ADOPTION OF ECOLOGICAL FARMING PRACTICES BY MICHIGAN FARMERS

by

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BACKGROUND TO THE PROBLEM

"Organic farming" or "eco-farming" or "biological agriculture" are terms (among others) coined by various groups and writers to describe farming systems that eschew or de-empnasize the use of manufactured chemicals for fertilization, weed and pest control. Instead, emphasis is placed on working with ecological processes--particularly on building soil structure and mineral balance and encouraging growth of soil life. These aims are accomplished through the use of soil builders as close as possible to their natural states and the use of cultivation methods that allow optimum breakdown of organic materials in the soil. Maintaining a healthy soil is believed to produce healthy plants and, consequently, eliminate many of the problems for which chemical additives are used by conventional farmers. If pest control is required, emphasis is on either maintaining ecological balance or the use of materials that are non-toxic to humans and wildlife.

Since only a tiny fraction of American farmers use what are popularly known as "organic methods," the question may be legitimately raised, "Why study organic farmers?" The major reason is that organic agriculture is one possible future alternative in an agricultural system which is increasingly being confronted by natural resource limitations and environmental constraints.

Certain drawbacks of a chemically intensive agriculture

are becoming apparent. This has implications for the farmer, as well as other societal groups. Modern chemically intense farming tends to involve little rotation of small grain crops, legume crops, and cover crops, and little use of manure and other humus building materials, thereby resulting in greater soil erosion (USDA, 1980). Furthermore, use of harsh chemicals, such as herbicides and anhydrous ammonia, tends to kill earthworms and other soil life, which can result in loss of soil tilth and increased erosion (Albrecht, 1975; Walters, 1975).

Under certain conditions herbicides, pesticides and nitrate fertilizers leach into ground water or enter streams through soil erosion. Runoff from crops in the U.S. deposits enough sediments and associated pesticides and nutrients into U.S. streams and rivers each year to fill a railroad train stretching 24 times around the earth's equator (Dale, 1979a). A recent environmental impact statement for the Rural Clean Water Program estimated that 67% of the nation's lakes and stream channels are adversely affected by pollution from agriculture. A number of other studies document increasing water pollution in agricultural areas (McElroy, et.al., 1975; Rajagopol, 1978; EPA, 1977). Agricultural nonpoint pollution presents dangers to human health through the pollution of ground and surface waters. It also creates aesthetic problems, especially pertaining to recreation, and generates economic impacts both from sedimentation in streams and from the loss of productivity of eroding soils (EPA, 1979a; GAO,

1975; USDA, 1980). Pesticides that enter the ecosystem present dangers to bird and wildlife populations, and chemical residues in the food present dangers to human health (Oelhaf, 1978; Khera, 1976).

On the farm, producers are subject to the health hazards of applying agricultural chemicals and face economic pressures that result from their dependence on fossil fuel derived fertilizers, pesticides, herbicides, and growth regulators. This dependence renders the individual farmer vulnerable to input shortages and volatile price shifts. Farmers may also be subjected to decreasing returns from the same amounts of fertilizer and from resistence to pesticides and herbicides (Allaby, 1974).

Given these potential problems with conventional farming techniques, the use of organic methods, which eschew fossil fuel derived chemicals, may be a preferred alternative in some circumstances. A recent USDA report on organic farming (1980) concluded that many of the management practices used by organic farmers are those which are also best for controlling soil erosion, conserving energy and minimizing water pollution. This study cites other research which shows that crop rotations, chisel plowing, use of cover crops, increasing organic matter in the soil, substitution of biological controls for pesticides, and reliance on natural nitrogen fixation will reduce the input of agricultural pollutants--herbicides, pesticides, nitrates and topsoil--to surface and ground waters and the environment at large

(Johnson and Moldenhauer, 1979; Wischmeier, 1966; Wischmeier and Smith, 1978; Cooke, 1977; Parr, 1973; Singh and Sekhon, 1978; Stewart, et.al., 1976; Wauchope, 1978; Stewart, et.al., 1975).

Policy suggestions have included ways to induce farmers to substitute non-polluting techniques for current practices. One possibility involves educational efforts to make farmers aware of the polluting effects of their activities; however, economic factors are regarded as barriers to changes in many practices (Frere, et.al., 1977). Another option is taxation of fertilizers and pesticides, with the expectation that increasing their cost would lead to lower levels of use. Yet there is disagreement about the effectiveness of reducing pollution as a direct impact of reducing inputs (EPA, 1979a; Frere, at.al., 1977). Incentives to individual farmers to substitute alternative practices is a third possibility, but such programs are costly, and dependent upon Congress for further appropriations (GAO, 1975).

STATEMENT OF THE PROBLEM

The important issue is how to get farmers to adopt the most ecologically sound, non-polluting practices (social goals), consistent with their other (private) goals. Research on adoption of organic methods has important policy implications because it looks at a group of farmers who have willingly adopted these practices, and have developed workable, economically sound alternatives to conventional agricultural practices (USDA, 1980). Therefore, it is important to understand why they were willing and able to adopt these practices. In this paper, the primary goal is to document the processes Michigan farmers have gone through in deciding to adapt their farms to organic farming techniques. A diffusion of innovation multi-stage framework is used in viewing data from organic farmers describing their experiences in either converting a conventional farm or beginning farming using organic methods.

LITERATURE REVIEW

Organic Farming Literature

The literature on organic farming in the the United States has been contributed by three basic sources: organic change agents, other journalists, and scientific researchers. The primary organic change agents have been Rodale Press and ACRES USA, both of which publish magazines which focus on the theory and practice of ecological farming, and which feature interviews with successful organic farmers. Both also publish books which set forth the biological and ecological rationale for organic farming (Woolf, 1977; Goldstein, 1973; Allaby and Allen, 1974; Walters, 1975). In recent years, journalists for other publications have written articles which were basically case studies of successful organic farmers (Zwerdling, 1978a; 1978b; Tucker, 1979).

Within academia most research relevant to organic agriculture has been carried out by researchers in non-agricultural disciplines. Until very recently agricultural researchers have tended to regard organic farming as "old-fashioned", in conflict with modern "scientific" agricultural practices, suited only to small scale gardening, and, in general, economically unfeasible (Aldrich, 1977; Utzinger, et.al., 1978; Margolus, 1973; Jukes, 1974; White-Stevens, 1977; Perry, 1977).

Existing academic studies have focused primarily on the

agricultural and ecological ramifications of certain individual agricultural practices (for specific references see USDA, 1980; and CAST, 1980). However, in the last few years some studies have begun to look at organic farming as a system. Three recent studies (albeit with different aims and assumptions) have taken an overview approach to organic agriculture. The first, an economics dissertation (Oelhaf, 1978), examines the implications of a food system which would hypothetically gradually adopt organic farming methods. He stresses that organic and conventional farming are independent systems, and simple withdrawal of one or two elements from a conventional system does not produce an ecological system. Higher retail prices of organic food are due largely to the costs of handling small quantities of organic food, although production costs rise for certain crops, notably fruit rees and root crops. He estimates that a large sale changeover to organic farming in the U.S. would require about 5 to 10% more labor and land for major crops. The human and natural resources would be available to make this change, including enough natural fertilizers. Oelhaf also concludes that organic farming could be encouraged by public policy which encourages research in biological control and which would provide incentives and insurance for the transitional period. A report by the Council for Agricultural Science and Technology (CAST, 1980) used existing agricultural studies to examine the issues of soil fertility, safety of chemicals, chemical vs. non-chemical

pest control, and the energy implications of conventional versus organic agriculture. They too examine the implications of increased adoption of organic farming methods for the system as a whole, but are more pessimistic in their conclusions than Oelhaf.

A USDA study team (USDA, 1980) went beyond secondary sources and used interviews with selected farmers in the U.S. and Europe together with a survey conducted by Rodale Press of its farmer readers. The aims of the study group were to assess and describe the activity of organic farming in the U.S. and to determine the needs of and barriers to successful organic farming. Included in their analysis was the assessment of economic costs, benefits and problems involved; and the identification of research and educational programs of help to organic farmers whicn are underway or are needed. The researchers were impressed with the management ability of the organic farmers and recommended that this method of farming be given more attention and research effort.

Our primary interest in this study is in actual studies of existing organic farmers and farming systems. Along this line several researchers have looked at the economic viability of eco-farming. The pioneering study was a research project carried out by the Center for the Biology of Natural Systems (CBNS) at Washington University from 1974 to 1978 (Klepper et.al., 1977; Lockeretz, 1975; Lockeretz et.al., 1978; Lockeretz et.al., 1980; Wernick and Lockeretz, 1977; Lockeretz and Wernick, 1981). In these studies, the

researchers examined management practices, economic performance, crop yields, and energy consumption on eco-farms in the Corn Belt. With regard to organic management practices, they found that, although organic farmers used no chemical fertilizers and pesticides, their practices differed from those of their conventional counterparts mainly in degree. For example, organic farmers used cultivation to control weeds, but many conventional farmers also used cultivation in addition to using herbicides; and while organic farmers used legumes to provide nitrogen, conventional farmers with livestock also produced legumes but used nitrate fertilizers as well. Levels of mechanization were quite similar. Few differences were noted between size of equipment used by organic farmers and their conventional counterparts. Crop mix was slightly different (slightly less corn and soybeans and more oats and wheat for the organic farmers.) This, plus higher use of cultivation, led to use of only slightly more labor on the organic farms.

The CBNS economic studies showed that for the first four years (1974-1977) organic farms produced between six percent and thirteen percent less market value per hectare of cropland than their conventional counterparts. On the other hand, their operating costs were lower by about the same amount. Therefore their returns were within four percent of each other (organic returns were higher for two of the years and conventional returns higher the other two years.) In 1978, however, the organic farms grossed seventeen percent

less, and the returns were thirteen percent lower. This is attributed to extremely favorable weather conditions which provided optimum conditions for agricultural chemicals. Organic techniques were judged to be most favorable under suboptimal weather conditions such as drought. Studies showed organic yields to be slightly lower on those crops which used the highest chemical inputs. Corn yields were an average of ten percent lower, soybean yields five percent lower, and oats and hay the same. Again, in years of drought, organic farmers were close to, or exceeded, conventional yields. Wheat, which was not a significant crop on any of these farms, showed on average one-fourth smaller yields on organic farms. Even though organic farmers used more mechanical cultivation, they used two-fifths the fossil fuel energy of conventional farms to produce one dollar's worth of crops. Soil erosion due to water was estimated to be one-third less on the organic farms.

Three other studies which have looked at economic viability and energy intensiveness on existing farms were conducted with very limited budgets and small samples (they are all Master's theses). Berardi (1978) looked at organic wheat production in New York State and Pensylvania; Kraten (1979) studied small grain farms in Washington State; and Roberts (1977) researched field crop production in the Corn Belt. Their findings confirm the previous conclusions that organic farms use less energy than conventional farms and are economically competitive.

A few studies have examined the social and institutional reltionships of organic farmers. Youngberg (1978) and Buesching (1979) deal with organic agriculture as a social movement and discuss its various philosophical bases. Alexander (1977) looked at the organic industry including input suppliers, sources of information, and markets. The Small Farm Management and Technology Project studied thirty-one small organic farms in Maine and found that two-thirds of the farms got most of their soil nutrients off the farm, with poultry house manures being the single most important source for over half the farms. The study suggests that the pessimistic, long-term projection for the Maine poultry industry has unfavorable implications for the viability of organic farming in Maine as that farming is currently constituted. The authors also report that the farms in their sample generate few full-time employment opportunities; the average wage bill for the thirty-one farms is about $1100, and thirty-nine percent of the farms hire no outside labor. Finally, Vail found that the typical farmer sells through two retail and two wholesale outlets; retailing was more important than wholesaling for two-thirds of the sample. He suggests that the reliance on retail sales has led to a "tendency to overdiversify production and to produce ill-suited products in order to meet the competition in particular markets" (Vail, 1978a.)

Harris, Powers, and Buttel (1978, 1980) conducted a small survey of organic and conventional farmers throughout

Michigan. They found that organic and conventional farming can best be regarded as a continuum: some farmers who use chemicals also use rotations and cover crops, and some predominantly organic farmers will use herbicides on their rented land. Certain prevailing beliefs about farmers were also evaluated. It was found that organic farmers are not older, backward farmers lacking the education to understand modern farming methods, but, in fact, are slightly younger than conventional farmers. Another stereotype--that organic farmers are predominantly migrants from urban areas seeking rural lifestyles--was true for some farmers, but not others. Although the conventional sample was more likely to have come from a farm background, farmers in the organic sample also tended to come from a farm background. The organic sample did farm smaller acreages on the average, although some very large farms were included in the organic sample. Not surprisingly, due to the smaller acreages, organic farmers were more likely to raise vegetables and small animals while conventional farmers produced more grains and large livestock. Organic farmers were nearly as likely to sell to conventional markets, but utilized direct marketing more frequently. When acreage was controlled, only small differences in attitudes such as agribusiness cynicism, powerlessness, favorability toward collective bargaining, or welfare-state liberalism could be discerned between the two samples. In addition organic farmers were slightly less favorable toward price supports, and described themselves as

slightly more liberal on a scale from extremely conservative to extremely liberal. Organic farmers also had a higher noneconomic orientation toward farming. Conventional farmers were much less likely than organic farmers to be concerned with environmental impacts of agricultural practices.

Several studies have yielded information on the adoption process. In a sociological component of their questionnaire, the CBNS study asked farmers; 1) when and why they decided to convert to organic methods; 2) what sources they consulted while making their decision; 3) what contacts they had with other farmers and agricultural institutions and groups, both organic and conventional; 4) what inputs they used and which they avoided; 5) what advantages and disadvantages they perceived in organic farming; and 6) information about their other farm practices in an effort to determine how "modern" they were. Eighty percent of the sample had once farmed with conventional methods, and the organic farmers were about the same age as their conventional counterparts (about 50 years). On the average, they had adopted organic methods in 1971. Three-fourths of the converters expressed the following reasons for trying organic methods: 1) a specific problem or concern with chemical use such as the health of their families and themselves; 2) the health of their animals; 3) problems with soil, or 4) the ineffectiveness of chemicals. About one-third mentioned general dislike for chemicals, environmental concerns, or religious reasons. Advantages mentioned were: family health and livestock health, soil

quality, and environmental and religious factors. The four most frequently mentioned disadvantages were: weed problems, difficulties finding markets for organic products, lack of up-to-date information sources, and a low opinion of organic farming by others.

A Center for Rural Affairs study (1980), funded by the National Center for Appropriate Technology, used a mail survey of 547 organic farmers in Minnesota, Iowa, Missouri, Nebraska, and Illinois to focus on barriers to conversion to ecological farming methods among small farms. They found the most serious barriers to be difficulty obtaining reliable information on organic farming, lack of objective research on ecological farming practices, lack of markets for organically grown food, and weed control problems. Discrimination in loans by lending institutions was also regarded as a problem, as was discrimination by tax-supported agricultural agencies. Organic farmers were found to provide support and information to each other--although less than half of the sample belonged to an organic grower's organization. Organic farmers generally regarded their methods as an economically sound alternative and were enthusiastic about the ecological and health advantages of these methods.

Agricultural Innovation Studies

Studies of agricultural innovations have been part of a larger body of literature that examines the diffusion of a

variety of innovations. In 1971, Rogers and Shoemaker attempted to draw generalizations from a vast body of diffusion research.

Diffusion of innovations is seen by them as a communication model with five components: the **source**, the **message**, the **channel**, the **receiver**, and the **effects**. The source is the inventor or disseminator of the innovation--the "change agent" or "opinion leader". The **message** incorporates the attributes of the innovation, specifically the attributes as perceived by the adopter or potential adopter. An innovation has specific characteristics which theoretically affect its adoption. For example, "relative advantage" is the perception of the innovation as better than the idea it replaces. Criteria may be economic or involve personal satisfaction or convenience or social prestige. "Compatibility" is the extent to which an innovation is seen as consistent with the values and circumstances which the adoptee is faced with. Other characteristics are "complexity", "trialability", and "observability." Channels of communication can be either interpersonal or involve mass media. Thus, the adoptee's contacts are potentially important. The adoptee (the receiver) is also conceived as a member of a social system with a value system and norms which will influence his or her decision.

The effects are the gaining of knowledge about the innovation, possible attitude change and finally, behavioral change. The effects are conceived as a four-function process

which a person undergoes. The knowledge function occurs when the individual is exposed to the innovation's existence and gains some understanding of how it functions. It may be introduced accidentally, but people often expose themselves only to ideas which fit in with their existing attitudes, interests and needs. In some cases, need for an innovation must precede awareness-knowledge, but it is also true that needs can be created through knowledge of an innovation. The persuasion function occurs when the individual forms a favorable or unfavorable attitude toward the innovation. Persuasion involves actively seeking information about the idea, and the person may mentally self-apply the new idea. All innovations carry risk--the potential innovator is unsure of the idea's results and seeks reinforcement for his/her attitudes. Decision comes when the person decides to try the innovation, and actually tries it. It may involve small-scale trials at first. The confirmation function occurs when the person evaluates the decision after trying the innovation. Information is thus sought after deciding to adopt as well as before.

Most agricultural innovation research in this country took place in the 1950's and early 1960's. The focus was on adoption of the farm innovations which were concommitant to the post World War II agricultural 'revolution' of land and labor saving inputs (Goss, 1979). Research has typically regarded adoption versus nonadoption of the innovations in question as the dependent variable, with a variety of

variables invoked to try to predict adoption. Certain demographic variables have been consistently shown to be positively associated with, and to predict, adoption. These include: age, education, size of operation (including acres farmed), productive person work units, gross farm income, social status, contact with information, and formal participation in groups (Finley, 1968; Rogers and Shoemaker, 1971; Coppe, 1958; Photiadis, 1962). Other relevant variables which are posited by the literature include farmer attitudes, values and personality characteristics.

Results of such studies are ambiguous, due in large part to the fact that a wide variety of innovations are used, in combinations that make it difficult to draw meaningful conclusions. For example, adoption of a new herbicide may be lumped with another "recommended practice," such as a soil conservation practice or use of a certain farming implement when, in fact, the characteristics of the innovations may be perceived to be quite different. The correlates of adoption could, thus, be different. More sophisticated studies have recently shown that the characteristics of the innovation are important to recognize. For example, certain environmental innovations may be regarded as economically profitable while others may be perceived as economically damaging (Pampel and Van Es, 1977).

It is interesting to note that many of the innovations involved in eco-farming are the antitheses of certain innovations in the earlier studies, such as use of herbicides

and pesticides. Future research is needed to assess the correlates of adoption which, on the surface, could be expected to be reversed. Organic innovations are different than many of the innovations previously studied in that the change agents are different. Past agricultural innovations have been almost universally those disseminated by a knowledge, technical or political mainstream agent. Organic change agents tend to be outside the mainstream of agricultural thought and, until recently, have been generally ignored by the usual agricultural change agents such as the Cooperative Extension Service (USDA, 1980).

METHODS

The data reported in this study are from a mail survey of Michigan farmers in the Summer and Fall of 1978, and follow up interviews with fifteen of the respondents that were conducted in the Spring of 1980. The attempt was made to identify and contact the population of self-identified "eco" or "natural" or "organic" farmers in Michigan by including all members of Organic Growers of Michigan (OGM) and Michigan subscribers to ACRES, USA--a publication directed toward ecologically-oriented farmers. The OGM sample consisted of 198 individuals or couples; the ACRES, USA list included 275 individuals (after duplicates were eliminated) for a total of 472. Of these, 281 responded (59%). Only 143 of the questionnaires were usable--the remainder were either not farmers or declined to participate. Of these 143 respondents retired farmers (16) were eliminated. Also eliminated were farmers who did not indicate that any of their land was organically farmed or who reported the "regular" use of herbicides, anhydrous ammonia, urea, or superphosphate on their "organically managed" land (leaving 115 farmers). In an attempt to eliminate gardeners, the decision was made to eliminate very small acreages. Gross income figures could not be used since the lowest category was $2500 or less, and income figures were more often missing than acreage data. Twenty three cases whose cropland operated (including pasture) was less than five

acres, or which did not report acreage farmed were eliminated, for a final sample of 92. None of the 23 farmers reported a gross income greater than $2500.

It is difficult to assess the true response rate (the percent of those who should have responded, who actually did) because not all the 472 names contacted were actually organic farmers. If we assume the proportion of organic farmers in the nonrespondent group was the same as the proportion of organic farmers among the respondents, the true response rate would be 60%.

In choosing the case study sample an effort was made to stratify on four variables: 1) farmers who converted to organic methods versus those who had always used organic methods, 2) husband's off-farm work (high versus low); 3) gross farm income (high versus low); and 4) major enterprise--cash grain, dairy or beef, or fruits or vegetables. Since cases could not be found to fill every cell, two cases were taken from the larger cells; the sample included farmers throughout the southern part of the state.

FINDINGS

Since organic farming was not defined in the questionnaire, the farmers identified themselves with organic methods based on their own definitions. The case studies provide a much clearer picture of respondents' philosophies of farming, and what methods are actually used for soil fertility, weed control and pest conrol. Several of the farmers interviewed were concerned that the prevailing view of organic farmers dwelt on the nonuse of chemicals rather than on the positive use of other practices. For the case study farmers, the basic emphasis of "organic" or "eco" or "biohumic" or "natural" farming (there was great diversity in self-description) is to maintain the health of the soil through use of materials that do not damage soil life (from earthworms down to nematodes and soil bacteria) and to use only materials which are non-toxic to humans, both in their application and in their residue on food. A variety of practices are used for soil fertlity, including blended naturally occurring fertilizers, greensand, granite dust, colloidal phosphate, composted manure, legume crops, and lime. Weeds are generally controlled with chisel plows or rotary hoes which minimally disturb topsoil and leave weed seeds on top of the ground to dry out. Weed problems are generally believed to be the result of unbalanced soil and are treated with rock mineral fertilizers. Grain farmers generally control pests through crop rotation and balancing

the soil. Vegetable and fruit growers rely on careful monitoring of pests, and generally control pests with diatomaceous earth, predator insects and bacteria molds, or broad spectrum naturally occurring insecticides like rotenone or pyrethryn. Other items are being marketed for use in eco-farming, such as bacterial seed innoculants, bacteria to add to the soil, foliar sprays made from seaweed, and soil penetrants which allow water to move through soil more effectively.

The interviews revealed a range of attitudes about what is acceptable practice for natural or eco-farming. The two fruit farmers in the case studies expressed their belief that certain levels of "organicness" should be specified since certain fruits, such as apricots and cherries, are very difficult to grow without some chemicals--particularly fungicides. However, the point was made that certain chemicals are much less toxic than others, and economic reality can be merged with ecological concern to encourage use of the least toxic materials possible--even if they do not occur in nature. Certain other practices are "borderline", such as use of maufactured forms of potash. Local chapters of organic growers (who certify products as organically grown) as well as individual farmers struggle with these issues, but the general overriding goals expressed by the interviewees are preserving soil health, human health, and environmental quality.

A distinction made in this paper is between 1) farmers

who converted to organic methods after using conventional chemical methods (converters), and 2) farmers who farmed organically from the time they began farming (always organic farmers or nonconverters). Converters and nonconverters illustrate two different paths to organic farming. Accordingly the differences between the two groups concerning farm and farmer characteristics will be examined in an attempt to better understand any differences in the adoption process.

Tables 1-17 (presented in the appendix) compare converters and farmers who have always farmed organically, in terms of farm and farmer characteristics. As can be seen from Tables 1 and 2, a larger proportion of the farms operated by converters are very large farms, and always organic farmers are more likely than converters to operate the smaller acreages. The median cropland of a converter is almost twice that for the nonconverter group. Converters also are more likely to rent land (Table 3). Converters, however, rent the same percentage as always organic farmers of the total acreage they operate. The large differences in acres operated suggest a significant difference in major farm enterprises, and this is the case. Table 4 shows that converters are much more likely to be cash grain farmers or dairy farmers, while always organic farmers are much more likely to produce vegetables. Table 5 shows the breakdown by acreage for each major enterprise. For the major enterprises, cash grain, dairy, beef, and swine, converters

farm significantly larger acreages than always organic farmers. While many more always organic farmers produce vegetables as a major crop, converters still farm slightly higher average acreages. Always organic farmers who reported fruit as a major enterprise farmed slightly more acres than converters.

Converters are much more likely to have come from a farm background (Table 6), are older on the average (table 7), and have been farming an average of nine years longer (Table 8). Always organic farmers are more highly educated, with the mean education being over four years of college (Table 7). As one might expect from the differences in farm size, financial data reveal a greater median net value of farm assets (Table 9) and greater total net worth (Table 10) for the converter group. Always organic farmers are significantly more likely than converters to gross less than $2500. The median 1977 gross farm income (Table 11) of the converters was over twice the median farm income for the always organic group. When 1977 net farm income (Table 12) is examined the differences in general disappear. Converters and always organic farmes are fairly similarly distributed across the income categories, with both medians falling into the "costs exceeded income" category.

Despite fewer assets and less land, always organic farmers have a larger median level of debt (Table 13)--probably partly because converters (with the higher frequency of farm backgrounds) are more likely to have inherited their

land. Always organic farmers, as a group, are also newer to farming than converters. Thus, these differences can be interpreted as indicating that nonconverters are at an earlier stage in a cycle of investment and recovery than the converters. This is corroborated by the fact that always organic farmers are more likely than converters to expect a greater net farm income in the next 5 years (Table 14).

Given smaller acreages and higher debt it is not surprising that more always organic farm families work off the farm. As Table 15 shows, 88 percent of farmers who had always farmed organically report some family off-farm income; 60 percent of the converter families report that a member works off the farm. Of those who do work off the farm, husbands in converter and always organic farm families tend to work full-time (200 or more days); over three-fourths of the converter husbands work full-time while 57% of the always organic farmers work full time off the farm. About half the wives in each group work full time off the farm.

Virtually identical median total family revenues exist for the two groups, as shown in Table 16. However, the groups were examined for differences in their level of self-sufficiency, and it was found that always organic farmers are consistently more likely to produce their own meat, vegetables, milk and fuel (Table 17). Thus, always organic farmers farm fewer acres and have more debt, but appear to make up for it by producing more of their own food and working off the farm more than converters.

Phase 1 - Knowledge

Knowledge of the existence of an innovation is obviously necessary before its use can be considered. In the case of eco-farming, only a few persons or organizations exist who might act as change agents. These are: the organic publications, other environmental publications or advocates, salespersons for organic amendments, or farmers using eco-methods (who may or may not be interested in actively trying to convert other farmers). In the case of organic farming, the concept of **negative** change agent may be appropriate to consider as well; many change agents advocate the use of chemicals and, therefore, covertly or overtly the disuse of eco-methods. The primary example is producers of agricultural chemicals, which tend to be large corporations (Krebs, 1976) with large advertising budgets. Land grant universities have advocated use of agricultural chemicals, and have generally fostered the impression that it is impossible to farm successfully without them. Access to both types of change agents will presumably have a very great influence on the stages of adoption, beginning with knowledge.

The survey results do not contain data on how and when farmers became aware of what eco-methods are. However, the case study data provide some illustrations of the varying ways farmers (or prospective farmers) become aware of the

those who "stumbled onto" organic methods and those who went seeking information because of dissatisfaction with chemical methods. For about half the converters in the case studies, knowledge first came from an Agriserum dealer (Agriserum is a seed innoculant which works best in the absence of chemical fertilizer). Other influences were: 1) information passed on from other farmers or friends and relatives; or 2) membership in NFO, where 12 to 15 years ago, Charles Walters (the editor of ACRES USA) was active in providing information about eco-methods. Always organic farmers who were interviewed tended to obtain their first knowledge of organic methods either through general contact with the environmental movement and environmental publications, or from meeting organic farmers accidentally.

The questionnaire asked, "Which of the following sources of information did you consult while making your decision?" The results are tabulated in Table 18. (As a result of an inadvertent wording of instructions in the questionnaire it was answered only by converters.) Books and magazines about organic farming clearly are the most important sources of information; other organic farmers are also highly important. Salesmen for organic farming products are of some importance; government agencies and bankers were rarely consulted.

Phase 2 - Persuasion

The persuasion stage as discussed by Rogers and

Shoemaker, was assessed by two questions about reasons for trying organic methods. Farmers were asked: "What first make you think of using organic methods?" and "What other factors contributed to your decision?" Again, only converters were asked to respond. Responses fell into eight major categories, plus a miscellaneous category of responses that could not be easily grouped with others or were only offered by one or two respondents. For purposes of this analysis, the responses to both questions are merged. Table 19 shows that the desire for personal and family health, desire for healthier soil, realization of problems with chemical farming (not otherwise specified), and personal recommendation were the most frequently mentioned stimuli for trying organic methods. Economic advantages of organic methods, reading articles and books, belief that organic methods produce better crops and livestock, and general environmental reasons were mentioned slightly less frequently. What is called "desire for personal and family health" in this study incorporates responses which speak of the desire for a more wholesome supply of food and water as well as the desire to avoid the danger of applying chemicals. "Desire for healthier soil" incorporates responses which speak of chemical farming killing soil life and harming soil tilth. "Realization of problems with chemical farming" is a general category which incorporates ambiguous answers such as "don't like chemicals" and "problems with chemical farming." "Economic advantages" incorporates items which mention high

prices of fertilizer and sprays, cost advantages of organic farming, lower costs for inputs, and the belief that organic methods are more suitable for smaller farming. "Environmental reasons" include such responses as "it's nonpolluting", "concern for the ecosystem" and "the environmental movement", as well as specific instances of chemicals killing birds or polluting streams. It would be desirable to know more about the comparability of the various responses. Although many respondents expressed direct and negative experience with chemical farming, other responses were ambiguous as to whether the reasons were based on personal experience or indirect sources of information.

Unfortunately, converters and always organic farmers cannot be compared on this question to see if personal family health or environmental ideology as opposed to economic factors was more important for beginning farming organically or for converting to organic methods, because the question was only answered by converters. The desire for personal and family health is much more important to converters than economic reasons. Reasons were compared for farm families reporting no off-farm work and those doing any work off the farm. Full time farmers were more likely than part-time farm families to regard economic reasons as important in their decision to adopt. This is not surprising since full time farmers, largely dependent on the farm for their living, would presumably have to at least consider the economic viability of the methods. But economic factors were still

less important for full-time farmers than desire for healthier soil, and desire for personal and family health. Realization of problems with chemicals was equally as important as economic advantages.

Although varying reasons for adopting organic techniques were apparent in the case studies, some common patterns existed. Concern for health was mentioned by every full-and part-time farmer in the case studies, as contributing to the decision to try organic methods. On the other hand, in very few cases was economics the deciding factor. That is, these farmers did not choose organic methods primarily because they were perceived to cost less, to be economically more viable in the long term, or because greater gross or net income is possible. Many found these economic factors to be important advantages with experience, or they may have had some influence while they were making the decision, but other issues were paramount. The lack of economic motivation is not surprising for those farmers who do not depend on farming for a living. In fact, virtually every part-time farmer (or farmer whose wife works full-time) volunteered that this was important in their decision to try organic methods--they were not dependent on the farm and were more relaxed about trying new things. Many volunteered their opinion that large farmers are locked into using chemicals because they have such a high level of debt. This economic pressure on larger farmers produces fear of taking chances and the belief that they cannot afford to rotate crops because they must get a

cash crop off every field every year.

The full time farmers in the case study illustrate the decision to use organic methods even though they are dependent on farming for their living. Two were converters and two had started farming organically. In no case were immediate economic considerations paramount. The two farmers who converted (one of whom is still in the process of converting his 600 acres to organic methods) were dissatisfied with chemical farming because of perceived hazards of chemicals to their own health, and the health of others, but mostly because of a nagging feeling that "something wasn't right." They reported that the soil was losing its tilth, becoming very compacted, and that earthworms were killed by the chemicals. This took the pleasure out of farming, and also made them realize the chemical methods of farming could not continue indefinitely without severe damage to the soil. These responses suggest that concern for the soil does have long-term economic implications. One of the always organic farmers who had been farming for over 30 years always had good results growing quality vegetables with natural means, had built up a market interested in quality, and saw no reason to start using chemicals in the 50's when the push was on to use them. The other always organic couple chose organic methods because they were presumed to be better for the long term health of the soil.

The case studies indicate that the persuasion phase of

the process ranged from a few months to six or seven years. In several cases the farmers described themselves as being willing to try something new, and when the Agriserum salesman came around, they were willing to see if it would work for them. In both cases, they tried the product immediately on a small scale, got excellent results, and used it on their entire land the next year. Use of the product then led to attendance at meetings called by the company, and subsequent growing interest in health and ecology issues from contact with other people at these meetings. Other farmers in the case study required several years to study the literature before making the decision--notably the young 600 acre full-time grain farmer, who converted very gradually after thoroughly studying the issue. Other interviewees had thought about trying eco-methods for years, but were stopped by economic fears, or the opposition of family, but made the decision after a precipitating crisis, such as death of a parent, where farm chemicals were felt to have contributed, or weed problems were so severe that with the experience of herbicide failure it was either "go organic or go broke."

Always organic farmers in the case study tended to go into organic farming experimentally (without much experience as farmers) because of environmental or health oriented reasons and stayed with it partly because of perceived economic advantages. It is significant that in no case did an interviewee report that organic methods were tried with the feeling that a big risk was being taken. Either off-farm

income was regarded as sufficient to counteract risk (the farmer felt things couldn't get much worse anyway, and at least organic methods were not as costly as chemicals) or the farm operator had reason to believe the method would be successful because of his or her own personal trial or testimony from others.

Phase 3 - Decision

In Rogers' scheme, positive decision occurs when the innovation is implemented to any extent, even if on a trial basis; and confirmation is a decision over time to continue using the innovation after evaluation. Historically, for this sample of Michigan farmers, the decision to try organic methods clusters around a period about eight years ago. The converter group's median first year of using organic methods was 1972 with a range of 1938 to 1978, and the always organic group's median first year was 1973 with a range of 1940 to 1978. The distributions (Table 20) indicate that 73 percent of converters and 89 percent of the always organic farmers began using organic methods in 1969 or later. The interviews suggest that this clustering may be due to certain historical influences such as the environmental movement, which apparently influenced the younger, always organic farmers (SILENT SPRING (Carson, 1963) was published in the early sixties and had an impact on some of the older farmers). The late sixties and early seventies were also a time of general

social protest and examination of social and personal values and a time when several of the always organic farmers decided to make major career or life-style changes. In one case the farm was purchased in conjunction with a nonviolent political movement, and eco-agriculture was perceived to be compatible with the group's other goals. It was just at this point that sources of organic supply were becoming more visible and available. This was mentioned as important by several farmers as a turning point for them, and it was about this time that Agriserum was first available in Michigan. The influence of Charles Walters was also felt in Michigan in the late sixties and early seventies, first in the NFO, and later with the publication of ACRES USA.

Converters were not asked directly if they tried organic methods on portions of their land first, but the results indicate that many of the converters in the sample may presently be trying organic methods on a portion of their land. At the time of the survey, 62.8 percent said all of their land was under organic production, and the mean percentage of operated land farmed organically was 42.5 percent for the rest of the converters. (The comparable figures were not obtained for the farmers who had always farmed organically.) Of these farmers who had not completely converted (N=18), fourteen or 77.8 percent said they planned to convert the rest of their land to organic production.

Phase 4 - Confirmation

Confirmation is evidenced by the fact that these farmers are still using organic methods. Farmers' evaluations of organic methods at the time of the survey were obtained by asking the farmers to respond to a checklist of possible advantages of organic farming; each respondent was asked to indicate if the item was a "major advantage," "some advantage," or "no advantage at all," and to select three top advantages. Over 90 percent of the sample selected "healthier for the farmer and his family," "better for the soil," "more wholesome and more in harmony with nature" or "less environmental damage" as major advantages while roughly 3/4 of the sample selected "higher quality products," "use less energy and other nonrenewable resurces" or "healthier livestock" as a major advantage. Three more major advantages were mentioned by about 50 percent of the sample--"lower production costs," "yields don't suffer as much under adverse conditions," and "easier tillage."

Mean scale scores of all the possible advantages are ranked in Table 21 where "major advantage" is scored two, "some advantage" three, and "no advantage at all," four. The rankings of the top advantages are almost the same as in Table 22 which gives the rankings of the top three advantages; in addition it can be seen that the lesser advantages are "fewer insects", "organic products command a premium price", "this way of farming is closer to the way

described in the Bible," "higher net income", "work more evenly spread over crop year," "crops dry better," "yields are usually higher," "fewer weeds," and "total hours of labor less."

As discussed earlier, we are interested in the relative importance of economic motivations in the confirmation stage of the decision process. Certain responses are clearly economic while others may have economic implications that are hard to distinguish. "Lower production costs" and "yields don't suffer as much under adverse conditions" appear in the top ten in rankings of the data. These are clearly economic advantages. However, "organic products command a premium price," "higher net income" and "yields are usually higher" are less highly regarded as advantages, ranking 13th, 16th and 18th respectively (Table 21). Certain responses have economic implications in addition to their environmental focus, but it is impossible to tell how important the economic factors were to the respondents. "Better for soil" is ranked second--a highly regarded advantage, which has long term economic consequences as discussed above. The response "use less energy and other non-renewable resources", ranked 7th, also has economic implications because these inputs are expensive. However this thinking may be incorporated under the response "lower production costs."

Although it was not covered in the survey, the case study data do indicate that these farmers' evaluations of organic methods changed with experience. Many were

pleasantly surprised to see the change in soil tilth which made tillage much easier, reduced gasoline consumption, and provided better drainage. Others stated that, as their soil is gradually being built up, their yields are getting better, and pest and weed problems have subsided.

Very few differences exist between converters and nonconverters in their evaluations of advantages of organic farming; the tables show that the rankings of the advantages are very similar. Scale scores in Table 21 show that converters are slightly more likely than nonconverters to see "easier tillage," "fewer insects," and "closer to the Bible" as advantages. The first two may be related to the fact that more converters are grain farmers and to the fact that they have been farming organically sightly longer. We would expect those who have been farming organically longer to have better soil, and fewer insect and weed problems. (The responses "fewer weeds" and "fewer insects" are ambiguous, however. They could be interpreted literally or to mean fewer problems with weeds or insects.)

On the other hand, converters are slightly less likely to see as advantages--premium prices, higher yields, fewer labor hours, higher quality products, use of less energy, and "yields don't suffer as much under adverse conditions." The only statistically significant difference (.01 level) appears in response to saving energy and other non-renewable resources. It is unclear why always organic farmers would see this as more important than converters do. Perhaps this

is an ideological response based on a general environmental awareness, but we would have to be able to show that converters are less environmentally well informed. (The always organic farmers are more likely to be college educated.)

The ability to obtain a premium price for organic products might be considered a prime advantage of using organic methods, and half our sample thought it was some advantage, but the others were evenly divided between "major advantage" and "no advantage." Only 65 percent of those who sell their organic produce in special chanels obtain a premium price (Table 23). Case studies indicate that some farmers in a direct marketing situation are reluctant to charge premium prices even thougn they think they could command them.

Evaluations of organic methods were also obtained by asking the farmers to indicate which of a list of possible disadvantages were "a serious problem," "some problem," or "no problem at all." Table 24 lists the disadvantages in order of their selection as one of the top three disadvantages. Table 25 ranks the disadvantages by the mean score where two represents "serious problem," three equals "some problem" and four means "no problem." In both cases the first six rankings are about the same--fewer up to date sources of information, weed problems, difficulty in obtaining manure, higner total labor, greater expertise needed, and difficulty finding markets. However, as

expected, among currently practicing organic farmers these disadvantages are not regarded as highly serious. Very few differences of any magnitude exist between converters and always organic farmers (Table 25).

Several other questions allowed us to look at variables that may affect these farmers' evaluation of organic farming practices. They were asked to compare their crop yields with those of neighboring farmers who do not use organic methods (Table 26). The largest response was "about the same," with "somewhat lower" a close second, although the two responses indicating inability to respond ("don't know" and "yields too variable to tell") totaled about the same as each of the two highest responses. Always organic farmers are more likely to report they "don't know". The case studies indicate that fruit and vegetable farmers are less likely to measure their yields. The interviews also indicated that yields were regarded as less important than quality by farmers who feed their grain to their own livestock. These farmers reported that organically grown grain requires no protein supplementation because of its higher protein content, that the animals require less of the grain, and that its higher mineral content produces healthier livestock. No differences appeared between the converters and nonconverters.

Confirmation is presumably influenced by continuing sources of support and information. Large percentages of our sample subscribe to the major organic publications. Seventy-five percent subscribe to ORGANIC GARDENING AND FARMING, 53

percent to ACRES, USA and 43 percent to COUNTRYSIDE (Table 27). Farm meetings other than organic meetings were meagerly attended and were not helpful to organic farming (Table 28). Only 58 percent attended a natural food or organic farming organization meeting. Case study interviews show that these farmers all have support groups composed of other organic growers with whom they discuss their problems and experiences. In many cases, these are networks of friendships rather than formal groups. Many of the farmers also mentioned the psychological support they receive from their customers who value their produce for its quality and freedom from chemicals. Many of these farmers have regular customers who drive from Indiana and Illinois to buy fruits and vegetables or meat.

Converters were asked if they experienced a drop in net income during the first few years of organic management. Forty percent said yes and about a third were not sure (Table 29). When asked directly if they had ever considered giving up organic methods, a few of the organic farmers said they had (see Table 30). Several farmers wrote their reasons on the questionnaire. Two people mentioned that it was hard to build up poor soil fast, especially large acreages, and they could have been making more money with conventional methods. One of these persons said he decided against using chemical fertilizer because the soil tests showed improvement, and the crop yields were improving. The other one said he was committed to organic methods and willing to stick it out.

One person mentioned lower yields of corn, but said that the quality of the corn and the health of the animals were more important. Two others mentioned weed and insect problems during the transition.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The decision-making processes of Michigan organic farmers were examined using data from a mailed questionnaire and follow up case study interviews. Converters and nonconverters illustrate two paths to organic farming, so differences between the two groups were examined. Converters were found more likely to have come from a farm background, were older and had been farming an average of nine years longer, and had higher gross farm incomes. Always organic farmers were more likely to grow vegetables, were more highly educated and were more food self-sufficient. In general, they were at an earlier stage in a cycle of investment and recovery than the converters.

The first stage of decision-making is knowledge. Farmers became aware of eco-farming and received their information on methods mainly from books and magazines about organic farming and secondarily from other organic farmers. Salespeople for organic farming products were of some importance. The persuasion function occurred when the farmers formed favorable or unfavorable attitudes toward organic farming methods. The Michigan farmers decided to try organic methods for four main reasons: the desire for personal and family health, the desire for healthier soil, realization of problems with chemical farming, and exposure to the farmers who recommended the practices. Economic reasons for trying organic methods were not predominant, but

converters appeared to be more economically motivated. None of the farmers thought they were taking a big risk. They either had off-farm income as protection against loss during the transition, or they were so dissatisfied with their chemical methods that they didn't think they had much to lose.

The decision phase occured when the farmers implemented organic methods, even if on a trial basis. The decision clustered around the year 1972. Certain historical events were deemed influential such as the environmental movement and the impact of organic change agents at that time in history. The confirmation phase occured when the farmers decided year after year to use the organic methods. The data show the farmers to be highly satisfied with organic methods. They found these methods to be more healthful and harmonious with natural processes, although some economic motives were also present, particularly long term economic viability. The problems that were stated were lack of up to date sources of information, weed problems, and problems finding organic markets.

A general pattern of adoption is suggested by the case study and questionnaire data. Farmers or prospective farmers learn about organic methods either accidentally or because they are dissatisfied with chemical methods and actively seek alternative methods. Having been exposed to the idea, it appeals to them either because they are innovators in general and like to try new things, or because it appeals to certain

environmental predispositions or interests (including basic concern for the soil and concern for human health), or because it appeals to their desire to spend less money. All three factors may be involved. They investigate further, come into contact with other written sources of information, or go to meetings where they meet other people who provide them with further information and personal experiences. These sources are evaluated in terms of their own situation, and they may do a small scale experiment. Evaluation of risk appears to influence the decision in addition to the factors which attracted them to the innovation in the first place. Many to whom financial risk is an important issue make the decision to try the innovation with the realization that it is reversible. After the eco-methods are tried, the innovations are constantly evaluated each year of their use.

The reasons which have impelled farmers to adopt organic methods in the past may differ from the factors which affect such decisions in the future. Thus, future studies will be required to determine whether different historical circumstances (such as higher prices for fossil fuel inputs) will change the reasons for adoption of organic methods. In addition, it should be noted that in studying current organic farmers, researchers are dealing only with those farmers who made positive decisions about adoption throughout the decision-making process. In order to fully understand the process it would be necessary to study those farmers who considered the methods and decided not to try them as well as

those who actually tried the methods and decided not to continue their use. This point really raises issues of how to locate these groups of past, present, (and also future) organic farmers. Extensive use of key informants and snowball sampling would seem to be very desirable in future work. This became apparent in the case study interviews when farmers were asked to name other organic farmers. The number of names and other information (such as farm size) provided in the interviews suggested 1) that many organic farmers were not included in the study sample; and 2) that the farmers not included were probably proportionally large and more often full time farmers than those which were included in the study. Interviewees almost universally stated that organic grower groups (from which about half the sample was drawn) are geared toward very small farmers and gardeners, and that larger farmers in general do not join these organizations. It was hoped that many of the larger farmers would have been identified through the ACRES USA mailing list, but had a one year subscription list is apparently not adequate. The interviews revealed that organic farmers may have been very influenced by this publication in the past, but let their subscription drop for the year of the study sample. Contacting dealers for organic products was suggested by several large farmers as a way of locating eco-farmers.

Another limitation of the study was the large amount of non-response to the questionnaire. The interviews indicated that many farmers known to the interviewees did not respond

to the questionnaire because of their mistrust of Michigan State University which they tended to view as opposed to the efforts of organic farmers.

Future studies can go beyond the limits of this data. More comprehensive ways of sampling eco-farmers are needed. Sales people for organic farming amendments should be enlisted along with extensive snowball sampling, i.e., farmers providing the names of other farmers.

In order to better understand adoption of organic methods, a wider variety of farmers could be interviewed. Farmers who have seriously considered using organic methods and decided not to try them could be interviewed as well as farmers who have tried the methods and decided not to continue them. The problem here is in locating these farmers. Snowball sampling and use of key informants would be important here. Another possible strategy would be to mail a short questionnaire to a very large sample of farmers in order to identify the desired groups of farmers for subsequent interviews.

Another possible focus of future study would be to compare adopters and nonadopters on a variety of variables hypothesized to predict adoption such as demographic variables, attitudes, exposure to organic farming, and perceptions of the innovation, including how they fit in with the structural conditions within which the farmer operates.

Longitudinal study would also help answer some interesting unanswered questions. Since this sample of

Michigan eco-farmers rarely chose organic methods solely because of economic considerations--lower costs, possibilities for specialized markets, long term productivity--the question remains, how will rising agricultural costs in the future affect potential transition to organic methods? If future innovators are like past innovators, willingness to go against majority opinion, and concern for environmental issues will also be important.

TABLE 1

Total Acreage Operated

Acres	Converters (Percent)	Always Organic (Percent)
1-9	0.0	0.0
10-29	7.1	22.2
30-49	21.4	31.1
50-69	11.9	2.2
70-99	11.9	17.8
100-139	16.7	15.6
144-179	2.4	4.4
180-219	4.8	2.2
220-259	0.0	2.2
260-499	16.7	2.2
500-999	4.8	0.0
1,000-1,999	0.0	0.0
2,400 or more	2.4	0.0
	X = 220.1 SD = 470.9 M = 94 N = 42	X = 75.1 SD = 68.85 M = 48 N = 45

TABLE 2

Acreage Cropland and Pasture Operated

	Converters (Percent)	Always Organic (Percent)
1-9	2.2	6.7
10-29	17.8	37.8
30-49	22.2	26.7
50-69	11.1	11.1
70-99	15.6	8.9
100-139	4.4	4.4
140-179	6.7	2.2
180-219	4.4	2.2
220-259	4.4	0.0
260-499	4.4	0.0
500-999	4.4	0.0
1,000-1,999	0.0	0.0
2,000 or more	2.2	0.0
	X = 179.5 SD = 454.75 M = 62.5 N = 45	X = 42.7 SD = 39.5 M = 34 N = 45

TABLE 3

Rent Versus Own Farm

	Converters (Percent)	Always Organic (Percent)
Own all of farm	66.7	81.0
Own part and rent part	24.4	9.5
Rent all	8.9	9.5
	N = 45	N = 42

TABLE 4
Major Enterprises*

	Converters (Percent)	Always Organic (Percent)
Cash grain	50.0	14.0
Dairy	17.5	9.3
Beef	12.5	9.3
Vegetables	10.0	34.9
Fruit	12.5	14.0
Swine	10.0	18.6
Sheep	2.5	7.0
Maple Syrup/Honey	2.5	4.7
Miscellaneous	7.5	7.0
Goats	2.5	7.0
Poultry and eggs	5.0	8.9
Rabbits	0.0	2.3
	N=40	N=43

*Percent checked; some checked more than one.

TABLE 5

Acres Operated by Major Enterprise

	Converters	Always Organic
Cash grain	270.0 (20)	82.5 (6)
Dairy	283.57 (7)	28.2 (4)
Beef	100.4 (5)	51.7 (4)
Vegetables	34.5 (4)	20.9 (15)
Fruit	32.4 (5)	55.5 (6)
Swine	107.5 (4)	42.0 (8)
	N=45	N=45

TABLE 6

Parents Were Farmers

	Converters (Percent)	Always Organic (Percent)
Husband:		
Yes	72.7	36.4
	N = 44	N = 44
Wife:		
Yes	45.5	25.0
	N = 33	N = 36

TABLE 7

Age and Education

	Converters	Always Organic
Husband age	X = 45.72	X = 37.8
	SD = 13.88	SD = 9.55
	N = 40	N = 41
Husband education in years	X = 13.5	X = 16.8
	SD = 3.37	SD = 11.9
	N = 40	N = 43
Wife age	X = 45.03	X = 35.46
	SD = 13.68	SD = 8.54
	N = 34	N = 35
Wife education in years	X = 15.0	X = 13.06
	SD = 2.72	SD = 2.53
	N = 37	N = 35

TABLE 8

Number of Years Farming

Years	Converters (Percent)	Always Organic (Percent)
1-5	22.7	66.7
6-10	31.8	24.4
11-15	11.4	2.2
16-20	9.1	0.0
21-25	6.8	4.4
26-30	0.0	2.2
31-35	6.8	0.0
36-40	4.5	0.0
41-45	4.5	0.0
46 or more	2.3	0.0
	X = 15.14	X = 6.1
	SD = 13.0	SD = 5.68
	N = 44	N = 45

TABLE 9

Total Net Value of Farm Assets

Net Value	Converters (Percent)	Always Organic (Percent)
Debts exceed assets	2.8	0.0
None debts equal to assets	0.0	0.0
2,499 or less	2.8	2.5
2,500 - 4,999	2.8	2.5
5,000 - 9,999	0.0	5.0
10,000 - 19,999	8.3	12.5
20,000 - 39,999	13.9	32.5
40,000 - 69,999	19.4	25.0
70,000 - 99,999	25.0	12.5
100,000 - 149,999	8.3	5.0
150,000 - 199,999	0.0	2.5
200,000 - 499,999	16.7	0.0
	M = $69,999	M = $3,692
	N = 36	N = 40

TABLE 10

1977 Total Net Worth

	Converters (Percent)	Always Organic (Percent)
Debts exceed assets	0.0	2.0
None debts equal to assets	2.4	0.0
2,499 or less	2.8	0.0
2,500 - 4,999	0.0	0.0
5,000 - 9,999	0.0	5.0
10,000 - 19,999	11.1	7.5
20,000 - 39,999	16.7	37.5
40,000 - 69,999	19.4	22.5
70,000 - 99,999	13.9	15.0
100,000 - 149,999	22.2	7.5
150,000 - 199,999	0.0	0.0
200,000 - 499,999	13.9	5.0
	M = $69,999 N = 36	M = $39,999 N = 40

TABLE 11

1977 Gross Farm Income

	Converters (Percent)	Always Organic (Percent)
$2,499 or less	31.6	64.1
2,500 - 4,999	28.9	23.1
5,000 - 9,999	15.8	7.7
10,000 - 19,999	10.5	2.6
20,000 - 39,999	2.6	0.0
40,000 - 69,999	2.6	2.6
70,000 - 99,999	2.3	0.0
100,000 - 149,999	5.3	0.0
150,000 - 199,999	2.6	0.0
	M = $4,092	M = $1,950
	N = 38	N = 39

TABLE 12

1977 Net Farm Income

	Converters (Percent)	Always Organic (Percent)
Costs exceeded income	51.3	51.3
Broke even	20.5	25.6
2,499 or less	10.3	15.4
2,500 - 4,999	5.1	2.6
5,000 - 9,999	2.6	2.6
10,000 - 19,999	7.7	2.6
20,000 - 49,999	2.6	0.0
	N = 39	N = 39

TABLE 13

Debt

	Converters (Percent)	Always Organic (Percent)
None - less than 2,499	41.7	36.6
2,499 - 4,999	5.6	4.9
5,000 - 9,999	11.1	9.8
10,000 - 19,999	19.4	26.8
20,000 - 39,999	5.6	12.2
40,000 - 69,999	8.3	9.8
70,000 - 99,999	0.0	0.0
100,000 - 149,999	2.8	0.0
150,000 - 199,999	0.0	0.0
200,000 - 499,999	5.6	0.0
	M = $6,250	M = $9,380
	N = 36	N = 41

TABLE 14

Expected Net Farm Income Next Five Years

	Converter (Percent)	Always Organic (Percent)
Much larger	11.6	19.5
Somewhat larger	48.8	63.4
The same	20.9	7.3
Somewhat smaller	7.0	2.4
Much smaller	2.3	0.0
Don't plan to be farming	9.3	4.9
Somewhat larger if we expand	0.0	2.4
	N = 43	N = 41

TABLE 15

Off-Farm Work

	Converters (Percent)	Always Organic (Percent)
No Family Off-Farm Work	40.0	11.6
	N = 40	N = 43
For working families, husband off-farm days:		
Up to 199 days	21.1	42.8
200 or more days	78.9	57.1
	N = 19	N = 28
For working families, wife off-farm days:		
Up to 199 days	44.5	56.2
200 or more days	55.5	43.7
	N = 9	N = 16

TABLE 16

1977 Total Family Income

	Converters (Percent)	Always Organic (Percent)
2,499 or less	11.1	7.7
2,500 - 4,999	8.3	10.3
5,000 - 9,999	13.9	20.5
10,000 - 19,999	44.4	41.0
20,000 - 39,999	16.7	15.4
40,000 - 69,999	2.8	5.1
70,000 - 99,999	2.8	0.0
	M = $13,750	M = $13,200
	N = 36	N = 39

TABLE 17

Amount of Own Food and Fuel Produced on the Farm

	Converters			Always Organic		
	less than 1/3	more than 2/3	scale score*	less than 1/3	more than 2/3	scale score*
Meat	43.9%	53.7%	2.098	26.2%	54.8%	2.286
Vegetables	13.3%	66.7%	2.533	6.7%	75.6%	2.689
Milk	63.6%	34.1%	1.705	44.4%	53.3%	2.089
Fuel	53.3%	31.1%	1.778	35.6%	44.4%	2.089

*1=less than 1/3, 2=1/3 to 2/3, 3=more than 2/3.

TABLE 18

Sources Consulted in Decision-Making*

	Converters (Percent)
Books and magazines about organic farming	88.6
Salesman for organic farming products	25.0
Other organic farmers	75.0
Extension personnel or county agents	4.5
Soil Conservation Service	2.3
Bankers	0.0

N = 44

*More than 1 were checked.

TABLE 19

Reasons for Trying Organic Methods

	Converters (Percent of all possible responses)
Desire for personal and family health	39.0
Realization of problems with chemical farming	41.5
Desire for healthier soil; chemical farming harms soil	31.7
Economic advantages of organic methods	22.0
Personal recommendation or example	29.3
Articles, books, courses	24.4
Healthier for livestock or produces better crops	17.1
Environmental reasons	14.6
Miscellaneous	19.5
	N = 41

TABLE 20

Year began using organic methods

	Converters (Percent)	Always Organic (Percent)
1936-1948	4.4	0.0
1949-1958	8.9	4.5
1959-1968	13.3	6.8
1969-1973	37.8	43.2
1974-1978	35.6	45.5
	X = 1969.4	X = 1972.18
	M = 1972	M = 1973.48
	N = 45	N = 44

TABLE 21

Advantages of Organic Farming Scale Scores

	Converters	Always Organic	Total
Healthier for farmer and his family	2.000	2.022	2.011
Better for the soil	2.023	2.000	2.011
Organic methods more wholesome and more in harmony with nature	2.093	2.067	2.078
Less environmental damage	2.095	2.089	2.090
Healthier livestock	2.237	2.267	2.250
Higher quality products	2.381	2.178	2.270
Use less energy and and other nonrenewable resources	2.500	2.178	2.326
Lower production costs	2.512	2.511	2.500
Yields don't suffer as much under adverse conditions	2.600	2.432	2.512
Easier tillage	2.585	2.756	2.659

TABLE 21

Con't

Less dependence on outside suppliers	2.769	2.756	2.744
Fewer insects	2.750	2.111	2.931
Organic products command a premium price	3.098	2.956	3.023
This way of farming is closer to way described in the Bible	2.917	3.310	3.114
Works more evenly spread over the crop year	3.250	3.267	3.230
Higher net income	3.256	3.244	3.233
Crops dry better	3.243	3.442	3.317
Yields are usually higher	3.579	3.524	3.531
Fewer weeds	3.525	3.105	3.605
Total hours labor less	3.854	3.698	3.753

(2 = major advantage, 3 = some advantage, 4 = no advantage at all)

TABLE 22

Advantages of Organic Farming

	Percent who checked as 1 of 3 greatest advantages		
	Converters	Always Organic	Total
Healthier for the farmer and his family	76.9%	59.5%	67.5%
Better for the soil	59.1	45.2	50.6
Less environmental damage	38.5	50.0	44.6
Organic methods more wholesome and more in harmony with nature	33.3	40.5	36.1
Higher quality products	20.5	28.6	24.1
Use less energy and other nonrenewable resources	7.7	30.9	19.3
Healthier livestock	15.4	23.8	16.9

TABLE 23

Organic Price Compared to Market Price

	Total (Percent)	Converter (Percent)	Always Organic (Percent)
Same	42.0	29.2	46.9
Higher	65.1	66.7	53.1
	N = 69	N = 24	N=32

TABLE 24

Percent of Possible Choices as One of Top Three Disadvantages

	Converters	Always Organic	Total
Weed Problems	20.9	11.9	16.4
Fewer up-to-date sources	14.5	14.4	14.2
Total labor requirement higher	9.1	15.2	12.1
Difficult to get enough manure	11.8	9.3	10.3
Greater expertise needed	6.3	11.0	8.6
Difficult to find a market for organic products	4.5	10.9	8.2
	N = 110	N = 118	N = 232

TABLE 25

All Disadvantages Ranked by Scale Scores

	Converters	Always Organic	Total
Fewer up-to-date sources of information for farm management	2.929	3.023	3.000
Weed problems worse than conventional farming	3.045	3.089	3.077
Total labor requirement is higher than conventonal farming	3.190	3.022	3.124
Greater expertise needed to be an organic farmer than a conventional farmer	3.163	3.133	3.167
Difficult to get enough manure	3.116	3.200	3.178
Difficult to find a market for organic products	3.415	3.289	3.318
Lower profits than conventional farming	3.463	3.444	3.466

TABLE 25

Con't

Lower Yields	3.488	3.556	3.534
Can't have all land in cash crops	3.390	3.667	3.545
People look down on the organic farmer	3.581	3.556	3.556
Pest problems worse than conventional farming	3.614	3.556	3.582
Organic farming requires livestock	3.659	3.489	3.582
Hard to get loans and credit	3.606	3.658	3.630
No time to take a vacation	3.756	3.523	3.644
	N = 41	N = 45	N = 91

(2 = serious problem, 3 = some problem, 4 = no problem at all)

TABLE 26

Crop Yields Compared with Non-organic Farmers

	Converters (Percent)	Always Organic (Percent)	Total (Percent)
Considerably higher	2.2	2.2	2.2
Somewhat higher	2.2	2.2	2.2
About the same	44.4	26.7	35.9
Somewhat lower	28.9	24.4	26.1
Considerably lower	4.4	4.4	4.3
Don't know	6.7	22.2	15.2
Yields too variable to tell	11.1	17.8	14.1
	N = 45	N = 45	N = 92

TABLE 27

Farm Magazines Read Regularly

	Converters (Percent)	Always Organic (Percent)	Total (Percent
Natural Foods	4.4	7.0	6.7
Farm Journal	51.1	16.3	34.4
Organic Gardening and Farming	66.7	88.4	75.6
Acres USA	57.8	46.5	53.3
Successful Farming	24.4	11.6	18.9
Prevention	42.2	27.9	35.6
Country Gentleman	4.4	4.7	4.4
Hoard's Dairyman	15.6	4.7	11.1
Countryside	26.7	62.8	43.3
Compost Science	0.0	2.3	1.1
Mother Earth News	12.2	9.1	15.8
Michigan Farmer	19.3	21.8	12.3
Small Farmer's Journal	4.4	18.2	17.5
	N = 114	N = 55	N = 57

TABLE 28

Meetings attended in 1977 *

	Percent who attended meetings which were helpful to organic farming	Percent who attended meetings not helpful to organic farming	Meeting not attended
County extension program	6.5%	12.0%	81.5%
Personal meeting with county agent	10.9	12.0	77.1
Farmer-dealer meeting	5.4	3.3	91.3
Natural food-organic farming organization meeting	57.6	5.4	37.0
Farm organization meeting	5.4	4.3	90.3
Extension service field day	2.2	5.4	92.4
Company field day or farm tour	4.3	0.0	95.7
Soil conservation meeting	4.3	9.8	85.9

* N=92

TABLE 29

Decrease in Net Income

	Converters (Percent)
Yes	40.5
No	23.8
Not sure	35.7
	N = 42

TABLE 30

Have You Ever Considered Giving up Organic Methods?

	Converters (Percent)	Always Organic (Percent)	Total (Percent)
Yes	15.9	13.6	14.4
No	84.1	86.4	85.6
	N = 44	N = 44	N = 90

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