

Some Missouri Farmers' Perspectives
Of Sustainable Agriculture
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What is sustainable agriculture? Is it organic farming, diversified farming, soil conservation, or simply any kind of farming that is profitable? Does sustainable agriculture refer to specific farming practices, methods, or enterprises; or is it simply a broad set of guiding principles? Even though the issue of sustainable agriculture has been around for more than a decade, there is still no universally accepted definition. Among those who work in sustainable agriculture research and education, there seems to be a growing consensus that we need to spend less time trying to define sustainable agriculture and more time working to achieve it. However, among farmers and members of the general public there seems to be continuing confusion regarding what sustainable agriculture is all about.

This study reported here was designed to gain insights into Missouri farmers' perceptions of sustainable agriculture what it means to them. However, it may be worthwhile to begin with a brief assessment of what the concept of sustainable agriculture has come to mean among the educators and researchers who have been supporting and helping to implement it.

"Sustainability is a question rather than an answer," as the late Robert Rodale was fond of saying. Sustainability is a direction rather than a destination, like a star that guides the ships at sea but remains forever beyond the horizon. The "question of sustainability" can be asked of any ongoing activity or process. It can be asked of "conventional" agriculture and of any proposed "alternative" agriculture: Is it sustainable? Is it moving toward the goal of sustainability?

In building a consensus on the goal of sustainability, it is important to find agreement on what is to be sustained, for whom, and for how long. Most, but not all, of those who support the sustainable agriculture issue probably agree that we are working to sustain "agriculture," for the benefit of "people," "forever."

Most of the definitional disagreements seem to stem from differing opinions concerning the "means" by which a sustainable agriculture can or should be achieved rather than the "goal or purpose" toward which those means are directed.

Agriculture, by its very nature, is an effort to shift the ecological balance so as to favor humans relative to other species in production of food and fiber. Thus, sustaining "agriculture" carries with it the assumption that it is being sustained for the ultimate benefit of people. There is a general consensus also that agriculture must be sustained for the benefit not only of this generations and for all generations to follow -- forever. No credible definition of sustainable agriculture places a time horizon on how long agriculture should be sustained.

With respect to means, one cannot prove through empirical studies that one approach to agriculture is sustainable or that another is not. It would quite literally "take forever" to collect the data for such a study. Thus, the science of sustainability must rely on the science of logic. Logically, a sustainable agriculture must be (1) ecologically sound, (2) economically viable, and (3) socially responsible. Furthermore, these three dimensions are fundamentally inseparable dimensions of the same whole. All three are essential, and thus, no one or two alone are sufficient to ensure sustainability.

Most who are concerned about sustainability recognize an interconnectedness of humanity with the other biological/physical elements of our natural environment. Through agriculture, we may tip

the ecological balance in our favor. But if we attempt to tip it too far or too fast, we will destroy the integrity of the natural ecosystem, of which we ourselves are but a part. If we degrade our natural resources and poison our natural environment, we will degrade the productivity of agriculture and ultimately will destroy human life on earth. Nearly everyone seems to agree that an agriculture that is not ecologically sound is not sustainable.

There may be less agreement regarding the contentions that a sustainable agriculture must also be economically viable and socially responsible. However, agriculture, by its nature, involves self-conscious attempts by humans to change or "manage" natural ecosystems. Humans are unique among species in that we make purposeful, deliberate decision that can either enhance or degrade the health of the ecosystems of which we are a part. Thus, and question of sustainability must take into account the purposeful, self-conscious nature of individual and collective human actions which are driven by the economic and social motives of people.

A sustainable agriculture must be profitable, at least periodically, for farmers if they are to be able to maintain control over use of the land. If good stewardship is not rewarded financially, good stewards will not be able to farm the land, and agriculture will not be sustainable. If such rewards are not forthcoming from the marketplace, public policies must be devised so that the farmers' rewards will reflect both the private and public good associated with sustainable farming. An agriculture that is not economically viable is not sustainable.

Agriculture is a creation of society and thus must be supportive of its societal purposes. The most obvious of these purposes is the provision of an abundant supply of safe and healthful food at a reasonable cost to consumers. That's the purpose that comes first to mind. However, agriculture, like any other sector of the economy, must provide opportunities for people to be productive. In the long run, we can be consumers only if we are also producers. We must produce something to exchange for the things we consume. So a sustainable agriculture must provide opportunities for people to lead productive, successful lives. An agriculture that cannot sustain society will not be sustained by society.

Defining Sustainable Agriculture

From a growing consensus of purpose and principles, a definition of sustainable ultimately may evolve. Many different definitions of sustainable agriculture have been proposed (Allen, et. al., Lockeretz, Altieri, Smit and Smithers). However, most definitions seem to agree in defining sustainability as a characteristic of performance, outcomes, or consequences of farming systems rather than attempting to define sustainable farming practices, methods, or enterprises.

The Food, Agriculture, Conservation, and Trade Act of 1990 defines sustainable agriculture, for purposes of federally funded research and education programs, as "integrated systems of plant and animal production practices having site specific application that will over the long term: (a) satisfy human food and fiber needs, (b) enhance environmental quality and the natural resource base upon which the agricultural economy depends, (c) make the most efficient use of nonrenewable resources and on-farm resources, and integrate, where appropriate, natural biological cycles and controls, (d) sustain the economic viability of farm operations, and (e) enhance the quality of life for farmers and society as a whole" (U.S. Congress, Title XVI, Subtitle A, Sect. 1603)

Discussions during the legislative process further clarified the intended meaning of quality of life, at least as the concept applies to federally funded research and education. Increased income and employment opportunities, especially self-employment opportunities, in agricultural and rural communities, and a strong family farm based system of agriculture, with small and moderate sized farms, principally owner operated, were identified as indicators of enhanced quality of life (Congressional Record, Oct 22, 1990).

Most definitions and the above legislation seem in agreement that a sustainable agriculture must be ecologically sound, economically viable, and socially responsible. An agriculture that meets all three objectives is logically capable of maintained productivity and value to society over time, and thus, would be perpetually sustainable viable, and socially responsible? All three are necessary and none alone is sufficient.

Allen, et al. offer the following definition: "A sustainable agriculture is one that equitably balances concerns of environmental soundness, economic viability, and social justice among all sectors of society." While this definition provides an appropriate set of objectives or principles, it does not define the overall goal or purpose of sustainability. It does not answer the question; what is to be sustained and for whom? An appropriate preamble may be added, however, resulting in the following definition: *A sustainable agriculture is one that is capable of maintaining its productivity and of value to society -- indefinitely. A sustainable agriculture, so defined, must be ecological sound, economic viable, and social just.*

This definition makes clear the anthropocentric, human-centered nature of agricultural sustainability. We are concerned about sustaining agriculture for the benefit of humans, both now and into the indefinite future. However, the definition is also eco-centric in that it explicitly recognizes the critical interconnectedness of humans with the other biophysical elements of the natural environment and with each other. The ecological, economic, and social dimensions are all recognized as necessary and sufficient conditions for agricultural sustainability.

Missouri Farmers Perceptions of Sustainable Agriculture

In the spring of 1996 a survey instrument was developed to assess the perceptions of Missouri farmers in relation to sustainable agriculture. The survey was designed for completion in two phases. In the first phase a short survey instrument was utilized -- designed for direct mailing. The instrument focusing primarily on producers' opinions and attitudes. The second, longer instrument was used to collect more detailed information about farming enterprises, production methods, and cultural practices. The second phase of data collection was completed by in-person interviews. The second instrument included all questions asked in the first, plus additional information focusing on enterprises, methods and practices. Thus, information concerning farmers' opinions and attitudes was available for both phase one and phase two.

A mailing list of 600 farmers was derived from random samples of 100 farmers per county for six south Missouri counties. Three counties were in the southeastern region of the state and three in were in the southwestern region. Lists of farmers were obtained from the Farm Services Agency of USDA. Well over 100 people responded to the mail survey, however, a significant number of the respondents were not actively engaged in farming, as in the case of landlords, or for a number of other reasons did not return usable information. The net result was 99 usable responses to the mail survey.

The second phase of the project was completed through in-person interviews conducted by Lincoln University's Small Farm Family Program Educational Assistants. The sample from phase two was selected from SFFP contacts and cooperators in the same counties as those surveyed in phase one. No one was interviewed if they had been included in a random sample during phase one. A total of 80 usable responses were obtained in phase two. Thus, the total number of responses to the opinion and attitude questions in phase I was 179.

No claim is made that the sample of farmers' included in this study are statistically representative of Missouri farmers in general, or even of farmers in the six south Missouri counties where the study was conducted. The intent of the study was more to formulate hypotheses concerning farmers' perceptions of sustainable agriculture than to test hypotheses for validity. As the sustainable agriculture issue has evolved, opinions and attitudes have evolved and changed as

well. This evolution quite likely has continued since the survey data was collected and quite likely will continue into the future. This study simply provides a snap shot of perceptions of 179 Missouri farmers in the summer and fall of 1996.

What is Sustainable Agriculture? The survey instrument was designed to explore some of the basic attitudes that have evolved since sustainable agriculture emerged as a public issue. The initial emphasis in sustainable agriculture was on specific farming methods and practices, such as organic farming, integrated pest management, and crop rotations, all designed to reduce the negative environmental impacts of farming. Later, the emphasis shifted from means to ends or goals of farming, with a specific emphasis on reducing input cost and increasing farm profitability. Still later, the social dimension of sustainability begin to receive attention as concerns the future of family farms, rural communities, and opportunities for self-employment became a part of the issue.

The first question on the survey asked: "When you hear people talk about "Sustainable Agriculture," what does it mean to you? Respondents were asked to select up to three items from a list that "best" describe sustainable agriculture. The averages of their responses are shown in figure 1.

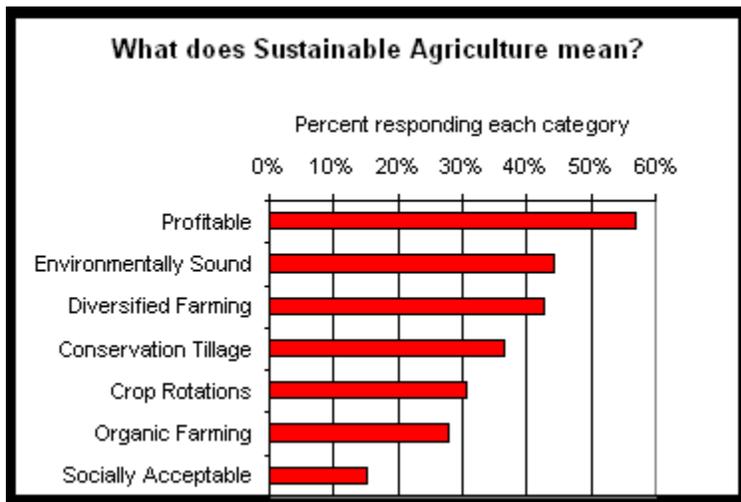


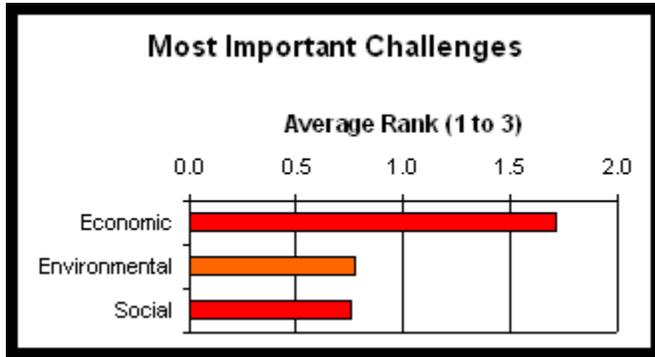
Figure 1.

The results indicated a mixture of perceptions among farmers regarding the meaning of sustainable agriculture. Some responded by selecting farming methods, such as diversified farming and organic farming, and others choose farming practices, such as conservation tillage and crop rotations. However, the two most frequently descriptive terms used to define sustainable agriculture were profitable and environmentally sound, with more than half of the respondents choosing profitable as one of their three choices.

Socially acceptable was the least frequently chosen term among those provided for consideration. This likely reflects a lack of understanding of what social acceptability, social responsibility, or social justice has come to mean with respect to the sustainability issue on the part of farmers responding. In answers to later questions it became clear that viable family farms and healthy rural communities are closely linked with the issue of sustainability in the minds of farmers. But, community and family issues had just not yet been linked with "sustainable agriculture."

What are the most important challenges? Farmers were asked to rank the most important challenges or problems that they face on a day to day basis in farming. Rankings ranged from one to three – with a rank of three meaning "most important."

Figure 2.

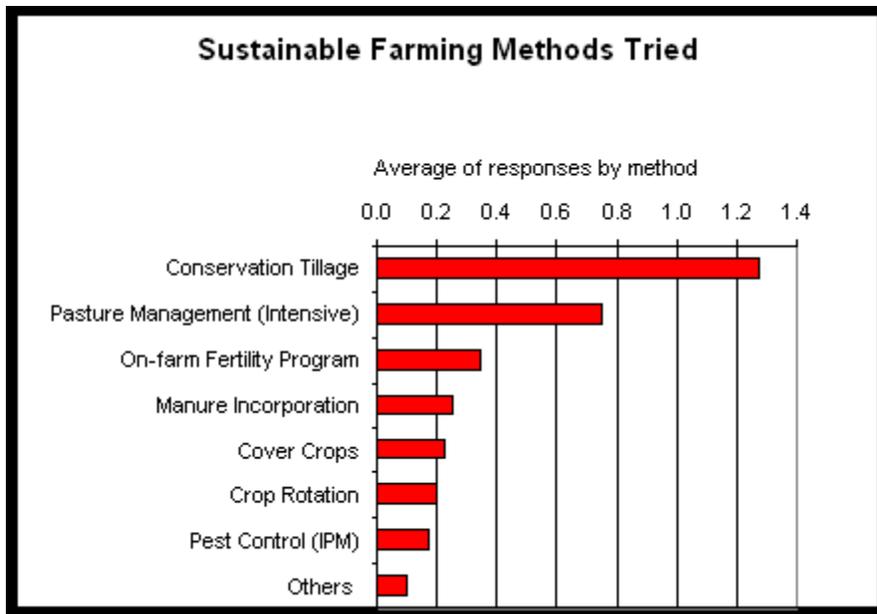


The three options included (a) economic problems (prices, costs, profits, cash flow, debt burden), (b) environmental or natural resource problems (water quality, air quality, worker health and safety, food safety, soil loss, wildlife, rural landscapes, land use issues), and (c) social or community problems (income and employment, schools, churches, local government, and other quality of life issues).

Results in Figure 2 indicate that economic problems were rated nearly one full rank higher than environmental or social challenges facing the farmers in this survey. Environmental and social problems were rated nearly equal in importance. Note that the social dimension was ranked nearly as high as the environmental dimension when it was explained to include community problems of local income and employment, schools, and other quality of life issues, as it is defined in relation to sustainable agriculture.

What farming methods and practices have been tried? Farmers were asked to identify new farming methods or practices they had tried within the last five years to improve the overall sustainability of their farming operation. They were provided with a list from which they could check as many as they choose. The results are shown in figure 3.

Figure 3.



The new method most tried by farmers was conservation tillage. Conservation tillage included ridge tillage, minimum tillage, and no tillage. The conservation compliance provisions of recent farm bills may have played a significant role in the adoption of conservation tillage practices. The second most common new practice was pasture management, including management intensive grazing. The survey was conducted in an area of the state where livestock is a prevalent farm enterprise. Recent emphasis on pasture management in Missouri seems to have had a significant impact on farmers in the survey counties.

On farm fertility programs and manure management combined would have ranked about as high as pasture management as a new practice. The relatively lower rankings for cover crops, crop rotation, and IPM may be explained, at least in part, by the fact that many farmers in the survey did relatively little crop farming.

What are the reasons for trying new methods? Farmers were asked to identify the reasons for trying new farming methods as economic, environmental, social, or some combination of the three. The purpose of this question was to gain insights into how the different dimensions of sustainability were influencing farmers' management decisions. The results for this question are shown in figure 4.

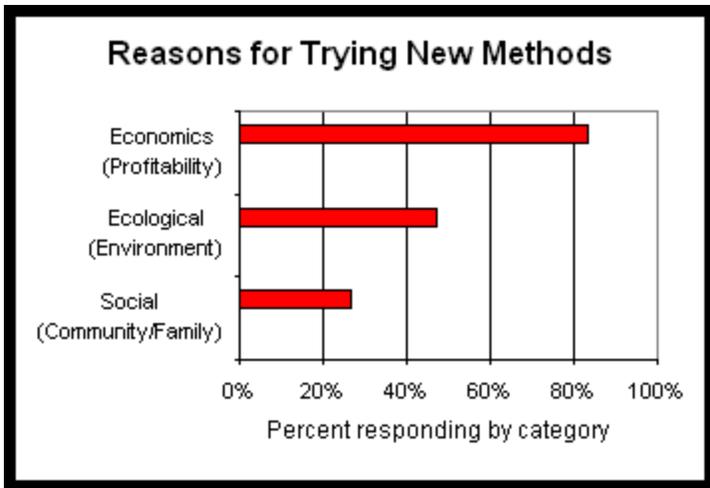
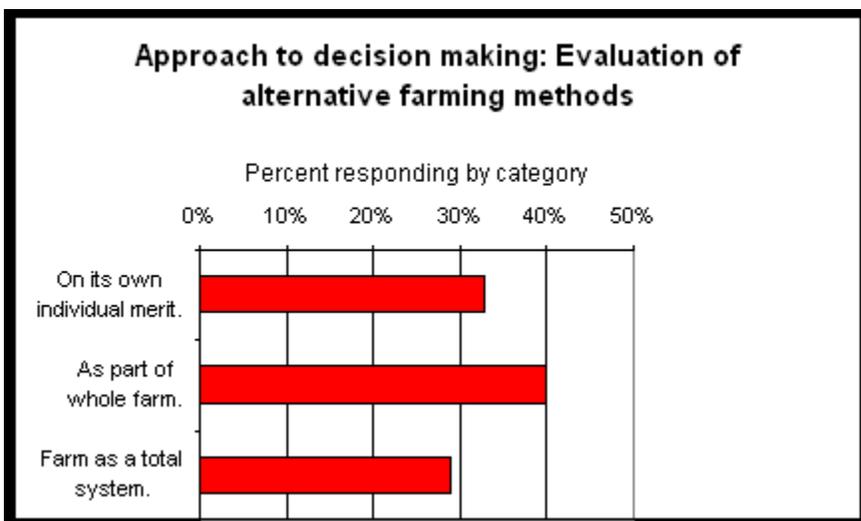


Figure 4.

As in previous questions, economics was the dominant reason given for trying new farming methods and practices, with over 80 percent of all respondents listing economic as a reason for changes. Nearly half of those responding listed ecological or environmental issues and just under 25 percent listed social (community or quality of life) as a factor in their trying new methods. The results seem to confirm that all three dimensions are motivational factors, but that economics is still a dominant consideration.

Overall approach to farm decision making. After answering questions regarding the challenges of farming, new farming practices and methods and motivation for changes, farmers were asked to identify their overall approach to decision making. They were given three choices (a) each farming practice, method, or enterprise is evaluated on its individual merit or performance, (b) farming practices, methods, and enterprises are evaluated both individually and in terms of their positive or negative impacts on the overall farming operation or (c) the farm is evaluated as a total system. An assumption of sustainable agriculture is that farms ultimately must be managed holistically, as whole systems, if they are to be managed for long run sustainability. The results of the survey are shown in figure 5.

Figure 5.

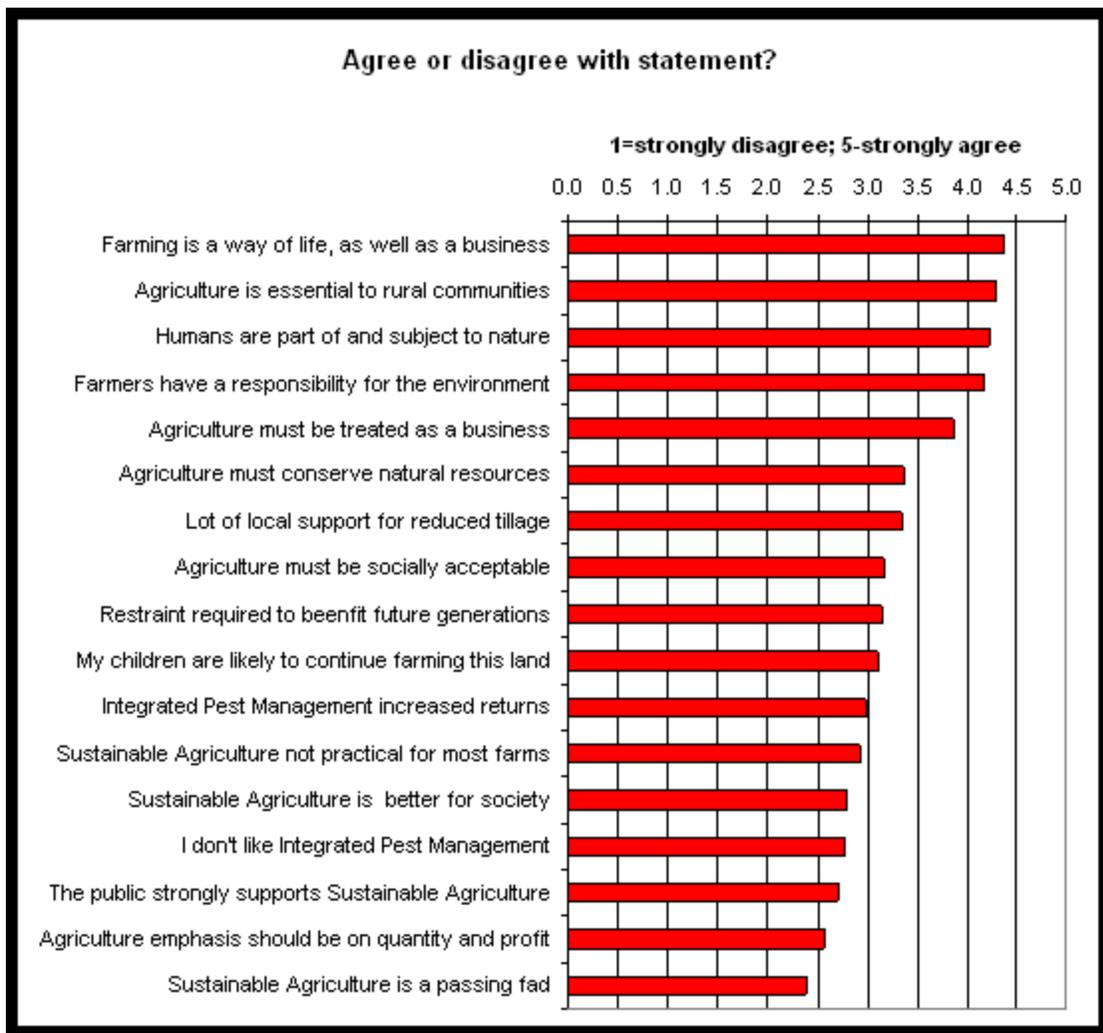


Forty percent of the farmers in the survey indicated that they evaluate individual methods, practices or enterprises both on their own merit and in terms of their impact on the whole farm. Nearly 30 percent responded that the farm is evaluated as a total system. But, more than 30 percent evaluate individual alternatives on their own individual merit.

General attitudes of farmers. Farmers in the study were asked to indicate their degree on agreement or disagreement with a number of statements related to agricultural sustainability and its various economic, ecological, and social dimensions. The results of this question are shown in figure 6.

The strongest overall agreement was with the statement: "Farming is a way of life, as well as a business." This was followed closely by "Agriculture is essential to rural communities, humans are a part of and subject to nature, and farmers have a responsibility for maintaining the environment." These results make clear that these farmers are supportive of the multiple economic, ecological, and social objectives of sustainable agriculture.

Figure 6.



There was also strong support for the proposition that "agriculture is a business and must be treated that way." Lower levels of agreement were found on a number of more general questions

related to economic, environmental and social issues. There was almost an even split between agreement and disagreement with most statements that mentioned the specific term, sustainable agriculture, by name. These statements included whether sustainable agriculture was practical on most farms, whether it is better for society, whether it has strong public support, and whether it is a passing fad. About an equal number of those interviewed agreed and disagreed with these statements. The variance of responses indicated that most had an opinion one way or the other, but did not agree.

Overall farmers seemed to perceive that the issues that underlie concern of the sustainability of agriculture are important. They also feel that the economic, ecological, and social dimensions of sustainability are very important as well. But they had not yet linked the general underlying issues of sustainability with the specific concept of "sustainable agriculture."

Differences between "conventional and sustainable" farmers

Farmers were asked to identify themselves as "conventional farmers, transition to sustainable, or sustainable farmers." Preliminary analysis failed to detect differences in responses between those choosing sustainable and transition to sustainable, so the two categories were combined to form one. This resulted in approximately equal numbers of farmers in the conventional and sustainable categories.

A Chi Square statistical procedure was used to identify responses which tended to distinguish between the two self-identified groups of farmers: conventional and sustainable. The Chi Square procedure evaluates differences in frequencies of responses among all possible responses in estimating the probability that the population from which a sample of farmers surveyed was drawn would in fact respond differently to a question. The primary significance level used in this study was 0.10 indicating less than a 10 percent chance of drawing a wrong conclusion from the sample data.

Differences between sustainable and conventional farming

Analysis of the total data set yielded no significant differences in responses between those farmers identifying themselves as conventional and sustainable on questions related to (1) meaning of sustainable agriculture, (2) most important challenges or problems, (3) reasons for trying new farming practices, or (4) approach to farm decision making. Conventional and sustainable farmers only disagreed significantly on two of the eighteen statements regarding issues related to sustainable agriculture: (1) In agriculture, the primary emphasis should be on speed, quantity and profit and (2) Humans are a part of and subject to nature.

There were significant differences in farming methods tried by conventional and sustainable farmers, with sustainable farmers significantly more likely to have tried (1) Crop rotation, (2) On-farm fertility programs, (3) Cover crops, (4) Management Intensive Grazing, and (5) Pasture management. Thus for respondents in total, farmers seem to have selected themselves into either the conventional or sustainable group based primarily on the nature of farming practices they had tried on their farms. If they had tried several farming practices typically associated with more environmentally sensitive approaches to farming, they considered them either as sustainable or transitional. If they had not tried any or many of these environmentally friendly practices, they considered themselves to be conventional. But, the two self-selected groups were not significantly different in their perceptions and attitudes regarding the general concept of sustainable agriculture.

These results raised the question of whether the lack of significance might be due to continuing uncertainty regarding what sustainable agriculture means among those who consider themselves sustainable as well as those who call themselves conventional. If the result is due to ambiguity

regarding what sustainable agriculture means, the distinction between the groups might be clearer among those farmers in phase two of the study than those in phase one.

The farmers in phase one were selected by random sample from USDA lists of all farmers. The farmers in phase two of the study were selected and interviewed in- person by Educational Assistants working with Lincoln University's Small Farm Family Program (SFFP). Farmers selected for interviews were farmers with whom the SFFP workers were acquainted or who had previous professional contact. And, sustainable agriculture had been a significant thrust area for the SFFP for at least a couple of years prior to the survey. Thus, farmers in phase two might be expected to have a clearer understanding of what the sustainable agriculture issue is about.

Small farm differences between sustainable and conventional farming

Although no instructions were given to SFFP Educational Assistants to select operators of small farms, survey results indicated those interviewed in phase two were primarily operators of small farms, although there were clearly some larger farmers included in the sample. Thus, the analysis reported in this phase of the survey is identified with small farms. A more accurate description of farmers in phase two might be "farmers with prior contact working relationships with SFFP workers."

There is not universally accepted definition of small farms, however, the general guidelines for SFFP Educational Assistants is that a small farms are those will less than \$50,000 in annual sales of agricultural commodities. In south Missouri, this definition includes farms of several hundred acres of unimproved pasture or marginally productive cropland as well as farms of only a few acres of berries, vegetables, or intensively managed crops. In nearly all cases, families on small farms in Missouri have significant sources of off-farm income. However, many such families depend of farming for their place of residence and much of their family recreation, as well as significant portion of their family income. The farms in phase two of this study, on average, clearly fit the general description of Missouri's small farms.

Meaning of sustainable agriculture. Responses were significantly different concerning importance of environment soundness in defining sustainable agriculture between "conventional" and "sustainable" farmers in the small farm group. In table 1, there appeared to be some tendency for conventional farmers to identify sustainable agriculture more closely with specific farming methods than did sustainable farmers, but differences were not statistically significant. Sustainable farmers also had more of a tendency to identify sustainability with social acceptability, but the difference was only significant at the 23% level. The two groups were virtually identical in the their high degree of association of sustainability with profitability.

Table 1.

Attitude differences between "sustainable" and "conventional" farmers		
	Percent response by category	
What does sustainable agriculture mean?	Conventional	Sustainable
Environmentally Sound**	12%	25%
Profitable	25%	24%
Socially Acceptable	5%	9%
Organic Farming	17%	15%

Diversified Farming	27%	25%
Crop Rotations	17%	12%
Conservation Tillage	17%	14%
** Only significant difference between Conventional and Sustainable.		

Farming methods tried to improve sustainability. Conventional and sustainable farmers in the small farms group differed significantly in farming methods tried for same four categories as for the phase one and phase two group in total. All differences shown in table 2 are significant at the .10 or higher probability level. Sustainable farmers were significantly more likely to have tried on farm fertility programs, cover crops, and both management intensive grazing and other forms of pasture management. Thus, the difference which were key to the self-selection of conventional and sustainable farmers for the study group in total were also significant for the small farms group. However, for the small farm data, the two groups differed in several additional respects as well.

Table 2.

Farming Methods and Approach to Decision Making		
	Percent that have tried	
New Farming Methods	Conventional	Sustainable
On-farm fertility program	10%	18%
Cover crops	3%	11%
Management intensive grazing	8%	17%
Pasture management	15%	28%

One of the more significant implications of these results may be that about 45% of sustainable farmers have tried some form of more intensive management of pastures. The lack of differences in tillage, pest management, and other crop related practices might have been due to lack of commercial crop producers in the sample rather than to any lack of differences among conventional and sustainable farmers in general with respect to these practices.

Approach to decision making. Sustainable farmers in the small farm group were significantly more likely than were conventional small farmers to take an approach to decision making which evaluates the farm as a total system than to evaluate practices, methods, or enterprises on their individual merit. This tendency was only significant at the .22 probability level for the concerning individual merit, but was significant at the .10 level for the option related to considering the farm as a total system. The two groups responded virtually the same to the middle option which considers both individual merit and whole farm impacts.

Table 3.

Differences in Approach to Farm Decision Making
Percent Response
Conventional Sustainable
Evaluated on individual merit* 23% 15%
Evaluated individually & as part of whole farm* 19% 18%
Farm evaluated as total system** 10% 18%
*significant at .22 ** significant at .10

Agreement or disagreement with position statements. The major disagreements between sustainable and conventional farmers in the small farm group with respect to the various position statements relate to perceptions of the sustainable agriculture movement. Conventional farmers were more likely to consider sustainable agriculture as a passing fad that is not practical for most farmers and has little support among farmers or the general public. Whereas, over half of the sustainable farmers strongly disagreed with the statement that sustainable agriculture is a passing fad. They are more likely to feel that it is practical for most farmers and that it has at least modest public support. The other differences in table 4, all of which were statistically significant, were subtler in nature.

Differences in attitudes regarding integrated pest management and emphasis on speed and profits are mainly due to differences in responses in the ratings for 2 and 3 categories, which do not indicate strong differences one way of the other. With respect to whether the farmers' children would farm the same farm, differences were primarily with respect to the degree of disagreement with the statement.

Table 4.

Agreement with Various Position Statements							
(Frequency: 1=strongly disagree; 5=strongly agree)							
			1	2	3	4	5
Lots of support for sustainable ag.			Percentage of responses				
Conventional			28%	28%	23%	16%	5%

Sustainable			11%	28%	50%	11%	0%
Don't like Int. Pest Management							
Conventional			16%	3%	63%	13%	5%
Sustainable			17%	23%	43%	17%	0%
Sustainable ag not practical for most							
Conventional			5%	25%	19%	35%	16%
Sustainable			28%	26%	14%	23%	9%
Sustainable agriculture is a passing fad							
Conventional			5%	41%	41%	5%	8%
Sustainable			53%	30%	11%	6%	0%
My children will continue on this farm							
Conventional			15%	5%	32%	15%	33%
Sustainable			19%	5%	11%	41%	24%
Emphasis should be speed & profit							
Conventional			24%	24%	33%	10%	9%
Sustainable			26%	44%	15%	9%	6%
Humans are part & subject to nature							
Conventional			0%	10%	24%	43%	33%
Sustainable			0%	0%	14%	36%	50%

The only differences in opinion statements that were statistically significant for the total group turn out to be a matter of degree rather than direction. For the statement that emphasis should be on speed and profits, both groups disagreed, but the sustainable group disagreed more strongly. For the statement that humans a part of and subject to nature, both groups in general agreed with the statement, but the sustainable group agreed more strongly.

Long term effects of sustainable agriculture. A maximum likelihood statistical procedure was used to evaluate differences between the two small farm groups with to their perceptions of differences in the long run effects of adopting sustainable farming systems. This data was not available for the total group. Respondents were asked to estimate impacts on eight different factors: number of family farms, farm labor requirements, purchase of external inputs, enterprise diversification, operational risks, environmental quality, quality of rural life, and farm profitability. The respondents were asked to indicate increase, decrease, or no change for each factor.

The only significant differences when all factors were included in the analysis were for (1) purchase of inputs, (2) diversification, and (3) environmental quality. The sustainable farmers were more optimistic about the potential to reduce purchased inputs, increase diversification, and improve environmental quality than were the conventional farmers. When all other non-significant variables were removed from the analysis, significant differences were observed for (4) quality of

rural life and (5) farm profitability. Again, the sustainable farmers were more optimistic about the ability of sustainable agriculture to sustain increased profits and quality of life.

Selected differences in characteristics of farming operations. Information regarding various characteristics of overall farming operations were gathered and examined for differences between conventional and sustainable farming operations in the phase two, small farm portion of the analysis. Comparisons for some of the more interesting differences are shown in table 5.

Table 5.

Differences Between Sustainable and Conventional Operations Averages		
	Conventional	Sustainable
Acres Farmed	295	129
Asset/Liability Ratio	3.68	3.05
Age of farm operator	50	53
Highest level of education (1=Primary; 2=HS; 3=College)	2.24	2.29
Years of farming experience	26	24
Off-farm income of operator	\$7,500	\$8,869
Off-farm income of spouse	\$4,590	\$7,994
Percent of family income from farming	23%	26%

The most significant difference between the two groups would appear to be in terms of numbers of acres farmed. Conventional operations farmed an average of 295 acres, more than twice as large as the 129 acres average for sustainable farmers. Asset/liability ratios were somewhat larger for conventional farms, indicating a more favorable financial status. The sustainable farmers were three years older on average, but both averaged in the 50-plus range. Sustainable farmers had a slightly higher level of formal education than did conventional farmers, but averaged 2 years less in farming experience.

Data for household income derived from farm and non-farm sources indicate that at least the average of both groups would be consistent with most definitions of small farms. Sustainable farm operators reported higher average off-farm incomes both for themselves and for their spouses than did conventional farmers. At the same time, they reported a higher percentage of their total income came from farming, 26% compared with 23%. The implied average total household income for conventional farmers is \$15,700 with \$3,600 derived from the farm. For sustainable farmers, average total household income is 22,800 with \$5,900 derived from farming. The financial results are consistent with previous studies, which indicate that farmers utilizing sustainable approaches to farming can generate higher household incomes while farming less than half as many acres as are needed with conventional approaches to farming.

Summary and Conclusions

The farmers in this study were uncertain regarding what the sustainable agriculture issue is all about. They clearly agree that farms must be profitable to be sustainable. There is also growing agreement that farms must be environmentally sound if they are to be sustainable over the long run. They agreed that viable family farms, healthy rural communities, and desirable quality of rural life are necessary for sustainability, but had not yet identified these as elements of a socially responsible agriculture. In addition, most Missouri farmers apparently have not integrated the economic, ecological, and social dimensions of sustainability into a holistic concept of sustainable agriculture.

The farmers in this study tended to separate themselves into "conventional" and "sustainable" categories based on specific farming practices, such as crop rotations and management intensive grazing, rather than their perceptions regarding the relative importance of economic, environmental, or social considerations in farming. However, farmers who were more likely to have had greater exposure to sustainable agriculture concepts, indicated more clearly defined differences between what they considered to be conventional and sustainable farming.

Among farmers selected by small farm workers, sustainable farmers were significantly more likely than conventional farmers to self-identify with environmental soundness. The sustainable small farmers were also more likely to manage their farms as a whole system rather than focus on individual practices or enterprises. In terms of general opinions and attitudes, conventional farmers in the small farm group were more likely to see sustainable agriculture as a passing fad with little public support or relevance to most farmers. Sustainable farmers apparently view sustainable agriculture as just the beginning of a fundamental change of long run importance to farming in general and to society as a whole.

The farm households in both the sustainable and conventional small farm groups rely significantly on non-farm income sources. However, farmers who identified themselves as sustainable reported higher farm and non-farm household incomes, while farming less than half the acres of those who identified themselves as conventional. Thus, sustainable farmers, at least those on small farms, seem to have found ways to maintain or enhance their farm profits while maintaining their commitment to a healthy environment and to a desirable social quality of life – while farming less than half as many acres as their conventional counterparts. They may still have difficulty defining sustainable agriculture in words, but they are clearly defining it in the ways they are learning to farm.

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