Influences on ACCEPTANCE OF FERTILIZER PRACTICES in Piatt County, Illinois

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Influences on Acceptance of Fertilizer Practices in Piatt County, Illinois

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THE PHENOMENAL INCREASE IN THE PRODUCTIVE CAPACITY OF AMERICAN farms which occurred simultaneously with a decrease in farm manpower during World War II was due in part to the increased use of commercial fertilizer.

The volume of commercial fertilizers used in the corn belt during and since the war has reflected economic conditions. Yet if economic considerations were the only basis for the acceptance of good fertilizer practices, use of these practices would have been considerably more general. Before this study was initiated, economists had estimated that application of a comprehensive fertilizer program to all the farms in the county studied could have doubled the farm income of that county.[2]

THE RESEARCH PROBLEM

Why had farm operators in one of the most prosperous and progressive cash-grain farming areas of Illinois fallen so far short of a technically attainable goal — a goal which almost everyone would agree was economically desirable? This is a practical question that has long faced agricultural extension and other agencies concerned with bringing new technical knowledge to farm people.

Several theoretical points of view may be applied to this problem, including the point of view of sociology. The sociologist views adoption of new agricultural practices as part of the general category of sociological phenomena called socio-cultural change. In their macro aspect, changes in agricultural technology are part of the general pattern of change in American society and are responsive to the same moving forces. In micro aspects, the adoption of new practices takes the form of decision-making by individual farmers and their wives.

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[2] At the time the interviews for this study were conducted (1953 and 1954), an organized educational program promoted by the Cooperative Extension Service was underway in Piatt county to increase the acceptance of a balanced fertilizer program. This was one factor influencing the decision to make the study there.

We live in an era of rapid socio-cultural change. Rural society especially has been subjected to an almost explosive series of changes in recent decades as a result of developments such as mechanization, urbanization, industrialization, and communication. Modern communication and transportation facilities have "shrunk" the world to the point where American farmers are almost literally in contact with city residents as well as other farmers of this and most other nations in the world. The effect has been a tremendous increase in the number and variety of external pressures which actually or potentially impinge upon the consciousness of the individual farmer and his family in their everyday decision-making.

Yet in spite of the powerful pressures to change, there are great resistances, even among the most progressive persons. Change is not automatic, even in an environment so charged with dynamic forces as ours.

Changes in farming, like changes in other practices such as style of dress or speech mannerism, take place within a complex social setting. This setting includes so many factors that an attempt to identify the crucial ones for any particular change is a very formidable task. For example, a cash-grain farmer in central Illinois may decide to use commercial nitrogen fertilizer only after an economically rational calculation of expected costs and returns. But other factors, many of which are difficult to measure or cannot be measured in dollars and cents, will have influenced his decision. Some examples are immediate family needs which compete with fertilizers for the family's purchasing power, family traditions, opinions and reactions of relatives and friends, work habits, government programs, desire for prestige or recognition, and misinformation or lack of knowledge.

Sociologists and other students of social change have noted repeatedly that social and cultural change is multi-dimensional — that acceptance of innovations in one area of human activity forces changes in other areas. They have also noted that changes in social structure and nonmaterial culture tend to lag behind technological change. Technological change triggers change in economic, political, and social institutions. But in turn the influence of tradition and vested interest in these institutions affects the rate of acceptance of technological change.[1]

[1] In recent years concern with this lag between technical "know-how" and farm practice has prompted a number of serious, systematic efforts to discover the reasons for the lag. These are generally referred to as studies of the diffusion of farm practices. Productive contributions have been made by rural sociologists, cultural anthropologists, educational psychologists, agricultural journalists, and others.

PURPOSE, METHOD, AND CONDITIONS OF THE STUDY

Purpose

This study, a study of social change, was concerned with the relationships between technological changes and various socio-cultural and socio-psychological factors influencing farm people in their day-to-day decision-making. The technological changes studied involved the use of commercial mineral fertilizers. Answers were sought to the following questions:

1. Of the farm operators in the sample, what proportion used the principal mineral fertilizers?
2. At what rate did acceptance or adoption take place?
3. What was the role of communication in the acceptance process? When and how did farm operators learn of these fertilizers? What were their sources of information?
4. How much lag was there between first knowledge and trial?
5. What economic, social, and socio-psychological factors influenced decisions to try the practices?
6. What socio-economic, sociological, and socio-psychological characteristics of farm operators were associated with the acceptance of fertilizer practices?

Method

This study was limited to one major category of related agricultural practices — fertilizer practices.

The following six practices were included:

1. Soil testing.
2. Application of limestone.
3. Application of phosphate, either as rock phosphate or superphosphate.
4. Application of potassium.
5. Application of commercial mineral nitrogen in one or more of its various forms.
6. Application of a mixed mineral fertilizer, either as a starter or as a general replacement or maintenance application.

The decision to limit the study primarily to these six practices was influenced by the practical considerations of limited time and resources, and by the conviction that more may be learned by concentrating on a small number of related practices.[1]

[1] These six practices may be viewed as a single practice in the sense that for most cash-grain farmers the adoption of a balanced fertilizer program necessitates the use of all of the practices in a functional unit.

This was a study of human behavior, and as in any study of behavior the first problem was deciding which unit of behavior to measure. Obviously any of the above practices could be broken down into measurable subunits of behavior. For example, the fact that a specific fertilizer is used is a measurable unit of behavior, and the way a fertilizer is applied to the soil and the time of application may also be considered units for measurement and analysis. The fact that a particular fertilizer *was used* is herein treated as the unit of behavior, regardless of the amount used, time of application, or method of application.[1]

Acceptance scores

To facilitate the testing of hypotheses regarding the differences among farmers with different degrees of acceptance of fertilizer practices, a composite score based on their knowledge of and experience with each of the six practices was devised. Using three kinds of evidence — knowledge of each practice, extent of use of each practice, and pattern of use of the six practices — an index was constructed to represent the farm operators' degree of acceptance of fertilizer practices. Extent of use of the various fertilizers and the comprehensiveness of the fertilizer program or pattern of use were given the major weight in determining score positions.

Score positions varied over an 11-point scale, from farmers who had used none of the practices and had very little knowledge and understanding of them to those who were using all the applicable practices in a well-organized, comprehensive fertilizer program. Because the number of cases in some positions on the 11-point scale were too few to allow statistical analysis, the categories were further consolidated into the four presented in Table 1.

The sample

Because a principal objective of the study was to investigate the influences of various socio-cultural and socio-psychological factors on the acceptance of a series of related practices, a county where these practices were generally applicable provided the best opportunity. About 85 percent of the land in Piatt county is class I land, adapted to a cash-grain type of farming. Livestock and general farming enterprises are limited principally to the rougher land along the Sangamon

[1] In making this decision, it was recognized that in many instances the amount and kind of fertilizer used, and the time and method of application in the trial stage, may have a very crucial influence on the decision to adopt the practice.

Table 1. — Distribution of 221 Farm Operators by Fertilizer Acceptance Score

Acceptance category	Number	Percent
Low[a]	51	23.1
Medium[b]	105	47.5
High[c]	45	20.4
Very high[d]	20	9.0

[a] Never had soil tested or used any fertilizers, or used only small amounts in an unsystematic manner. Low knowledge.
[b] Had soil tested and used some fertilizers, but with poor knowledge of what constitutes a comprehensive fertilizer program.
[c] Had soil tested and used a variety of fertilizer practices, with fairly good knowledge of what constitutes a comprehensive fertilizer program.
[d] Had soil tested and used all applicable fertilizers in a comprehensive fertilizer program.

river, which cuts diagonally across the county from northeast to southwest. Aside from the area along the river, the land is level (2 percent or less slope) and composed of deep, well-drained prairie soils.

A sample of 221 farm operators was selected randomly from a listing of all open-country households in the county.[1] The data were obtained by personal interviews with a prepared schedule of questions.

Characteristics of sample farm operators

Several characteristics of the farm operators studied are presented here as descriptive background for the discussion to follow.

Sex. All of the farm operators in the sample were men.

Age. Ages ranged from 19 to 76 years, with the median being 44.5, and the mean 45.3. The distribution by age group of the 221 sample farm operators was as follows:

Age group	*Number*	*Percent*
Under 30	15	7
30–34	26	12
35–39	40	18
40–44	34	15
45–49	26	12
50–54	24	11
55–59	18	8
60–64	16	7
65–69	14	6
70 or older	8	4

[1] "Cultural" maps from the State Highway Commission were used in obtaining and numbering the list of open-country households. A table of random numbers was used in making the selection.

Education. Years of schooling completed ranged from none to one year of post-graduate college. The median was 10.4 years of schooling, which compared favorably with the state median of rural farm males in Illinois aged 25 and over in 1950. As will be noted again later, farmers in Piatt county represent a rather select group in terms of available measures of intelligence and managerial ability. The distribution of the 221 operators by educational attainment categories is given below.

Years of schooling	*Number*	*Percent*
Under 8	17	7
8	72	33
9–11	38	17
12	72	33
13 or more	22	10

Marital status. Ninety-four percent of the men were married. The remainder were equally divided between those who were widowed and those who had never married.

Size of household. The mean size of household was 3.6 members. About three-fourths (74 percent) of the households included children, with the average number of children being 2.4 per household.

Tenure. Three-fourths of the sample operators were full tenants. Another 13 percent were part owners, and only 12 percent were full owner-operators.

Number of acres in farm. Farms ranged from less than 100 acres to over 800. The median was 240. The owner-operators operated smaller farms than the tenants or part owners. The respective medians were 128, 229, and 313 acres.

Estimated gross income from crops. This constitutes a rough measure of size of operations in an area of cash-grain farming. Gross incomes varied from less than $2,500 to over $50,000. The median was $8,850. The distribution by estimated gross income from crops was as follows:

Income group	*Number*	*Percent*
Under $5,000	49	22
$5,000– 9,999	97	44
$10,000–14,999	46	21
$15,000–19,999	14	6
$20,000–29,999	10	5
$30,000–49,000	4	2
$50,000 or more	1	..

Landlords. The relatively high land values and high proportion of tenants and part-owner-operators made the landlord an important factor in decisions regarding the use of fertilizer practices. The majority of tenant-operators (68 percent) had only one landlord, but a few had as many as four to deal with. Most of the landlords, contrary to a popular notion among the local people, were not absentee landlords. Three-fourths of the landlords lived either in Piatt or an adjoining county, and only 15 percent lived out of the state.

The median age of landlords was 66 years. Women outnumbered men 55 to 45.

ACCEPTANCE OF FERTILIZER PRACTICES

The term *acceptance* is used in this study to include approval as well as adoption of a practice. Adoption without approval is not likely to occur, but approval without adoption may occur. *Adoption* is used to refer to the inclusion of a practice in the farm operation on a more or less permanent basis. If the practice has been used only once or twice by an operator, or if it does not need to be repeated each year, it is sometimes difficult to determine whether a unit of behavior signifies adoption or merely trial.

Table 2 indicates the proportions of farm operators in the sample who had at least tried each of the six practices. For each practice this includes a wide range of behavior, ranging from farm operators who had tried a single practice on a few acres to those who had used it in a comprehensive, well-balanced fertilizer program. But it does serve to indicate the relative degree of acceptance of the six different practices.

Rate of acceptance

Other studies of the acceptance of farm technology have revealed variations in the amount of time it takes for different practices to become known and adopted. This was true of the six fertilizer practices in this study.

All farmers interviewed had heard of each of the six practices but the dates when all had heard of them, the dates of "full awareness," varied. Table 2 indicates the approximate date of full awareness of each practice among the sample farm operators. Although awareness of liming[1] was complete as early as 1940, some practices (potash,

[1] Although lime is generally not classified as a fertilizer, it is included in discussions of fertilizers and fertilizer practices in this study.

Table 2. — Use, Awareness, and Acceptance Time of Six Fertilizer Practices

Practice	Percent of operators who had used each practice[a]	Approximate date of full awareness of each practice	Average acceptance time (years) for each practice[b]
Lime	90	1940	7.1
Phosphate	90	1950	6.6
Soil test	75	1950	7.6
Potash	30	1952	6.4
Commercial nitrogen	54	1952	2.8
Mixed fertilizer	81	1952	4.3

[a] Having used the practice is not necessarily bona fide evidence of full adoption, although in most cases it was. The fact that practices such as liming do not need to be repeated on the same land more than once every five to eight years made it difficult to obtain evidence of full adoption in terms of repeated use of the practice.

[b] These data are adjusted to account for the fact that many of the younger operators had heard of the practice before they started farming. Without this correction the time lapse for soil testing would be 11.1 years.

nitrogen, and mixed fertilizer) were not known to all of the operators until 12 years later.

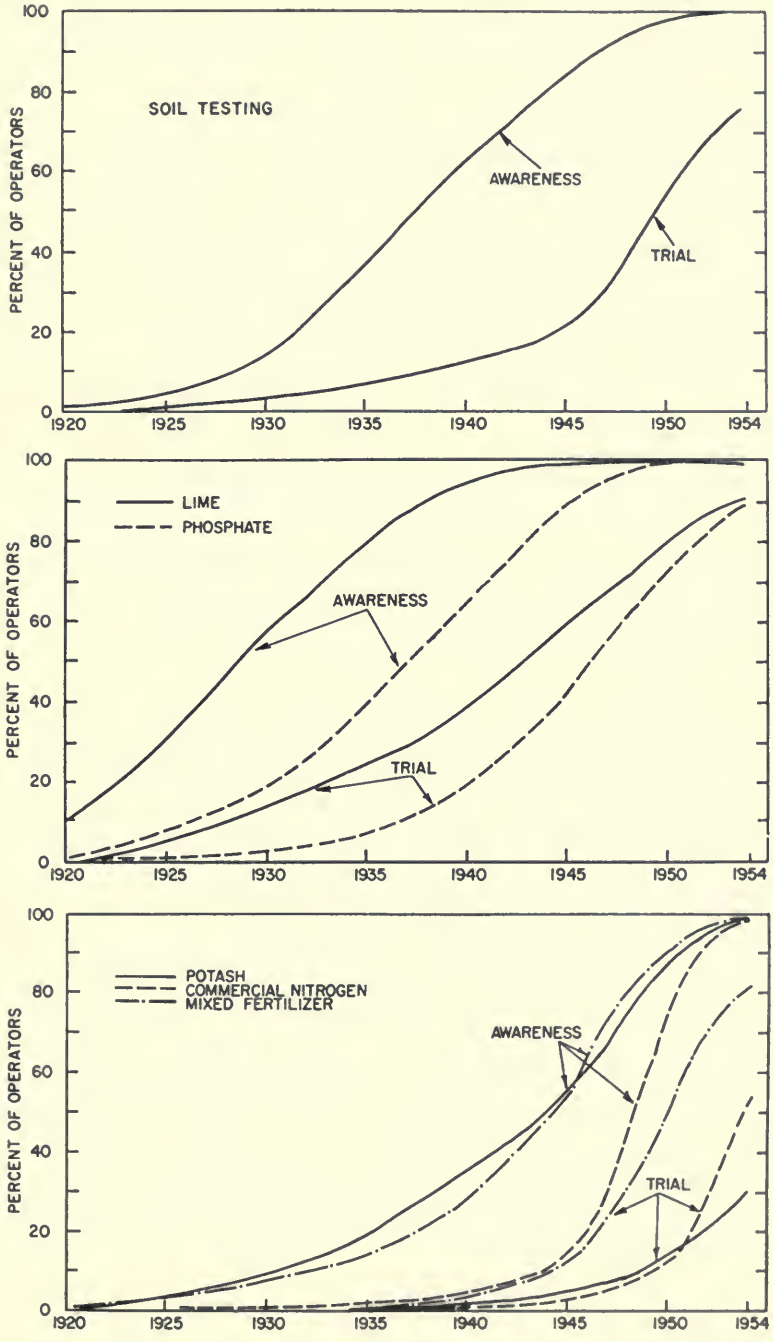
Obviously not all farmers heard about each of the six practices at the same time, nor did they all decide in the same year to use any particular practice. Some first learned about and tried such practices as liming and soil testing 30 or 40 years before this study was made; others learned about them and tried them much more recently.

Figure 1 shows the cumulative percentages of farm operators in the sample who had heard of and who had used each of the six practices at different dates over a period of 34 years.[1]

The awarness curve for each of the practices, and the trial or adoption curves for the two (lime and phosphate) that passed the 85-percent mark, exhibit the same characteristic S form — a period of slow increase after first introduction, a period of rapid acceleration, and then a leveling off as saturation is approached.

Although the contours of the curves are similar for different practices, they vary considerably in steepness during the period of rapid

[1] In interpreting these charts, one should keep in mind that they are cumulative proportions of a residual sample and exclude cases which might have been included had the operators not died, retired from farming, or moved into nonfarm work. Because there is no assurance that the dropouts would have behaved in the same way as those who remained in farming, it cannot be stated with certainty that the observed pattern is the same as might have been obtained had a sample been drawn at some date nearer the introduction of the practice and observed continuously over a period.



Cumulative percentages of operators who had heard of and had used various practices. (Fig. 1)

acceptance. The contrast is greatest between limestone and commercial nitrogen. The use of commercial nitrogen climbed from less than 10 percent to 54 percent in just seven years. It required about 20 years for the same change to occur with limestone.

Wilkening noted this variation in adoption rate in a North Carolina study (8)* and suggested that such variations are related to (a) seriousness of the need the practice meets, (b) communicability of the practice, (c) immediacy and visibility of returns from its adoption, and (d) the emphasis given to it by agricultural programs.

The relationship of the practice to other practices already in use or available for adoption, and capital resources needed for adoption, may be added to the above list in explaining variations in adoption rate among fertilizer practices.

Acceptance time

For most people, the process of acceptance of a new idea takes time. In Figure 1 the horizontal distance between the awareness and trial curves provides a rough measure of the time lapse between first knowledge and first use of a fertilizer practice. Table 2 presents a more accurate estimate of the average time between awareness and first use for each practice. This period is referred to in this study as *acceptance time.*

The average time that farm operators have taken in deciding to try specific fertilizer practices after first hearing about them varied considerably. One of the "oldest" practices, soil testing, had the longest acceptance time, while one of the "newest" had the shortest time. Answers given in the interviews indicated that some farmers learned about soil testing at demonstrations or in other ways 30 or more years before they had any of their soil tested.

Relationship of a new practice to established practices

In his role as a farm operator the farmer accepts or rejects a new practice in terms of the total complex of his behavior, which includes practices directly related to the new practice. Often adoption of a new practice requires that an old practice be abandoned or modified. The new practice may also complicate an old practice or make it less efficient. For example, in this study some operators explained that they had discontinued the practice of applying starter fertilizer at

* This number and similar numbers in parentheses refer to "Literature Cited" on page 36.

corn-planting time because of the time required to do the job, and because of the extra manual labor involved in handling the sacks of fertilizer.

Of the many changes taking place in American agriculture, some are minor in scope and involve little or no alteration in other practices; others have wide scope and require extensive alteration of the daily and seasonal pattern of activities of the farm operator and his family. The change to hybrid corn illustrates the first extreme, and a change from cash grain to dairying represents the latter.[1] A change from nonuse to use of mineral fertilizers falls in between these extremes. Also, some changes are qualitative (for example, the change from nonuse to use of commercial nitrogen) and some are quantitative (for example, changes in the amount of elemental nitrogen applied to the soil). This study concentrates on qualitative changes in fertilizer practices.

Differences among individual farmers in acceptance of new ideas

Differences in time required for different people to progress from the awareness to the adoption stage contribute to the time lapse between awareness and adoption of a practice within a group such as the sample farmers in this study.[2] The acceptance time of a particular practice is a composite of the time required for awareness to spread to all farm operators and the time required for each operator to decide to adopt it.

One of the first studies of the adoption of improved farm practices (7) noted that although the average time lapse between initial information about hybrid corn and adoption was 5.5 years, this average included "early adopters" who waited only 1.6 years together with "late adopters" who waited 9.2 years. Others have since characterized farmers in terms of how quickly they adopt new practices as either innovators, early adopters, majority, or nonadopters. The implication is that some people can be characterized as more willing than others

[1] Another dimension of variation, the attitudinal (social-psychological) dimension, should be added to these. For example, although from an activity standpoint the change to hybrid corn is a rather simple one, from the attitudinal point of view it may have involved a very complicated and difficult change for many farmers.

[2] A summary analysis of research projects in the adoption of new farm practices (6) suggested that the acceptance of a new practice involves a sequence of thoughts and actions beginning with awareness or first knowledge and proceeding through the interest stage, the evaluation stage, and the trial stage to adoption.

to accept new ideas. Although such a classification of farmers must be used with caution, it does serve to illustrate the importance of attitudes as variables influencing the acceptance process.

In this study, direct evidence of differences in readiness to accept new practices was obtained from responses to the question: "When a new practice comes out, do you like to try it right away?" Nearly one-fourth (23 percent) of the respondents said *yes;* the remainder said *no.*

Sequence of adoption of fertilizer practices

The functional relationship among the practices suggests a logical sequence of adoption. Soil testing is first, followed by application of lime and phosphate, and potash if needed. When these basic minerals are present in the soil in adequate quantities, it is then logical to consider the application of nitrogen. An exception would be when the soil already contained enough lime, phosphate and potash, but this would be an uncommon occurrence.

The figures below show the numbers and percentages of operators who used soil testing and applications of lime, phosphate, or potash in an improper order, that is, they applied the fertilizer before having their soil tested.

Fertilizer	*Number testing soil and using the fertilizer*	*Fertilizer used prior to testing soil*	
		Number	Percent
Lime	144	83	58
Phosphate	152	66	43
Potash	57	2	5

The following tabulation indicates how many of the 115 farm operators who used commercial nitrogen fertilizer either never applied lime, phosphate, or potash, or started applying these "basic" mineral fertilizers after using commercial nitrogen.

Practice	*Number*	*Percent*
Lime		
Had never applied lime	2	2
Tried lime after trying nitrogen	3	3
Phosphate		
Had never applied phosphate	5	4
Tried phosphate after trying nitrogen	5	4
Potash		
Had never applied potash	62	54
Tried potash after trying nitrogen	26	23

The figures do not tell the whole story, because some operators who had used the basic fertilizers first did not apply sufficient quantities. One-third of the 43 farmers who were dissatisfied with results of using commercial nitrogen admitted that they had not adequately built up the other requirements in their soil before applying the nitrogen.

Although the use of basic fertilizers and commercial nitrogen in proper sequence was somewhat more common than the use of soil testing and basic fertilizers in proper sequence, the low frequencies of proper use in both cases indicate a low level of understanding of the functional relations between fertilizer practices. It takes more than just getting adoption of a series of independent practices to bring about effective improvements in a fertilizer program. A comprehensive educational effort that treats each practice as a part of an integrated fertilizer plan is required.

THE ROLE OF COMMUNICATION

Because social change involves communication, some assessment of the number and relative importance of various means of communication has been a part of every farm-practice study.

Attention has been given to the availability of communications media, sources of information most used, sources most trusted, relative importance of different sources at different stages in the acceptance process as one moves from awareness or first knowledge to adoption, and the relative importance of different information sources to persons who may be classified as innovators, early adopters, informal leaders, and later adopters. Some attention has also been given to the fact that the importance of various information sources varies with the nature and complexity of the recommended practice.

With the development of radio in the 1920's, much attention was given to the idea that the mass media were potent instruments for bringing powerful action stimuli directly to millions of persons eager to receive such stimuli. Such a picture offered great possibilities of fostering change.

Intervening variables in the flow of information

Implicit in the concept of the role of mass media in communication was the suggestion that these media were omnipotent, and that the masses, on the other hand, were composed of independent persons ready and willing to receive information and act accordingly. However,

evidence from small-group analysis, sociometric analysis, and communications research made it increasingly clear that some very important events and processes intervene between mass media and the masses.

The following intervening variables which may facilitate, alter, or block the flow of information have been noted (3).

1. The degree of exposure or access to the stimuli transmitted by mass media.
2. The differential character of the media themselves. (What is the differential effect of the same message transmitted over radio, over television, or via the newspaper?)
3. Content in the sense of form, presentation, and language.
4. The attitude of the audience.
5. Interpersonal relationships.

Several aspects of the nature and significance of these variables to the communication process became evident in the data from this study.

In a gadget-conscious society with a high material level of living such as ours, it seems improbable that there would be significant differences in exposure, or at least the potential opportunity for exposure, to messages transmitted through mass media. Insofar as possession of the instruments of mass media is a measure of potential opportunity for exposure, this appears to be a sound assumption.

Farm magazines, newspapers, and radio are the principal mass media used for diffusing new ideas in agriculture. Of the 221 farm families in the sample, 99 percent reported owning a radio, 98 percent subscribed to one or more daily newspapers, 74 percent subscribed to one or more weekly newspapers, and all but one subscribed to one or more farm magazines.

How many newspapers and farm magazines a family had was a more appropriate basis for classification than having or not having newspapers and magazines. Twenty-two percent reported having two or more newspapers, and 64 percent reported four or more farm magazines. The average number of farm magazines per family was 3.9, and in addition each family had, on the average, 3.1 nonfarm magazines. There also was a noticeable tendency to subscribe to more than one weekly newspaper — 15 percent reported two or more.

At the time of the interviews, 1953 and 1954, television was still relatively new in rural areas. Even so, nearly half of the families (48 percent) had television sets.

Table 3 indicates that farm operators with high fertilizer acceptance scores tend to have more mass communications facilities than those

Table 3. — Mean Number of Units of Various Mass Communications Facilities per Family by Fertilizer Acceptance Score of Operator

Fertilizer acceptance score	Number of operators	Communications facilities				
		Daily newspapers	Weekly newspapers	Farm magazines	Nonfarm magazines	Television sets
Low	51	1.27	.98	3.33	2.89	.50
Medium	105	1.21	.89	3.95	2.75	.42
High	45	1.39	.93	3.80	3.92	.51
Very high	20	1.65	1.20	4.55	3.90	.30

with low acceptance scores. But since the operators with low acceptance scores have quite ample facilities, it is likely that the apparent association reflects a third variable, socio-economic status. Operators with high socio-economic status as measured by estimated income (see Table 7) tend to have the highest fertilizer acceptance scores and also the most mass communications facilities.

Recent mass media research has revealed that owning a radio or subscribing to a newspaper or magazine is no guarantee that information transmitted via these media will be received by the individual. Those groups which are most hopefully regarded as targets for a message transmitted through mass media are often least likely to be in the audience (3). Even though, by chance, they are in the audience physically — for example, being tuned in to a farm program on the radio — there is always the possibility that they may not be in the audience mentally for any specific practice. Their acceptance of any particular practice may have been arrested at the awareness stage.

Research also supports the observation that people view, listen to, and read those things that support their opinions, and tend to avoid exposing themselves to opinions that conflict with their own (4). This puts mass media in the role of "reinforcers" rather than "converters." Unfortunately, this may be true in spite of all the well-meaning efforts to "break through" to individuals by combining several mass media approaches into the same educational program and by careful attention to the content of messages. Success in such efforts is often rather severely limited, since even in the strictly informational programs attention may be conditioned by emotionally laden attitudes toward an old practice or old knowledge which is threatened by the new practice or knowledge.

Sources of first information about fertilizer practices

In general, studies of the acceptance of recommended farm practices have indicated that the mass media are the most important sources of first-remembered information about the practices (6).

Fertilizer practices apparently are an exception to this rule. In the Piatt county study, neighbors and friends or other farmers ranked first by substantial margins for five of the six practices involved (Table 4).

Data for this analysis were obtained from responses to the following question: "As far as you can recall, where or how did you first hear about this fertilizer practice?"

Several of the practices were known to some farmers for 30 years or more. Naturally it was especially difficult for respondents to recall where and how they first heard about these practices. If there is any selectivity in "recall" in favor of information received from individuals over that received through mass media, the passage of time could produce a cumulative error. However, as has already been indicated, fertilizer practices are relatively complex, and procedures for determining amounts of application are complicated. The very complexity of the practice and the absence of general recommendations with blanket application is a logical argument for a personal contact as the source of first information.

The high rank of neighbors and friends or other farmers, and especially the vocational agriculture program, as the sources of first information indicates that although the majority may have actually first heard of these practices on the radio or read about them in a newspaper or magazine, their first-*remembered* information came directly from another person in face-to-face interaction.

The extreme difficulty of isolating specific causal factors in any human relations situation is illustrated by the data from this study. Note that the vocational agriculture program ranked first as the source of first information about soil testing (Table 4). Apparently a historical factor is involved.[1]

The important consideration is not which agency or program is most important, but that a particular type of information or educational program — the face-to-face discussion involving a systematic approach to the problem over a period of time — is especially effective in pre-

[1] Some observers have said that the vocational agriculture program has carried the major load in spreading soil testing information and awareness in Illinois. That this has been true, at least in Piatt county, is indicated by the data. The basic position of soil testing as the foundation practice in a comprehensive fertilizer program no doubt has been a factor in the importance of vocational agriculture as a source of first information about other fertilizer practices.

Table 4. — Source of First Knowledge About Specific Fertilizer Practices

	Lime		Phosphate		Potash		Commercial nitrogen		Mixed fertilizers		Soil test	
	Rank	Number of operators	Rank	Number of operators	Rank	Number of operators	Rank	Number of operators	Rank	Number of operators	Rank	Number of operators
Neighbors, friends	1	90	1	84	1	46	1	81	1	44	2	47
Vo-ag program	2	37	2	47	2	43	4	19	2	14	1	71
Government program	3	22	5	13	..	0	..	0	..	0	6	6
Farm advisers	4	18	4	24	4	24	5	13	5	6	3	33
Magazines, newspapers	5	17	3	22	3	30	2	45	3	14	4	32
University specialists, etc.	6	7	6	9	5	10	7	3	..	0	5	13
Fertilizer dealers, salesmen, etc.	..	0	7	5	6	6	3	36	4	10	..	0
Landlords	..	0	..	0	7	6	6	5	..	0	..	0

senting information that "sticks" when the practices involved are as complicated as those in a fertilizer program.

Mass media, specifically magazines and newspapers, were second in importance as sources of first information about commercial nitrogen fertilizer and third in importance for phosphate, potash, and mixed fertilizer. They were less important for liming and soil testing.

Dealers and salesmen were apparently not important sources of first information about fertilizer practices, with the possible exception of commercial nitrogen. An Iowa study of fertilizer practices produced similar results (1). On the other hand, a study of the acceptance of hybrid corn in Iowa indicated that dealers and salesmen were very important sources of first information, especially as the use of hybrid seed became more general in the state (7).

The Agricultural Extension Service (farm advisers), although an important source of first information for all the practices studied, did not rank higher than third place in any case. In the commercial nitrogen and mixed fertilizers categories, the Extension Service ranked below dealers and salesmen.

Influences of the various government programs on the use of lime and phosphate, and of landlords in the use of commercial nitrogen as a high-cost quick-return practice were also indicated by the data.

Specialists from the University of Illinois, test plots, and field day programs were mentioned as sources of first information on all but one of the six practices. This is a mixed category which included some widely different kinds of contacts, but they have in common the fact that they are more or less direct contacts with an originating source of information on fertilizer practices, the Agricultural Experiment Station. A relatively small percentage of operators (less than 6 percent in all cases) reported these sources as the first sources.

Sources of most information about fertilizer practices

Here are the sources of most information about fertilizer practices as reported by farm operators in the sample (some operators mentioned more than one source):

Source	*Number of operators reporting*
Farm magazines	147
Other farmers	116
Farm advisers	101
Fertilizer dealers	84
Vocational agriculture teachers	58
Agriculture College bulletins	43

Although farm magazines were the most frequently mentioned, no other mass media source was mentioned often enough to be included in the tabulation. Of the other sources listed, all except college bulletins involve personal contact.

Definition of source presents a problem here. Certain mass media may be viewed in two distinct roles by a farm operator. For example, the radio may be viewed as the source of information, or it may be viewed simply as the medium for transmitting information. Farm operators who know the farm adviser personally may think of the adviser, rather than the radio station, as the source of information when they listen to his regularly scheduled programs. Authors of magazine articles, on the other hand, are not as likely to be known personally by many of their readers. Thus the magazine rather than the author is remembered as the source.

Most trusted sources of information

Recognizing the possibility of confusion between media and authority as sources of information, farmers were asked to indicate the kinds of authorities they were most inclined to trust as sources of information on fertilizers. The results, in order of rank, were as follows:

Authority	*Number of operators reporting*	*Authority*	*Number of operators reporting*
Farm advisers	165	Relatives, members of family	22
Vocational agriculture teachers	84	PMA representatives	20
University specialists	78	Farm organization leaders	16
Other farmers	75	Landlords, farm managers	6
Salesmen or dealers	46	Veterans, teachers	3
Bankers	37	Newspapers and magazines	2
		Businessmen	2

Magazines, which were the most frequently mentioned source of most information, were not in the top 10 authorities most trusted. This strongly suggests that any assessment of relative importance of various information sources must consider the farmer's identification of the authority for the information, whether it comes to him via the printed word or by word of mouth.

Magazine articles, news stories, or radio talks by persons considered trusted authorities on fertilizer carry more weight than articles or talks by persons not trusted. Not only what is said but who says it is important.

Importance of personal influence

The effect of information *per se* on decision-making, and the personal influence of the communicant, are often indistinguishable. One element in this picture, authority, has already been mentioned.

An estimate of the importance of personal influence on farm operators' decisions to try fertilizer practices is provided in Table 5. For all but one practice a majority of the respondents said that information from another person influenced them to make their first trial of the practice. "Neighbors' results" were kept distinct in the tabulation because of the possibility of direct observation. However, to the extent that neighbors' results were communicated, and to the extent that directly observed neighbors' results were given credence because of status considerations, they include a "personal influence" element together with the information provided.

Kinds of persons influencing decisions to try fertilizer practices

Anthropological studies have revealed wide variations in patterns for arriving at decisions. They range from one extreme where issues are almost never met by *ad hoc* opinions to others where most issues are resolved on *ad hoc* considerations. In the former, precedents are always sought — the "wise men" of the group decide what is appropriate from their knowledge of the past. In the latter, everyone, regardless of age or status, feels entitled to voice an opinion and make a decision in terms of his current mood. Rural society in the United States is somewhere between these extremes. Although farm

Table 5. — Number of Operators Who Used Each of the Six Fertilizer Practices and Percent Reporting Various Information Sources That Influenced Them to First Try the Practice

Practice	Number of users	Influencing information source					
		Another person	Mass media	Govt. program	Soil test	Personal experience[a]	Neighbors' results
		(percentage reporting)[b]					
Lime	199	40.7	14.2	13.1	28.1	20.1	17.1
Phosphate	199	50.2	43.0	20.0	33.2	11.0	14.1
Potash	67	80.5	22.4	(c)	52.2	12.0	12.0
Commercial nitrogen	120	70.0	30.8	(c)	(c)	(c)	35.0
Mixed fertilizer	179	54.2	26.3	(c)	(c)	15.1	28.0
Soil test	165	58.8	14.5	12.1	....	14.0	12.1

[a] Dissatisfaction with yield, noticed signs of deficiency in crops, etc.
[b] Totals exceed 100 because some operators reported more than one information source.
[c] Less than 1 percent of users.

people do not rely wholly on "wise men" to direct action in terms of precedent, they usually make decisions in terms of local customs, and very seldom without regard to the opinions of others.

In studies of public affairs we have learned that frequently the husband "tells his wife" what the issues are and how to vote (3). Although not many farmers in this study said their wives influenced them to try a fertilizer practice, relatives were often listed as having influenced the decision.

The following tabulation shows the number (571) and percentage of persons in various categories said to have influenced decisions of the sample farm operators to try a specific practice.

Influence source	*Number of persons mentioned*	*Percent of total*
Landlords	133	23.3
Relatives	102	17.8
Neighbors	88	15.4
Salesmen	33	5.8
Vocational agriculture teachers	2	.4
Farm advisers	1	.2
Others	212	37.1

A large number could not be classified because respondents gave the names of persons without identifying them as to type. Landlords, relatives, and neighbors were the most frequently mentioned. Replies of the operators indicated that though farm advisers and vocational agriculture teachers were recognized as the authorities on fertilizer practice information, they did not often personally "influence" adoption. Such

Table 6. — Reasons for Not Trying Specific Fertilizer Practices or for Failure to Try the Practice Sooner, Ranked in Order of Importance

Reason	Practice					
	Soil test	Lime	Phos-phate	Potash	Commer-cial nitrogen	Mixed fertilizer (starter)
Landlord objection	1	1	1	1	3	1
Satisfaction with yield, soil conditions, etc.	2	2	2	2	4	4
Lack of sufficient knowledge of practice	3	4	3	3	2	3
Cost or expense	4	3	4	..	1	2
Lack of equipment	..	..	..	..	..	5
Soil test	..	..	..	4	..	..

influence came through more informal relationships with persons more closely identified with the farmer, such as neighbors and relatives or landlords.

The landlord showed up as an important influence not only in adoption but in nonadoption of fertilizer practices. With one exception (commercial nitrogen), landlord objections, or reluctance of the landlord to go along with the trial, was given as the ranking reason for not trying a practice or for failure to try it sooner (Table 6). Satisfaction with present yields and soil conditions was the second most often mentioned reason for delay on four of the six practices.

PERSONAL AND RELATED CHARACTERISTICS ASSOCIATED WITH THE ACCEPTANCE OF FERTILIZER PRACTICES

Other studies of the acceptance of farm practices have indicated that differences in acceptance are associated with differences in such factors as age, education, tenure status of the farm operator, and size of the farm operation. Evidence of such associations was present in varying degrees in this study.

Farm operator-farm operation characteristics

Age. A man's age as such places no restriction on his ability to adopt a new practice except perhaps at the extremes of old or young. But age is commonly associated with certain other material and attitudinal factors which influence ability to try a new practice or willingness to accept the risks of trial. Operator actions may be influenced by such diverse items as operating capital, family needs, education, degree of managerial control over farm operations, and security needs. Some of these items tend to be directly associated with age (for example, operating capital and managerial control), and some tend to be inversely associated (for example, education and risk-taking). Others, like family needs, which compete with the farm for available capital, exhibit a curvilinear relationship to age. Insofar as these are causative factors in the acceptance process, they confound the relationship between age and acceptance. This confounding effect is observable in the first section of Table 7.

In a Missouri study (5) a small and negative correlation was obtained between age and a series of nine improved farm practices. However, an analysis of variance indicated that among four factors — age, education, gross farm income, and participation in formal social groups — only farm income and social participation were related to farm practice ratings.

Table 7. — Percentage Distribution of Farm Operators by Fertilizer Acceptance Score, Age, Years of Schooling, Estimated Gross Income From Crops, Number of Acres Farmed, and Tenure

	Fertilizer acceptance score		
	Low	Medium	High or very high
Age of operators			
Under 40 (N=82)	16	52	32
40–55 (N=101)	29	40	31
55 or older (N=36)	22	58	20
$X^2=7.49$ df=4 .20>P>.10*			
Years of schooling			
8 or less (N=89)	24	51	25
9–12 (N=110)	24	44	32
13 or more (N=22)	18	45	37
$X^2=2.07$ df=4 .80>P>.70*			
Estimated gross income from crops			
Under $5,000 (N=50)	25	62	13
$5,000 to $9,999 (N=97)	29	44	27
$10,000 to $14,999 (N=46)	20	41	39
$15,000 or over (N=29)	7	41	52
$X^2=15.82$ df=6 .02>P>.01*			
Number of acres farmed			
Less than 150 (N=37)	35	55	10
150–199 (N=50)	22	56	22
200–249 (N=44)	25	46	29
250–349 (N=47)	19	45	36
350–499 (N=26)	27	38	35
500 or more (N=17)	0	35	65
$X^2=18.68$ df=10 .05>P>.02*			
Tenure of operator			
Owner (N=26)	38	54	8
Part-owner (N=30)	17	40	43
Tenant (N=164)	22	48	30
$X^2=10.49$ df=4 .05>P>.02*			

* Computed on actual numbers.

Education. Although acceptance tends to increase with number of years of schooling completed by the farm operator, the association was not statistically significant in this study (Table 7).

Size of farm operation. Two measures of size of farm operations were used — estimated gross income from crops and number of acres operated.

Respondents were not asked to report their incomes, but an estimate of gross income from crops was made from information on acres of crops and crop yields during the growing season just prior to the interview. Although not by any means perfect, estimated gross income from crops is a fairly good measure of size of operations in a cash-

grain area such as east-central Illinois. For many farmers in the area gross income from crops is practically equivalent to gross farm income.

Estimated gross income from crops was significantly associated with level of acceptance of fertilizer practices. Farm operators with estimated gross incomes from crops of $15,000 or more were four times as likely to have high or very high acceptance scores as operators with gross crop incomes under $5,000 (Table 7).

Total acres operated, another measure of size of operations, was also significantly associated with level of acceptance of fertilizer practices (Table 7). The table indicates that farmers operating the larger farms were more likely to have high acceptance of fertilizer practices than farmers on smaller farms.

Tenure. In many farming areas, and particularly areas of relatively low productivity and low income, there are major differences between owner-operators and tenant-operators in their acceptance of recommended farm practices. Wilkening found that in North Carolina owner-operators had the higher acceptance levels (8). The reverse was true for Piatt county farm operators — tenants or part owners were more likely to have high acceptance of fertilizer practices than owner-operators (Table 7).

The explanation for the different pattern of association in Piatt county is found in differences in status value of land ownership. Traditionally land ownership has been associated with higher socio-economic status than tenancy. However, although land ownership is still an important goal and a status symbol, it is no longer the dominant status symbol in this area of cash-grain farming. Evidence in the study suggests that it has been at least partially replaced by managerial ability, the chief outward evidence of which is size of operation. The part-owner group had the largest average size of operation as measured either by number of acres or estimated gross income from crops, as shown in the following tabulation.

Tenure status	*Median number of acres*	*Median estimated gross income from crops*
Part owners	303	$12,000
Full tenants	229	7,150
Full owners	128	6,428

Landlord characteristics and acceptance of fertilizer practices

It was noted in the previous section that landlords were important in influencing the decision to try or not to try new fertilizer practices. A number of landlord stereotypes were expressed by respondents during the field interviews. Two examples were (a) that absentee land-

lords had a negative influence on agricultural progress, and (b) that it was harder to convince women landlords of the value of improved practices than to convince men landlords. Only one-fourth of the landlords could be classified as absentee. Fifty-five percent of the landlords were women.

To determine which characteristics, if any, of landlords were important in influencing decisions to accept new fertilizer practices, tenant-operators' acceptance scores were cross-tabulated against various characteristics of their landlords and the leasing agreements.

Only the following two relationships between landlord and acceptance of fertilizer practices were found to be statistically significant (Table 8): (1) farm operators with nonresident landlords tended to have significantly higher acceptance scores than operators with local landlords, and (2) farm operators who felt confident that they could continue on their present farms almost indefinitely had significantly higher acceptance scores than operators who did not know how long they might stay or who anticipated a definite time limitation.

The sex of the landlord was apparently not an important factor, nor were such characteristics as age, occupation, or whether the tenant was related to the landlord. The nature of the lease — whether written or oral, for a definite period or an indefinite period — apparently did not matter, but how the tenant regarded the permanency of the arrangement was related to his acceptance of fertilizer practices. The latter did not appear to be a product of the formal lease conditions, but of an informal understanding between landlord and tenant.

Table 8. — Association of Fertilizer Acceptance Score With Characteristics of the Landlord and the Leasing Agreement

Characteristics	Direction of relationship	X^2	C	Level of significance[a]
Landlord				
Residence (local or absentee)	+ (absentee)	51.58	.401	.01
Age	no pattern	10.75		
Sex	no pattern	1.08		
Related to tenant or not	+ (not related)	5.11		
Occupation (farm or nonfarm)	+ (nonfarm)	6.11		
Leasing arrangement				
Oral or written	no pattern	1.91		
Length (definite or indefinite period)	no pattern	2.79		
Length of time tenant expects to continue on same farm	+ indefinite stay	14.86	.236	.05

[a] Only .01 or .05 levels of significance reported.

FARM OPERATOR EXPERIENCES AND ATTITUDES ASSOCIATED WITH ACCEPTANCE OF FERTILIZER PRACTICES

Recognizing the probable importance of situational and environmental factors in influencing decisions to try new fertilizer practices, tests were made for association of acceptance scores with a number of farm operator experience and attitude factors. The experiences fall into three general classifications — farm operation, personal, and social. Social experiences are considered in a separate following section.

Farm operation practices and experiences

It is logical for a farm operator's experiences with fertilizer and certain related farm practices to be associated with his level of acceptance of fertilizer practices. Data on practices and experience assumed to be sufficiently related to influence or be influenced by fertilizer practices were cross-tabulated with acceptance scores (Table 9).

Chi-square tests of association indicated statistically significant association of acceptance scores with use of a crop rotation program, the length of time the rotation program was followed, increasing corn planting rate when nitrogen is applied, and, for those who had used each respective practice, satisfaction with the results of the use of commercial nitrogen and potash.

Practices such as saving manure, using certified seed, using chemical weed control, applying commercial nitrogen in the fall, including grass in the legume seeding, and burning plant residues were not associated with acceptance scores. Expressions of satisfaction with results in the use of lime, phosphate, soil testing, and mixed fertilizer were not significantly associated with acceptance scores.

Personal experiences

It was postulated that a number of personal experiences would influence a farm operator's acceptance of fertilizer practices. Data were obtained on experiences that could contribute to the farmer's knowledge of scientific farming, such as having been a member or having a son or daughter in a 4-H Club, taking vocational agriculture courses in high school, or having a son in such courses, and attendance at adult classes for farmers (veterans' classes, vocational agriculture classes). Data were also obtained on variations in occupational experience such as years of farm operation and whether the farmer had had any nonfarm job experience.

Table 9. — Association of Fertilizer Acceptance Score With Various Other Farming Practices and Experiences

Practice or experience	Direction of relationship	X^2	C	Level of significance[a]
Crop rotation	+ use of crop rotation	22.38	.303	.01
Length of time crop rotation has been followed	+ longer period	8.28	.210	.05
Increasing planting rate of corn when nitrogen is applied	+ increased planting rate	15.15	.359	.01
Satisfaction with results of commercial nitrogen use	+ satisfied	15.25	.335	.01
Satisfaction with results of potash use	+ satisfied	6.90	.979	.05
Satisfaction with results of liming	no pattern	1.57		
Satisfaction with results of phosphate application	no pattern	4.42		
Satisfaction with results of soil testing	no pattern	5.12		
Satisfaction with results of mixed fertilizer use	+ satisfied	5.57		
Saving manure	+ save manure	5.01		
Application of commercial nitrogen in the fall	+ fall application	4.66		
Certified seed	no pattern	2.71		
Chemical weed control	no pattern	3.37		
Use of commercial nitrogen to offset legume failure	no pattern	3.44		
Use of grass in the legume seeding	no pattern	3.80		

[a] Only .01 or .05 levels of significance reported.

Table 10. — Association of Fertilizer Acceptance Score With Various Personal Experiences of the Farm Operator

Experience	Direction of relationship	X^2	C	Level of significance[a]
4-H (operator)	+ 4-H experience	10.45	.221	.02
Son or daughter in 4-H	+ 4-H experience	55.56	.450	.01
Attendance at adult classes	+ attendance	10.80	1.97	.02
Vocational agriculture	no pattern	2.81		
Son in vo-ag	+ son in vocational agriculture	8.52	.195	.05
Years operating a farm	no pattern	4.64		
Nonfarm job	no pattern	4.83		
Percent of family income from nonfarm work	no pattern	3.65		

[a] Only .01 or .05 levels of significance reported.

Statistical analysis indicated that acceptance of fertilizer practices was associated with four out of five "educational" experiences that might increase the farm operator's knowledge of scientific agriculture (Table 10).

Farm operators who had been 4-H Club members and farm operators who had children in 4-H work were more likely to have high acceptance scores. Farm operators who had attended adult classes and those with boys in vocational agriculture also were more likely to have high acceptance scores, but farmers who had taken vocational agriculture in school were no more likely to have high acceptance scores than those who had not. The latter result appears inconsistent, but this may be explained by the fact that vocational agriculture was not available to the older farmers who completed high school training before the program was installed at their local schools. Probably the inconsistency would not have appeared if this time variable had been controllable. Lack of data on where farmers attended high school and whether vocational agriculture was available to them prevented such control.

Variations in length of farming experience and in nonfarm work experience were not associated with variations in acceptance scores.

Attitudes

From the suggestion that farmers can be classified as innovators, early adopters, majority, and laggards or nonadopters, it follows that at any point in time the early adopters would have a higher acceptance score on a series of related practices, such as fertilizer practices, not introduced simultaneously. The underlying hypothesis is that measurable differences exist in attitude toward new practices which will influence readiness to adopt. To test this hypothesis, acceptance scores were tabulated against time of trial of each practice.

Early trial of four of the six practices was associated with higher acceptance scores at a statistically significant level. The two exceptions were lime and phosphate (Table 11).

Further evidence of differences among farm operators in receptivity toward new practices was found when responses to the following question were tabulated against acceptance scores: "When a new practice comes out, do you like to try it right away?" (Table 12). Farmers who answered "yes" tended to have higher acceptance scores than those answering "no."

Proponents of the classification of farmers as innovators, early adopters, etc., also suggest that the innovators go through the accept-

Table 11. — Association of Fertilizer Acceptance Score and Time of Trial of Each Fertilizer Practice

Practice	Direction of relationship	X^2	C	Level of significance[a]
Soil test	+ early trial	14.42	.288	.05
Potash	+ early trial	8.11	.329	.05
Commercial nitrogen	+ early trial	18.47	.339	.05
Mixed fertilizer	+ early trial	14.40	.274	.05
Lime	no pattern	2.74		
Phosphate	no pattern	9.32		

[a] Only .01 or .05 levels of significance reported.

Table 12. — Association of Fertilizer Acceptance Score and Responses to the Question: "When a New Practice Comes Out, Do You Like to Try It Right Away?"

Fertilizer acceptance score	No	Yes	Total
Low	40	11	51
Medium	86	19	105
High	33	11	44
Very high	9	10	19
Total	168	51	219

$X^2 = 11.13$ $df = 3$ $.02 > P > .01$

Table 13. — Association of Acceptance Time of Various Fertilizer Practices With Acceptance Score

Practice	Direction of relationship	X^2	Level of significance[a]
Soil test	no pattern	2.71	
Lime	no pattern	6.97	
Phosphate	no pattern	4.22	
Potash	no pattern	.90	
Commercial nitrogen	no pattern	7.70	
Mixed fertilizer	no pattern	5.07	
All six practices	+ short acceptance time	12.73	

[a] None were significant at the .01 or .05 levels.

ance process, from the awareness to the trial and adoption stage, more rapidly than farmers in other categories (6). If this is true, it should follow that at any point in time those farmers who had the highest acceptance scores on a series of related practices such as fertilizer practices would be persons with the shortest time lapse between awareness and adoption.

To test this hypothesis, acceptance time was cross-tabulated against acceptance scores (Table 13). There was no evidence that farm operators who were currently making the most extensive use of fertilizer practices in a comprehensive fertilizer program required any less time to decide to try any particular practice than those with low acceptance scores. The index of acceptance time for all practices indicated some tendency toward less hesitation on the part of those with high acceptance scores, but the association was not statistically significant.

SOCIAL GROUP INFLUENCES ON ACCEPTANCE OF FERTILIZER PRACTICES

In addition to the farm operator's level of knowledge, past experience, and attitudes toward new practices, factors in his social environment influence decisions to try new practices. The importance of personal influence has already been discussed. Membership in or identification with specific social groups also influences decisions (5).

Although the blending of personal influence and group influence makes it difficult to separate causal impact on decision-making, it is likely that group influence on decisions is more than the composite of individual personal influence exercised by members of the group. This is because groups symbolize sentiments and goals.

Farm operators in this study were not asked to identify group influences on their decisions to try fertilizer practices, but they were asked in what social groups they and their wives had membership and how extensively they participated in the activities of these groups. The results provide some estimate of the importance of group influence.

The importance of informal communication between neighbors and friends in the diffusion of farm information has been noted in other studies (5). Membership in the same informal group facilitates communication of ideas on a person-to-person basis. Although the opposite situation, membership in different informal groups on the part of two or more operators, does not always preclude person-to-person communication, it frequently is an effective barrier, especially when status differences are involved. Informal groupings are typically based on status. An illustration of how effectively differences in status can produce barriers to communication was found in a study of farm families on different-sized farms in Kentucky (2).

The Kentucky study indicated enough social distance between farm families on the larger farms and families on the smaller farms to isolate the latter from much of what was happening in the community.

Families on the smaller farms were not very active in formal social

Table 14. — Association of Fertilizer Acceptance Score and Social Participation

	Direction of relationship	X^2	C	Level of significance
Formal social participation score	+ high participation	18.82	.279	.05
Operator member of Farm Bureau	+ member	10.79	.214	.02
Operator member of Million Dollar Club	+ member	9.90	.207	.01

groups, and their participation in informal groups other than kinship groups was quite limited. Because a prevailing tendency of agricultural leaders is to introduce new practices among the larger farm operators, operators on the smaller farms were much less likely to acquire reliable information on those new practices. The assumption that new information will filter down from the larger to the smaller farms, or from the more progressive innovators or early adopters to the less progressive late adopters, requires the further assumption that there are no barriers to communication. When social status differences are associated with size of farm operations, as they tend to be in many areas, there are likely to be some communication barriers. Wilkening found that the feeling of social isolation was associated with failure to adopt farm practices recommended by agricultural programs (8).

In this study it was not possible to determine the full extent of the social activity of sample farm operators and their families. However, available data on their membership and activities in formal groups provided an estimate of involvement in community life, and of participation in the networks of association that facilitate communication.

Extent of involvement of the operators in community social life, herein measured by a social participation index, was associated with acceptance of fertilizer practices.[1] The farmers who were most active in formal social groups were most likely to have high fertilizer acceptance scores (Table 14).

Two formal groups closely identified with the objectives of a progressive agriculture in the county were the Farm Bureau and the Million Dollar Club. Membership in these groups was highly associated with acceptance of fertilizer practices.

[1] Indexes were computed by assigning weights to various kinds of participation and summing the weights for each farm operator. The weights were as follows: membership 1, attendance at one-fourth or more of the meetings 2, committee membership 4, and officership 5.

About two years before this survey was made, the Agricultural Extension Service organized an educational program in the county to promote a comprehensive fertilizer program. This program included formation of the Million Dollar Club, so named after program leaders estimated that if all farmers followed a comprehensive fertilizer program the gross farm income for each township in the county could have been increased a million dollars.

To become a club member, a farm operator agreed to follow a program designed to bring his farm to an optimum state of fertility for maximum yields. Only 8 percent of the sample farm operators had joined this organization by the time this study was made, but this 8 percent had significantly higher acceptance scores than other farmers (Table 14). Obviously the relationship would have been even greater except for (a) the fact that membership was based on intentions rather than past performance, and thus some members had not had time to put a comprehensive fertilizer program into operation, and (b) the fact that some nonmember farmers were following a comprehensive program developed prior to or independent of this particular educational program. Their reaction, as one respondent put it, was, "I am already following the fertilizer program recommended by the Million Dollar Club organization, so why should I join it?"

The Farm Bureau was the principal farm organization in the area studied — with a membership including 83 percent of all farm operators in the sample. Farm Bureau members tended to have higher fertilizer acceptance scores than nonmembers (Table 14).

SUMMARY

The experiences and opinions of a random sample of 221 farm operators in a cash-grain area, Piatt county, Illinois, were analyzed to determine the extent of knowledge and adoption of six principal fertilizer practices; the rate of, and time required for, acceptance; the role of communication in the acceptance process; the economic, social, and socio-psychological factors influencing fertilizer decisions.

Proportions of operators who used each practice varied from 30 to 90 percent. The use of lime and phosphate was the most general (90 percent), and the use of potash was the most limited (30 percent).

Rate of acceptance or adoption as measured by the cumulative proportions of operators using the practice was most rapid for using commercial nitrogen and slowest for liming and soil testing.

Acceptance time — time lapse between first knowledge and trial — was shortest for acceptance of commercial nitrogen and longest for soil testing and liming.

Although adoption of the six practices would logically follow a sequence dictated by their functional interrelationship, the data indicate that many farm operators were either unaware of this or disregarded it in their adoption of the practices. This underlines the need for a comprehensive educational program treating fertilizer practices as an integrated program.

In contrast with the situation for many other recommended farm practices, the mass media — newspapers, magazines, radio, and television — were not the top sources of first information about fertilizer practices among the sample farm operators. Neighbors and friends ranked first. However, farm magazines were the sourse of *most* information.

Farm advisers and vocational agriculture teachers, although not identified as important sources of *most* information, ranked first and second as the most trusted authorities on fertilizer information. And yet these most trusted authorities were not most frequently listed as the persons who "influenced" operators to try fertilizer practices. This position was held by landlords, neighbors, relatives, and friends. The flow of information and influence in the acceptance process is thus a complex phenomenon involving mass media as chief sources of information; agricultural experts as the trusted authorities; and landlords, neighbors, friends, and relatives as the persons whose opinions carry the most weight in the final decision to try a fertilizer practice.

Farm operators with high fertilizer acceptance scores differed from farm operators with low scores mainly in the size of their operations and income. Owner-operators had smaller operations and lower scores. Age and educational differences were not significant.

Contrary to popular opinion, operators with absentee landlords had higher acceptance scores than operators with resident landlords. Operators who felt confident they could continue on their present farms almost indefinitely had higher scores than those who lacked this confidence. The nature of the lease — whether written or oral, for a short or long term, or indefinite — was not crucial to this feeling. Instead it was the informal understanding between landlord and tenant that counted.

High acceptance of fertilizer practices was associated with acceptance of crop rotations and increased planting rate of corn when nitrogen was used, but not with acceptance of such practices as using certi-

fied seed, using chemical weed control, adding grass to legume seeding, conserving manure, or burning plant residues.

Level of schooling was not directly associated with acceptance of fertilizer practices, but certain "educational experiences" such as having been in a 4-H Club or having a child in a 4-H Club or the vocational agriculture program were directly associated.

Although operators who reported that they liked to try new practices soon after they came out had higher fertilizer acceptance scores than those who said they were more inclined to "wait and see," there was no substantial evidence that the former group went through the process of accepting a new practice more rapidly than the others. The time elapsed between first knowledge of a practice and first trial was about the same for operators with high acceptance scores as for those with low scores.

Active participation in formal associations was more characteristic of operators with high acceptance scores than of those with low scores. Membership in the Farm Bureau and the Million Dollar Club — the latter being a part of a comprehensive educational program sponsored by the Agricultural Extension Service to promote better fertilizer practices — was especially characteristic of operators with the higher fertilizer acceptance scores.

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