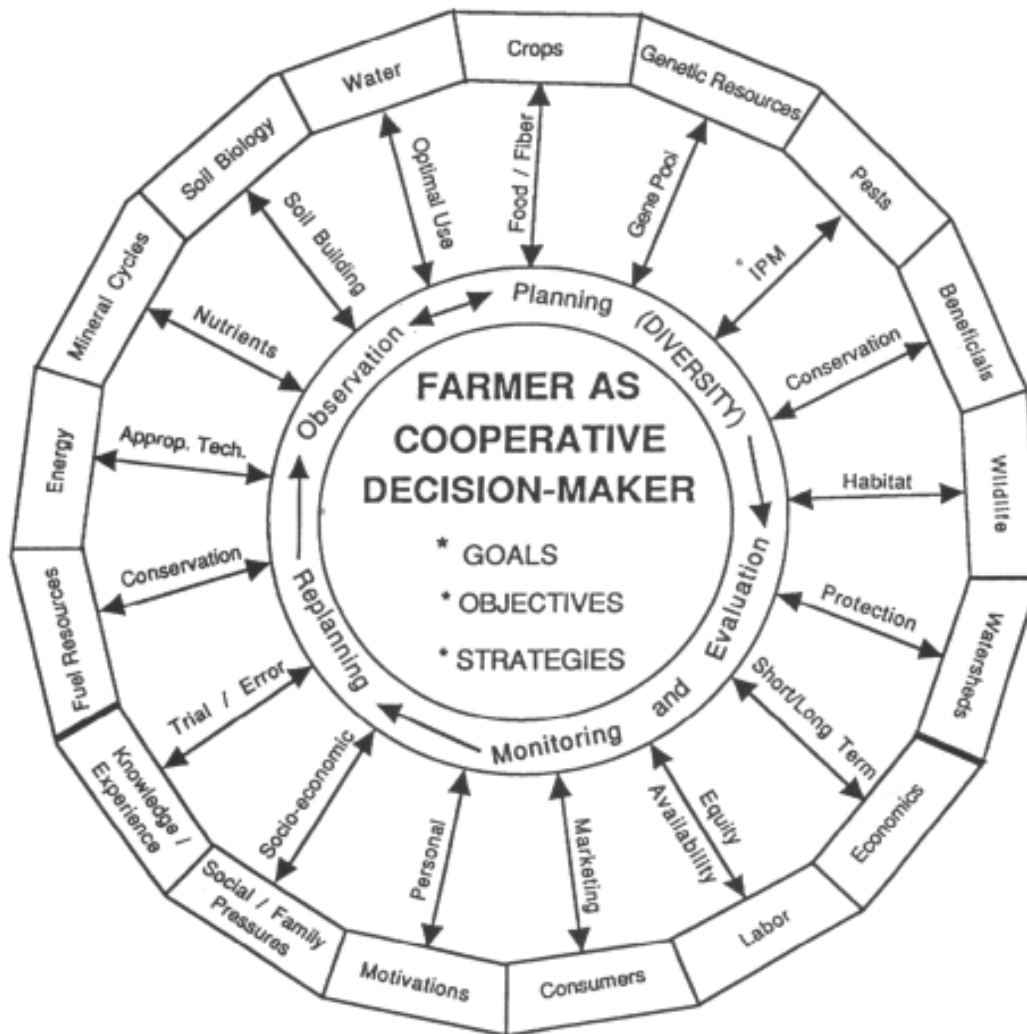


Figure 1. A Graphic Illustration of the Relationship of Essential Phases in the Transition from Conventional to Sustainable Agriculture, i.e., (1) the Human Element, (2) Information Handling and Planning, and (3) Management of the Farming System. The Farmer Occupies a Central Position as Decision-Maker Who Selects the Goals, Objectives, and Strategies That Will Guide the Transition Process.

The Human Element: Motivations and Attitudes

Economic necessity, increased regulation and a desire to improve soil quality are all strong motivations for change. However, many interviewed farmers felt that as they modified their production practices, new attitudes toward farming surfaced. Several reported that they were enjoying farming more, and although not everything they tried was successful, they were happy about the direction their farms were headed. As noted by A Central California Coast rancher, “The farmer changes first and this is reflected by changes on the land.” Ultimately, it is the farmer and members of the family or management team who provide the imagination, desire and knowledge to make a transition succeed.

Motivations

There are many reasons why farmers are changing the way they farm. Some farmers are responding to new marketing opportunities and changes in consumer demand. Others are altering their practices as a result of new regulations or other external forces beyond their control. The overlap of inspirations and concerns discussed by farmers was significant and reveals much common ground. The strongest motivators mentioned by those inter-viewed were: 1) economic necessity; 2) increased regulations; 3) a desire to enhance farm resources; 4) environmental considerations; 5) the

health of farmers and farm workers, their families and communities; 6) consumer preferences; and 7) labor concerns. While these seven motivations do not address all aspects of sustainable agriculture, they have provided many growers with the momentum needed to begin the process of change.

Attitudes

Research demonstrates how our thoughts influence our actions and experiences. When we envision success, we are more likely to achieve it. Farmers who had a deep belief in themselves and what they were doing had the most positive experiences during the transition period. These beliefs, combined with a strong commitment to find alternatives, carried them through periods of discouragement or frustration, and helped them persist until they were successful. Their curiosity and commitment motivated them to seek information, take responsibility for learning, and overcome a natural reluctance to change. It is no surprise that belonging to a group of like-minded farmers encourages information exchange and provides support when exploring new ideas.

Since decisions are usually influenced by the values of family or business associates, the central hub of the graphic (Figure 1) shows the farmer as a cooperative decision-maker. Agricultural lenders, farm suppliers and the availability of services may affect the types of changes that can be tried. It often helps to recognize these forces and to enlist their support early in the transition.

Planning for the Transition

Planning is an integral part of the transition process. Identifying goals and developing a transition plan provide a clear direction to follow. The farmer is able to ask questions, seek information, and evaluate methods and materials before changes are made, thereby reducing risk. A plan will also provide a path to follow during difficult stages. The experiences of other farmers can provide information to help determine the degree of change with which one is comfortable, and to avoid costly mistakes once the transition is underway.

As shown on the transition graphic (Figure 1), the planning circle encompasses the central hub. This is a circular process, with all decisions being monitored and evaluated during the growing season. The following are suggested planning steps, but they should be modified to suit each particular situation.

Evaluation of the Current Farming System

Sustainable agriculture emphasizes the use of internal resources (as opposed to purchased off-farm inputs), so it is useful to take an inventory of the farm's physical, biological, and human assets. This allows the farmer to locate weak points, problem areas, or inefficiencies, and to enhance internal nutrient cycling. A comprehensive evaluation enables the farmer to design a system that will meet farm goals and be cost-effective.

Assessment of Costs and Risks

Adjustment of the farming system involves more than just dropping the costs for fertilizers and pesticides. In many cases, there is a trade-off between new and old costs of production. For example, the cost of fertilizer is traded for the cost of purchasing and spreading manure or compost. Direct comparison between production methods is difficult because many alternative practices provide multiple benefits and are often geared toward long-term stability and productivity.

There are also short-term costs and modifications that can affect the economics during the transition. Some of the most common of these include:

- cost of keeping land out of production (e.g., soil building, rotation),
- purchasing new equipment or modifying old equipment,
- additional labor to support a more diversified production system,
- costs of alternative marketing strategies,
- relative value of new crops included in the rotation, and
- variability in yield and income as the new farming system stabilizes.

The greatest financial risks often come during the initial transition period. It is possible to have yield reductions and fluctuations until biological systems have time to become stabilized and the

grower develops a reliable production plan. Reduced yields and profitability are most often found with abrupt transitions. Effects on profits can be minimized through gradual reductions in chemical uses combined with conservation practices or introduction of natural enemies, reduction of debt, and diversification of the farming system (Dabbert and Madden, 1986; Peters, 1991; MacRae et al., 1990).

Development of Goals, Objectives and Strategies

Broad, long-term goals will provide a structure for the transition plan. The goal-setting process ideally includes individual farmers along with family and employees. Consensus and a clear sense of direction among all those involved in the farming operation tend to unify efforts and energy toward meeting the desired end. Objectives describe the building blocks that will be used to reach a goal, but do not list any specific production practices.

The last step of the planning process is to identify strategies that will fulfill the objectives. For example, a cover crop may be planted to establish a habitat for pest control. However, the choice of cover crop may be very different if soil building is the primary concern. In the latter case, a nitrogen-fixing legume or crop with a low nitrogen requirement may help to minimize the problem of nitrogen deficiency as the soil system adapts.

Management During the Transition

Transition Period

The transition period is often described as the time required for an agricultural system to adjust to new management practices. Although the term “transition” or “transition period” is commonly used to describe the biological processes occurring in the soil and on the farm, in reality it encompasses the increasing creativity and knowledge of the farmer as well.

Research and farmer experiences indicate considerable variation in the length of transition periods, depending on the individual farm goals and existing cropping system. Again, these studies usually refer to the biological (and sometimes economic) changes occurring on the farm. In talking with growers, their experiences demonstrated the individual nature of the transition process. One grower felt that “the transition period ends once a commitment is made to developing sustainable systems, even though changes on the farm are on-going.” Other growers remarked that the transition period never ends because there are always new factors (personal, economic, or biological) that impact the performance and productivity of the farm. Clearly, these are individual experiences and opinions. Neither is necessarily right nor wrong, just different ways of looking at a relatively complex process.

Research which was conducted on the biological transition period documented the distinct changes that occur within the agricultural ecosystem as soil is “weaned” away from conventional soluble fertilizers. The physical conditions of soil often require improvement and microbial activity must be re-established to increase nutrient cycling in order to meet the crop's nutritional needs.

Select a Starting Point

The amount of land selected depends on the quality and availability of resources. Many farmers and researchers advocate starting small: select a single field, develop soil building and conservation practices, then progressively introduce greater diversity. This system can be monitored, evaluated, and changed more easily than undertaking a whole-farm transition. With information gained from this small experimental acreage, a farmer can then adapt the system to the remainder of the farm. This approach tends to minimize the risks of experimentation.

Other farmers choose to start by modifying a single practice, such as band application of fertilizers and herbicides. This can later be combined with practices that build soil fertility and reduce weed pressure, such as planting a cover crop and mechanical tillage. Ultimately, the most successful transitions integrate these practices to modify the whole-farm system.

Emphasis on Diversity

Incorporating diversity is an idea that runs through all aspects of transition planning. For example, increasing vegetational diversity can aid in stimulating soil microorganisms as well as providing a

habitat for beneficial organisms. Diversified marketing can reduce overall risk by providing income from several sources, thus limiting exposure in any single market. Most farms can be diversified in some manner although it often requires creativity and patience to develop these strategies. Of course, objectives usually overlap, and choices generally must take several objectives into consideration.

Integrated Management

We tend to think of a farm as a set of distinct enterprises, each with its own management requirements and production practices. But a farm is much more than an arrangement of enterprises, it is a biological and social system with complex interactions. Developing this perspective is a crucial part of the transition process.

The scientific basis for a systems approach to farming is established in the field of agricultural ecology. Agroecology applies basic ecological concepts such as water and nutrient cycling, energy flow, and species interactions and competition to agricultural systems. It can be narrowly defined as the ecological study of farm fields, looking, for example, at crop and weed competition or pest/natural enemy complexes. Broader definitions recognize the impact that agriculture has on the environment and on society as a whole (Altieri, 1985).

Techniques Being Used

Some of the most important techniques California farmers are using to establish balanced agricultural systems are briefly discussed in the following sections.

Build Soil Quality and Biological Fertility

Nearly everyone recognizes the essential value of soil to productive farming. Even so, there are many approaches to managing this important resource. Managing soil as a whole system can provide multiple benefits, including:

- improved soil structure and conservation,
- reduced need for petroleum-based fertilizers,
- lower total cost for fertilizers and other inputs (depending on the cost of organic matter and materials),
- less energy required for tillage operations, and
- improved crop resistance to pests and other stress factors.

Maximize Use of On-Farm Resources

With the cost of purchased inputs increasing, farmers are taking advantage of internal farm resources. When possible, diversifying to include livestock and crop production on the farm is ideal. These enterprises complement and retain valuable resources and nutrients within the farm system. Because of the specialization of high-value crops and markets, incorporating animals in their operations is difficult for many California farmers. But, the use of cover crops and green manures to enhance soil fertility is becoming more popular. Green manure crops, when tilled into soil while green and succulent, provide a source of organic matter and nitrogen. Winter cover crops can be used to utilize soil nitrogen that might otherwise be leached below the crop root zone or into subsurface water sources. Non-legume cover crops (e.g., cereal rye, oats, wheat and crucifers such as oilseed radish, mustard, and rape) can accumulate up to 100 to 150 pounds of nitrogen per acre (Ingels and Miller, 1993). In addition, by keeping the soil surface covered, it is protected from sunlight, and wind and water erosion.

Use of Crop Rotations

Carefully planned crop rotations can prevent the buildup of weeds, plant pathogens, nematodes and soil-dwelling insects. Rotations for weed control should include crops that: (1) smother or compete aggressively with weeds; (2) chemically-suppress weeds (allelopathy); (3) allow for and tolerate cultivation; and (4) can be rotated through warm and cool seasons to break weed cycles. Plants that rapidly cover soil and provide abundant leaf development will compete best with weeds.

The rotation of crops can also improve soil quality. Each crop plant affects the soil environment differently, through type and amount of organic matter produced, composition of root exudates,

mineral uptake and release, and other effects on the soil environment. A balance between soil-exhausting and soil-restoring crops in the overall rotation is highly beneficial.

Apply Careful Monitoring

An agricultural consultant who works with transitional growers believes that successful farmers are observant, and that monitoring performed by farmers provides them with “knowledge, power and profit.” Accurate and timely monitoring is essential when working with biological systems. For example, early detection of insect pests allows the farmer to try alternatives, such as “soft” pesticides or augmentative beneficial releases, that would be impossible once a problem reaches crisis proportions.

Careful observation and testing also apply when working with the soil system. As noted by a San Joaquin Valley farm manager, “Observation is the key to any transitional program. . . you’ve got to get your hands dirty.” Comprehensive soil management plans require an understanding of the soil system and plant interactions, combined with current information from soil and plant tissue tests.

Increase Diversity

During this century, American farmers have simplified and modified their production systems more rapidly than at any other time in history; most systems have become technologically more complicated but ecologically less diverse. Diversification can help farmers reduce financial risk and protect against regulatory actions that affect the availability and cost of inputs. Diversified cropping systems can also provide an economic buffer. Some farmers report an increase in overhead costs that must be balanced against financial benefits.

Vegetational diversity improves the use and recycling of nutrients within the cropping system. By using a variety of plants, either in rotation or in the same field, growers can use the natural variations in rooting depth and nutrient uptake to advantage. Crops clearly differ in their effects on the soil environment. Highly diverse systems increase the availability of food, shelter and breeding sites for beneficial insects, and, at the same time, dilute the food and habitat resources which may discourage insect pest invasions. Increasing species and/or genetic diversity of the cropping system can also reduce the occurrence and severity of disease.

Properly managed diversity can also reduce weed pressure. The continuous field operations necessary for crop production favor natural selection of opportunistic and competitive weeds. When a mix of plant species is present, either through multiple cropping, rotation, or orchard and vineyard floor management, the biological selection of opportunistic and competitive weeds is reduced.

Modify Tillage Practices

Altering tillage practices can preserve and/or improve soil quality. In general, chisels, disks, and other shallow tillage equipment are preferred. When used correctly and at the proper time, these implements can help to reduce soil erosion, promote timely organic matter decomposition, improve nutrient cycling, and provide optimal conditions for soil organisms (MacRae et al., 1990). Deep tillage (12 to 26 inches) may be useful as a remedial measure to open up the soil profile or to break hardpan layers, particularly as a first step in changing soil management practices on a selected field. When used to preserve some amount of surface residue, tillage can enhance soil moisture conservation. For example, in hot climates, if winter annual vegetation is mowed in the spring, the mulch left on the surface can conserve soil moisture. Further tillage would destroy this mulch and expose the soil to drying.

Transition System Graphic

The final ring on the graphic shown in Figure 1 is the outer rim of the wheel. The top two-thirds of the rim describes resources, from fuel and energy to wildlife and watersheds. Each resource illustrated in the figure was given equal value to underscore the idea that sustainable farming relies on a balanced systems approach.

The bottom third of the rim lists social and economic pressures that impact management decisions. The arrows between the planning circle and outer rim represent tools and descriptions of processes that can be used to manage these resources. The arrows go in both directions because not only does

planning influence these resources, but the quality and availability of these resources also impact management decisions.

For example, if a farmer identifies an insect or group of pests that are a weakness in the production system, the arrows suggest looking into an IPM program, or searching for practices that will conserve or augment natural enemy populations. Of course, these arrows simply represent general ideas. There are many more possibilities and interactions that will surface as you search for information.

As represented on the bottom third of the graphic, social and economic pressures significantly impact management decisions. Decisions about farming practices, from water and agrichemical use to marketing, are impacted by both family and the larger community. For example, a new crop may be included in the rotation. The viability of this economic decision depends upon having a suitable market and adequate consumer demand for this crop.

Summary

Farmers are challenged to integrate information from different aspects of the farm (e.g., soil management, crop sequences and irrigation practices) into a balanced, functioning system. Thorough planning is essential for this complex task. These plans need not include radical changes over the entire farm. In fact, most growers recommended starting small, either on a small amount of land or with less disruptive practices over a greater portion of the farm. Setting long-term goals and evaluating farm resources will focus attention on what practices or enterprises can be modified first. Once the transition is started, most farmers experience some type of transition period. To some growers, this was a process within themselves when their attitudes, experience, and imagination developed to support changes that would ultimately take place within the cropping system. Distinct changes also occur in the agricultural ecosystem. The soil develops better biological and physical characteristics, and nutrient cycling is increased. Above ground, balances need to be established in vegetation and pest and natural enemy populations. Throughout this process, constant evaluation and modification will help determine whether progress is being made toward selected goals, as well as what further modifications may be needed.

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