



Jack Kelly Clark

"Organic" labeling has become a familiar sight to today's shoppers. Growers surveyed saw economic benefit in sustainable farming practices, partly because they appeal to health-conscious consumers.

A study asks . . .

Are California's farmers headed toward sustainable agriculture?

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California growers surveyed in a study indicate a willingness to change their approaches to farming from "conventional" to "ecological," a sign that some see as a movement towards a more "sustainable" agriculture. What remains to be seen: Is a real momentum gathering for sustainable agriculture—or is it all wistful thinking?

Sustainable agriculture is commonly recognized as having, at minimum, ecological, economic, social and political dimensions, but what, precisely, is "sustainable agriculture"? The subject has been widely publicized, and many agricultural producers claim they employ "sustainable" practices: in production, pest control, soil management, water management and marketing. How legitimate are their claims?

Shifts to more sustainable practices have practical implications, not just philosophical. If a goal of public policy is to ensure that a sustainable agriculture is practiced, then any switch to it would move policy makers (to create policies supporting sustainable practices), scientists (to study sustainable practices), extension personnel (to facilitate sustainable practices), and farmers (to ultimately make decisions about sustainable practices).

This study, focusing on perhaps the least ambiguous and most frequently cited dimension of sustainable agriculture, the ecological dimension, hypothesized that changes in agricultural approach — characterized on a continuum from ecological to conventional — could be identified by

growers and the rate of change could be related to their past, present and presumed future sustainable agricultural practices.

An agricultural issues survey, directed to California farmers and farm managers, was developed in consultation with University of California researchers and extension personnel in the area of sustainable agriculture. Revisions to the survey were made based upon pretests and field tests employing telephone and in-person interviews. The two versions of the survey used differed essentially in the number of questions posed. The longer version, an 11-page booklet, was primarily used, and a double-sided, single-page survey was used when time was short. Each version focused on farmers' current practices, preferred sources of agricultural information and concerns about farming in California, individually and in general.

Both versions also included a three-part question labeled, "Your Past, Present, and Future Practices," in which farmers were asked to characterize the overall nature of their agricultural practices 5 years ago (1985), today (1990) and 5 years from now (1995). For each time period, respondents

were asked to locate their farming approach on a seven-point continuum on which the extremes were described as:

"High ecological practices which involve high concern for the environment and efficient and very judicious use of inputs, minimal reliance on man-made resources, and reduced use of chemicals. They stress increased soil, water, energy conservation through use of varying agricultural practices..."

"High conventional practices which involve effective use of new and traditional technologies and practices, chemicals and natural resources, centralized arrangements and agricultural practices for effective management and production, and primary reliance on resources and practices that maintain desired level of production."

The survey's long version also included a list of agricultural practices, identified by UC experts as commonly associated with

"sustainable agriculture." These practices are listed in table 1, and were categorized as: (1) general production, (2) pest management, (3) weed management, (4) water management and (5) marketing. The short survey used an abbreviated list of practices. Respondents were asked to indicate whether they were currently using the practices, had used them in the past or had not used them. As part of the long survey were these open-ended questions: "How do you define sustainable agriculture?" "What do you perceive to be the benefits in adopting more sustainable agricultural practices?" "What do you perceive to be the risks in adopting more sustainable agricultural practices?"

A total of 610 persons were surveyed at six agricultural conferences during February and March, 1990. This number represented approximately 40% of all conference attendees. Of these, only the 255 persons identifying themselves as farm

owners, operators and managers were used for this analysis.

Because they targeted local farmers interested in making the transition to more sustainable practices, a series of four "transitional" conferences held throughout California was chosen. Both the long and short versions of the survey were used.

An annual farm conference, held in California's Central Valley (in Visalia), was chosen because it drew a statewide audience. While the conference was advertised to "provide information on family farming, direct marketing, and agricultural sustainability," only those persons attending workshops directly pertaining to sustainability were selected for surveying. Both the long and short surveys were used.

Finally, a statewide Farm Bureau conference, held in Sacramento, was selected because it attracted a large and diverse group of growers who farmed consider-

TABLE 1. Sustainable agriculture practices used by survey respondents (n=133)

Practices	Percent of sample using practice (n)
General production practices	
1. Soil testing	57.1% (76)
2. Tissue testing	42.1% (56)
3. Crop rotation*	39.1% (52)
4. Intercropping*	11.3% (15)
5. Companion planting*	9.8% (13)
6. Cover crops*	31.6% (42)
7. Green manure*	23.3% (31)
8. On-farm composting*	15.0% (20)
9. Purchased compost*	12.8% (17)
10. Animal manure*	28.6% (38)
11. Reduced tillage*	40.6% (54)
12. Modified equipment*	33.8% (45)
13. Windbreaks*	16.5% (22)
14. Diversification*	48.9% (65)
Pest control practices	
15. Resistant varieties*	52.6% (70)
16. Release beneficial predators*	22.6% (30)
17. Pheromones	20.3% (27)
18. Microbial pesticides*	19.5% (26)
19. Provide/improve predator habitat*	36.1% (48)
20. Monitor pest populations	63.9% (85)
Weed control practices	
21. Tillage for weed control*	70.7% (94)
22. Mulching*	39.9% (53)
23. Alternative spacing*	15.8% (21)
24. Biological control	19.5% (26)
25. Time planting*	26.3% (35)
Water practices	
26. Monitor soil moisture	57.9% (77)
27. Monitor water stress	38.3% (51)
28. Scheduled irrigation	64.7% (86)
29. Drip or mini-sprinkler*	48.9% (65)
Marketing practices	
30. Direct marketing*	55.6% (74)
31. Improved labeling*	15.8% (21)
32. Specialty/ alternative crops*	30.8% (41)
33. Specialty/ alternative markets*	27.1% (36)
34. Organic markets*	10.5% (14)

*Users of practice characterized themselves as more ecological than the non-users.

TABLE 2. Profile of respondents

Respondent characteristics	All conferences	Farm Bureau conference Feb., 90 (1 site)	Visalia farm conference Feb., 90 (1 site)	Transitional farm conferences Feb.-Mar., 90 (4 sites)
Total respondents	255	105	74	76
Farmers/owners	224 (87.8%)	100 (95.3%)	65 (87.8%)	59 (77.6%)
Farm managers	31 (12.1%)	5 (4.8%)	9 (12.2%)	17 (22.4%)
Enterprise				
Family or Individual Business	166 (65.6%)	56 (54.4%)	58 (78.4%)	52 (68.4%)
Corporation	27 (10.7%)	17 (16.5%)	3 (4.1%)	7 (9.2%)
Partnership (family)	47 (18.6%)	27 (26.2%)	8 (10.8%)	12 (15.8%)
Partnership (other than family)	7 (2.8%)	2 (1.9%)	2 (2.7%)	3 (3.9%)
Property management	4 (1.6%)	1 (1.0%)	2 (2.7%)	1 (1.3%)
Other	2 (0.8%)	0 (0%)	1 (1.4%)	1 (1.3%)
Years farming				
Mean	17.4	22.8	12.9	14.3
Range	1 - 61	1 - 60	1 - 56	1 - 61
Median	15.0	20.0	10.0	15.0
Acres farmed				
Mean	656.6	1400.3	109.7	204.5
Range	.5 - 17,000	1 - 17,000	1 - 1500	.5 - 4000
Median	80.0	310.0	20.0	40.0
Gender				
Females	62 (24.4%)	6 (5.8%)	24 (32.4%)	32 (42.1%)
Males	192 (75.6%)	98 (94.2%)	50 (67.6%)	44 (57.9%)
Age				
Mean	44.4	46.4	43.5	42.3
Range	24 - 74	25 - 74	24 - 67	24 - 69
Ethnicity				
White	231 (92.8%)	95 (94.1%)	67 (90.5%)	69 (93.2%)
All others	18 (7.2%)	6 (5.9%)	7 (9.5%)	5 (6.8%)
Highest education level				
High school	14 (5.5%)	10 (9.6%)	0	4 (5.3%)
Some college	84 (33.1%)	30 (28.8%)	31 (41.9%)	23 (30.3%)
College graduates	98 (38.6%)	46 (44.2%)	17 (23.0%)	35 (46.1%)
Graduate study/degree	58 (22.8%)	18 (17.3%)	26 (35.1%)	14 (18.4%)
Self-characterization continuum (means)				
1985	4.50	4.73	4.22	4.42
1990	3.55	4.10	3.03	3.30
1995	2.44	3.16	1.91	1.97

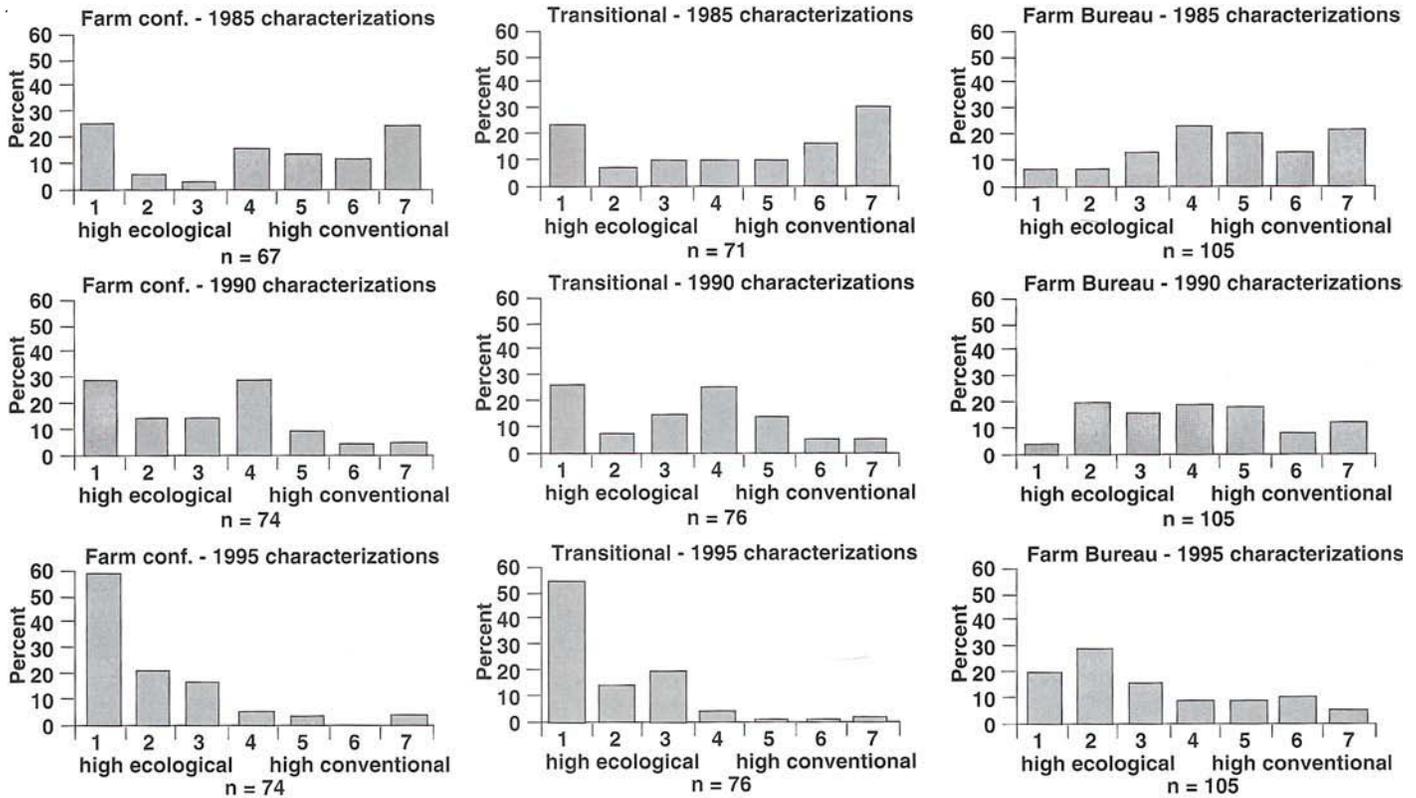


Fig. 1. Growers' self-characterizations in terms of their past, present and future use of sustainable practices.

ably larger acreages than the participants at the other conferences, It did not emphasize any issues of sustainability. Only the long survey was used.

At each conference, specific time was set aside to brief participants about the survey's purpose and how results were to be used, as well as to provide time to voluntarily complete the survey. Completed surveys were collected at the conferences and later coded and analyzed by the authors.

Of the 255 farmers and farm managers who completed the survey, 133 (52%) completed the long version and 122 (48%) completed the short version. These respondents represent a self-selected, non-random sample of California farmers. The profile of these farmers (table 2) suggests that survey respondents at the transitional and Visalia conferences were more alike (in terms of years farming, acres farmed, etc.) than they were like the respondents at the Farm Bureau conference. This distinction is also reflected in respondents' self-characterizations.

Results

Trend toward sustainable farming.

Results for the three-part, self-characterization question ("Your Past, Present, and Future Practices") are presented in fig. 1. At each conference, responding farmers

characterized their approach to farming as more conventional in 1985. Their responses for 1990 reveal patterns concentrated midway between conventional and ecological. Responses regarding approaches in 1995 reflect a definite movement toward the high ecological end of the continuum, with a considerably smaller percentage remaining at the high conventional end. In the cases of the transitional conferences and the statewide farm conference, both attended by a relatively large number of new and small farmers (as defined by acreage), the profiles are particularly pronounced in the direction of the ecological from 1990 to 1995. For respondents attending the Farm Bureau conference, the shape is less pronounced.

Self-characterizations. The relationship between growers' self-characterizations as ecological (or conventional) and the sustainable practices they reported using is provided in table 2. (This table includes only the responses of the 133 respondents to the long survey; the shorter survey contained only an abbreviated version of this section.)

As the table shows, in 26 of the 34 sustainable practices measured (over 75% of the practices), the self-characterization of the group using the practice was "more ecological" than that of the group not using the practice. This result suggests that

there may indeed be a positive relationship between growers' self-characterizations and their actual practice of sustainable agriculture.

Because some of the practices listed in table 1 may be substitutes for one another (that is, the use of animal manure might preclude the use of green manure and/or compost), an alternate analysis considered the total number of sustainable practices used in relation to growers' characterizations on the 7-point continuum (fig. 2). Again, those persons characterizing their approach as more ecological reported using a greater number of sustainable practices than their more conventional counterparts.

Definitions. Of the 255 farmers and farm managers participating, 133 responded to open-ended questions asking for a definition of sustainable agriculture and a listing of its benefits and risks. Admittedly speculative attempts were made to categorize the most common responses. Preliminary analyses yielded five nonexclusive dimensions in defining sustainable agriculture: (1) a "lasting value" to be repeatedly realized by future generations, (2) a maintenance of the integrity and viability of the environment, (3) a reduced dependence on purchased inputs, (4) at minimum, a maintenance of current production levels, and (5) economic viabil-

ity. Single, unique answers, placed in a sixth "miscellaneous" category, are not considered here.

The most frequently expressed dimensions were the economic ("sustainable agriculture must be economically viable"), a lessened dependence on purchased inputs ("sustainable agriculture involves less use of chemicals and man-made fertilizers") and increased environmental viability ("sustainable agriculture is environmentally sensitive and improves the productivity of the soil"). Respondents seemed to acknowledge that sustainable agriculture encompasses more than any one of these dimensions; the number of dimensions listed averaged two or three.

Respondents' assessments of sustainable practice benefits most frequently included economics (either in terms of increased income or in simply being able to sell products to today's health-conscious consumers) and an improved environment. Other common themes were better public relations and improved health and safety of farmworkers. Higher production costs were seen as a major risk in employing more sustainable practices, along with decreased crop yield. Lesser quality produce, the lack of proved methods, and the prospect of increased regulation were also commonly identified as risks.

Another analysis related the open-ended responses to farmers' self-characterizations. Those respondents who characterized themselves as at the high ecological end of the continuum in 1990 viewed sustainable agriculture primarily in terms of economics and environmental protection; those characterizing themselves at the high conventional end in 1990 viewed it chiefly in terms of economics.

Discussion

This study sought to find evidence from California farmers that a trend towards sustainable agriculture is underway, and results suggest that California farmers are altering farming practices. Farmers characterize themselves as less conventional and more ecological. The trend exists where we expect to see it (that is, in the transitional and farm conference samples where growers already seemed interested in moving towards sustainability), as well as among the Farm Bureau sample. In the case of future characterizations (fig. 1), Farm Bureau respondents foresee they will make a less dramatic change than other respondents, but they nonetheless envision themselves as moving toward the practice of a more sustainable agriculture. Because an ecological component has consistently been identified as a major ingredient of sustainable agriculture, these results support the no-



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No-till drill shown above is used to plant small grains into surface stubble without plowing, a sustainable agriculture technique which reduces soil erosion and saves time and energy.

tion that the movement towards a more sustainable agriculture is dynamic. Although the farmers' self-assessments are based on their beliefs and attitudes, this study offers some evidence that they practice what they preach.

Admittedly, results might differ if this study were conducted among different farmers or with a randomly selected sample. In addition, the reliability of self-characterizations can be called into question, and farmers, like survey respondents in general, may provide "socially desirable" responses. Nonetheless, results illustrate that a trend toward sustainable agriculture seems to be occurring. The high

ecological farmers surveyed in this study may well represent the pioneers of this movement, and their successful transformation could encourage others to follow.

This transformation has not occurred on its own, nor will it continue on its own. Change requires leadership, direction and management, which must come from the farmers themselves, as well as from researchers, field agents and policymakers. Useful in facilitating such change is the notion supported by this study that there exists no single growers' perspective. Growers differ in their interest in change, in their rate of change and in their definitions of sustainable agriculture. Efforts must be made to identify the different segments of agriculture practitioners and their needs and to relate to them accordingly.

Often, trends in public awareness, attitudes and behaviors are noted only in retrospect. Early detection of change and anticipation of more change present us all with exciting opportunities to facilitate and participate in this important process.

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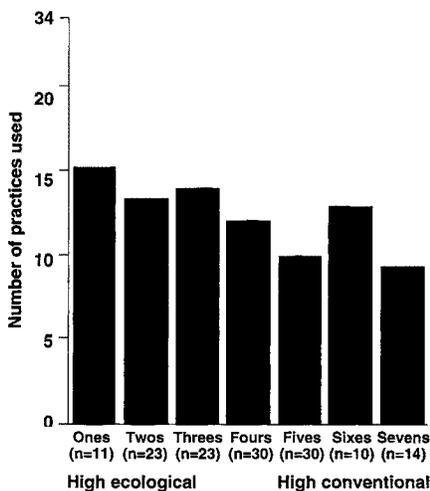


Fig. 2. Growers' use of sustainable practices and self-characterizations as ecological or conventional.