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RELATIVE EFFECTIVENESS OF  
VARIOUS EXTENSION METHODS AND PROGRAMS IN  
ABEY AREA OF MOUNT LEBANON

By  
OLA JAMAL HAMMAD

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EFFECTIVENESS OF METHODS - LEBANON

HAMMAD

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AN ABSTRACT OF THE THESIS OF

Ola Jamal Hammad for Master of Science in Agriculture

Major: Extension Education

Title: Relative effectiveness of various extension methods and programs in Abey Area of Mount Lebanon.

The purpose of this study was to determine the effectiveness of selected extension teaching methods on the rate of adoption of some agricultural practices in the selected county of Mount Lebanon.

Data were collected through interviews with 160 olive growers in nine villages of Mount Lebanon. The methods evaluated included those designed for group contacts, individual contacts, and mass media. Adoption was measured in terms of practicing the recommended techniques of fertilization, pruning, and pest control on olive trees.

The project was designed to furnish information as to:-

(1) The effectiveness of the various extension teaching methods in influencing the adoption of the recommended practices, (2) the most important sources of information for technical change, and (3) the factors affecting farmers in the making of adoption decisions.

The data were analysed through the AUB computer center. Frequency and percentage tables were prepared for the respondents' background characteristics as well as for the adoption data. Percentage distributions, chi squares  $X^2$ , and the corrected contingency coefficient  $C$  were used to determine the significance and amount of relationship between the selected independent variables and the respondents' adoption behavior.

The indirect influence as a source of information ranked highest in the adoption of fertilization and pruning practices, whereas the government extension agent ranked next. In the pest control practice, it was vice versa. Demonstrations were most effective in teaching fertilization and pruning practices, whereas for pest control the farm and home visit ranked first. Farm and home visits and demonstrations were most effective.

Results of the significance test for the association between selected variables and the adoption behavior showed that years of experience in farming, age and farm income of the respondents had little bearing on the rate of adoption of the recommended practices. A positive relationship was obtained between education and fertilizer application. Owner operators

of olive growers tended to be more receptive to adoption of recommended practices than tenant farmers including share croppers and cash renters. The adoption of recommended farm practices tended to be higher in the case of farmers who operated a large farm size. Farmers satisfied with the services rendered by the Extension Service tended to apply fertilizers in the proper time and also controlled the pests on their trees.

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## I. INTRODUCTION

Teaching is the process of providing a favorable situation that stimulates and guides learning activity toward the achievement of predetermined and well defined objectives. It is one thing to disseminate useful knowledge, and quite another to have it understood, accepted, and put into practice for the benefit of the learner. (Chang, 1963, p 73, 1965, p 21)

Teaching is a difficult task. This is particularly true in extension teaching where persuasion is the only sanction extension agents have in influencing people and where the audience is usually a heterogeneous group with respect to age, education, ability, outlook, preferences, social, and economic status. (Chang, 1965, p 21)

Lionberger (1966, p 21) has demonstrated that farmers generally do not tend to adopt a farm practice as soon as they hear about it, although the practice may have been tested by agriculture research experts. Rogers (1962, p 148) has also shown that there is a variation in the rate at which different farmers adopt farm practices.

Economic research studies in the Middle East (Anonymous, 1960, p 77, Kampe, 1965, pp 1-3) have shown that in Lebanon 50% of the total population live on farms and only 20% of the total national income is derived from agriculture or is considered farm income. These data illustrate the pressing need for increasing agricultural production and incomes. The accomplishment of this task requires the development of improved ways to diffuse among the farmers the new knowledge

and techniques concerning improved agriculture.

### Statement of the Problem

The Extension Service in Lebanon was established in 1953, to diffuse among the rural people useful and practical information on agriculture and farm living and to encourage the application of the same. Its ultimate aim is the development of people so that they can do things for themselves. It is considered as a means of bridging the gap between knowledge and practice or of reducing the time lag between research findings and field application through informal out-of-school education.

The extension office in Abey county was established in 1963, with one extension agent serving in the area. The process of learning is generally enhanced by efficient teaching, and since the Extension Service in Lebanon allocates much of its financial resources to the various extension teaching methods used by its field staff the need for evaluating the effectiveness of those methods and programs should not be underestimated.

How effective were the various extension teaching methods in influencing the adoption of the recommended practices ?

What are the most important sources of information for technical change ? and

What are the factors affecting farmers in the making of adoption decisions ?

Those questions and related others constituted the central point of this study.



### Purpose and Objectives

The purpose of this study was to determine the effectiveness of the Extension program and the various extension teaching methods on the rate of adoption of some agricultural practices in Abey county of Mount Lebanon.

The specific objectives were:

1. To determine the rate of adoption of the recommended practices by olive growers.
2. To identify the most important source(s) of information for effecting technical change among farmers.
3. To determine the most effective extension teaching methods that influenced farmers to adopt the recommended practices.
4. To determine possible relationships between selected independent variables and the pattern of adoption by respondent farmers of the recommended practices.
5. To suggest single or a combination of methods that will have the greatest influence on the farmers in adopting the recommended practices.

## II. REVIEW OF LITERATURE

### Evaluation in Extension

It was recognized (Byrn, 1959, pp 3, 10) that since the extension service was recommending research findings to improve agriculture and home making it must "practice what it preaches" and study itself through scientific procedures to improve its work.

Evaluation is done in order to have some measure of the desirable and undesirable outcomes of educational action that is taken by the extension staff to move a person or a group toward desired extension goals or objectives.

The ultimate goal of the evaluation process in extension is the increased effectiveness of its programs. Byrn (1959, p 96) identifies three objectives of evaluation:

1. Evaluation helps by telling how much progress the clientele have made toward the educational objectives.
2. It provides not only the results of efforts expressed in terms of changes in behavior, but also the benchmarks by which this progress can be gauged.
3. Evaluation also contributes to the educational efforts of the extension organization by giving it necessary information about situations for planning sound programs.

Improvement in the use of methods in extension teaching implies the necessity of making measurements and accountings. It involves the

scientific way of collecting and weighing the facts. How does one determine whether or not extension teaching produces the desired results ? What facts are needed to make a scientific approach of the contribution of the different methods utilized by the extension worker for teaching ?

Unless some change in behavior attributable to extension teaching has taken place, the "person" reached by extension has not learned and the extension worker has not taught.

When information on the relative effectiveness of the different methods and tools utilized by the extension agents is desired, the rural people themselves can best shed light on the extent of the extension efforts that influenced them to make the reported changes.

### Adult Learning

Learning is defined as the process by which an individual, through his own activity, changes his own behavior. Such behavioral changes may be spelled out as follows: (Chang, 1963, pp 70-73)

1. Changes in knowledge.
2. Changes in skills.
3. Changes in attitudes.

Therefore, the aims of education must be very specific in order to be able to bring about any or a combination of these desirable changes in human behavior. Effective learning results from a planned rather than a trial and error approach. Every extension worker is essentially a teacher, so he needs to know what makes both, teaching and learning effective.

There are few ways to measure the degree of learning a farmer has achieved, since the changes in behavior are intangible. One possible

way to do that is to measure the rate of adoption of the different practices taught by the extension worker. It is assumed that if the farmer has acquired new and improved knowledge about a practice, and has improved the way of applying it, and continues to apply the recommended practice, then he has changed his behavior.

Of all the teaching methods "learning by doing" is the most effective. Chang (1963, p 73) quotes Seaman Knapp saying "What a man hears, he may doubt; what a man sees, he may possibly doubt; but what a man does himself, he cannot doubt."

Before reviewing the adoption process and factors related to it, some of the main characteristics of learning that are essential for effective teaching are considered:

1. Learning is an active process on the part of the learner.
2. Learning can only be done by the individual and nobody else can do it for him.
3. Learning ability varies among individuals and so learning takes place at different rates for different people.
4. Learning is conditioned by past experiences of the learner.
5. People learn through their senses, i.e. hearing, seeing, doing, smelling and tasting.
6. Learning is affected by present purposes of the learner.
7. Learning is affected by the physical conditions of the learner.
8. Learning is promoted by some degree of success.

In the light of the above discussion, Chang (1963, pp 71-73) added that effective teaching-learning situations can be set up, if the following factors are taken into consideration:

1. Begin where the learner is.

2. The new must be related to the old.
3. The pace must be adjusted to the learner's capacity.
4. The best time to learn something is when it is needed.
5. Learning must be meaningful, and the main idea must be brought to the attention of the learner repeatedly and emphatically.
6. Learning should provide opportunities for practice.
7. Learning must be satisfying.
8. Progress must be constantly appraised and redirected.
9. Recognition of achievement should be provided.
10. There should be a friendly atmosphere.

Extension is an out-of-school educational agency, which helps the farmer to learn by doing. It involves, both teaching and learning, and this is the main reason for considering the above points which will make extension work more effective, and teaching and learning proceed in the desired direction. Adoption, being a communication process involves teaching and learning in its stages. An extension agent should therefore be aware of the items previously reviewed in order for him to diffuse his information in the right manner and expect a considerable number of adoptions. The adoption process will be discussed in detail later, and the teaching-learning process will be implied at all the stages.

#### The Adoption Process

The adoption process, as defined by Rogers (1962, p 76) is the mental process through which an individual passes from first hearing about an innovation to final adoption.

Empirically, adoption is defined in terms of actually practicing

the recommended techniques taught by the extension agent.

Rogers (1962, p 88) indicated further, that an innovation may be rejected at any stage in the adoption process. This has not been investigated in this study. However, if the rejection occurs after adoption, then this behavior is called "discontinuance", and factors affecting it will be reviewed later.

The diffusion process is the spread of a new idea from its source of invention or creation to its ultimate users. (Rogers, 1962, p 13)

### Classification of Adopters

The fact that people adopt new ideas or practices at different times means that they can be classified in terms of their time position in the adoption pattern. A classification system that divides people on the basis of time of adoption, relative to each other, would be appropriate, as shown in Figure 1.

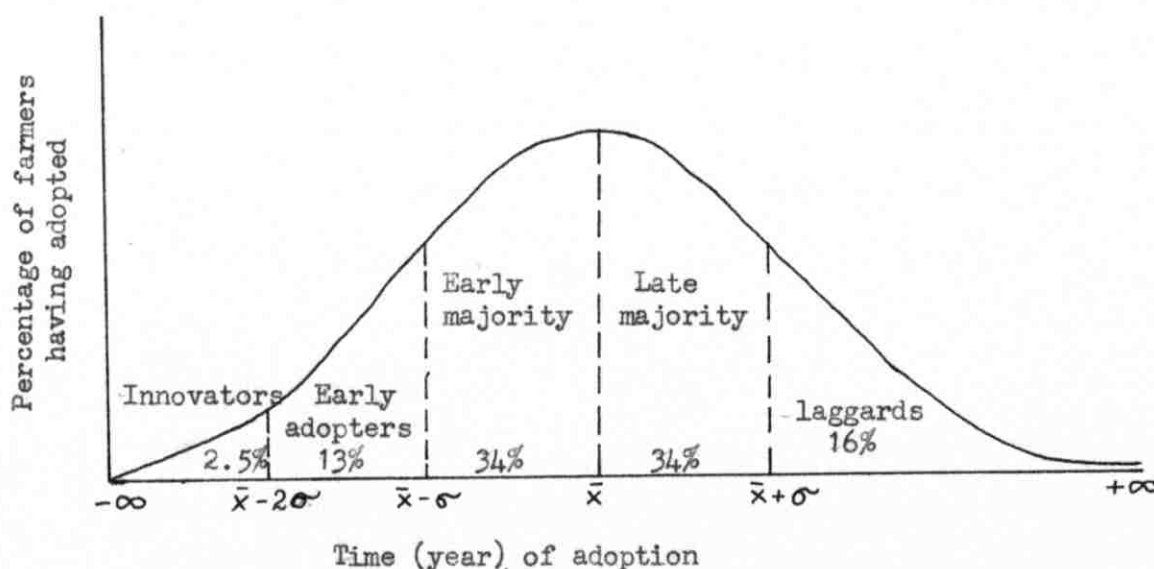


Figure 1. Adopter categories on the basis of adoption frequency distribution.

Since adoption of specific changes tends to conform to the normal or bell-shaped curve, it is possible to classify adopters in terms of standard units and to compare an individual's position in the adoption pattern for one change to the relative position of the same individual in another.

Adopters can be classified in five categories: (Rogers, 1962, pp 168-182, Lionberger, 1966, pp 36-41)

1. Innovators are eager to try new ideas. This has several prerequisites including control of substantial financial resources to absorb the loss of an unprofitable innovation, and the ability to understand and apply complex technical knowledge. Venturesomeness is the major value of the innovator. He must desire the hazardous, the rash, the daring, and the risking.
2. Early adopters have the greatest degree of opinion leadership in most social systems. They have a wide range of contacts with originating sources of farm information, and are quick in trying them. Potential adopters look to them for advice and information about the innovation. Early adopters ordinarily have larger farms and higher incomes than the average in their community. They are willing to take risks and are likely to be middle-aged.
3. Early majority adopt new ideas just before the average member of a social system. It may take them some time before completely adopting a new idea, and their adoption period is relatively longer than the innovators' and early adopters'.
4. Late majority adopt new ideas just after the average member

of a social system. They approach innovations with a cautious ear, and do not adopt until a majority of others in their system have done so.

5. Late adopters or laggards are last to adopt an innovation. They tend to be suspicious of innovations, innovators, and change agents, ordinarily have smaller farms and tend to be elderly. Often, they consult group leaders whom they trust as sources of information.

### Stages in the Adoption Process

Rogers (1962, pp 81-86) and Lionberger (1966, pp 21-23) have identified the acceptance of a new idea as a complex process involving a sequence of thoughts and actions.

Usually decisions are made after multiple contacts with various communication channels. However, once an idea has been introduced and the process initiated in any given community, some people can be found at all stages in the process, which may be broken down into five stages:

1. Awareness, when the individual learns of the existence of the idea.
2. Interest, when the individual develops interest in and seeks more information about the idea.
3. Evaluation, when the individual makes mental application of the idea and weighs its merits and limitations for his own situation.
4. Trial, when he actually applies it for certainty, usually on a small scale.
5. Adoption, when the individual uses the new practice on a full



scale and incorporates it into his way of farming.

An innovation may be rejected at any stage in the adoption process. A discontinuance is a decision to cease use of a previously adopted innovation.

The study considered an additional stage after adoption, continuance. There, the individual respondent indicated his satisfaction from the practice and his willingness to continue to use the practice. Also, in the study the adoption process was dealt with as a whole, and not by stages. People who didn't adopt certain practices were reported as such without any further investigation about the stage they reached before the rejection occurred.

#### Extension Methods and their Selection for Teaching

Najjar (1953, pp 24-27) pointed out that methods of conducting extension programs vary with the culture of the people, their level of education, their experience in working together in formal and informal groups, their financial resources, the communication facilities available, the resources of the Extension Service and other factors.

An extension teaching method should not be considered as a constant or completely stable unchanging "tool". This is mainly because people and situations change, almost on a day to day basis. Just as the essentials for agricultural production vary - soil, water, climate - so must the methods used to bring about the change be varied.

The teaching methods employed by the extension worker directly influence the effectiveness of his efforts. An understanding of the merits and limitations of the available teaching methods is essential to intelligent selection and efficient use.

The extension teacher attempts to influence the behavior of large number of people in life situations which are constantly changing as the result of social and economic developments (Wilson and Gallup, 1955, pp 12-26). Furthermore, according to Fenley and Williams (1962, pp 11-17), his major aim is to help people move "up the stages" toward adoption, and to gain satisfaction from the practices they adopt. An important thing to understand is that people will differ and extension workers must be able to move at a pace set by their capabilities and interests.

Time elapsed between the stages of adoption may vary from minutes to years for a certain practice to be adopted. The effective extension worker will need patience as he repeats his message. Thus he will vary the extension methods so as to present the basic message in a different form in different learning situations. Such variation will contribute to appealing to individuals who may be in various stages of awareness, interest, and the like.

#### Sources of Information in Relation to the Stages of Adoption

In considering the sources of information used at each stage in the adoption process it is necessary to recognize that they represent only one type of many influences operating in changes considered and made by individuals. The reasons for change are many and complex and will be dealt with later on.

1. Results of several studies (Beal and Bohlen, 1957, Beal and Rogers, 1957, Copp et al., 1958, pp 146-157) showed that at the awareness stage, when the farmer learns about the new idea or practice, mass media are most used, particularly farm magazines. Fellow farmers, used as sources of information, usually rate second

- in importance, particularly for persons who are not early adopters. For early adopters, the agricultural extension service and related agencies outrank other farmers.
2. At the interest stage, when the farmer needs more detailed information about the new idea or practice, mass media and neighbors and friends were most often mentioned (Beal and Bohlen, 1957, Beal and Rogers, 1957, Copp et al., 1958, pp 146-157). Early adopters tend to refer to agricultural agencies rather than fellow farmers in adopting technical innovations particularly when the practice is not closely related to existing farming operations.
  3. At the evaluation stage, when a decision regarding a recommended practice is required, and when considerations regarding its applicability to the local situation become paramount, fellow farmers who have had the requisite experience and whose opinions are respected are the sources most in demand. (Beal and Bohlen, 1957, Copp et al., 1958, pp 146-157, Ryan and Gross, 1943, Ryan and Gross, 1950). Also for commercial products, Beal and Rogers (1957) found that commercial sources rate very high in importance. Chang (1963, p 76) found that group teaching methods assist in moving people to the evaluation and trial stages of accepting new practices. These include general meetings, group discussions, and demonstrations. When a new idea is presented to a group, the participants may ask questions, exchange ideas, and stimulate each other to action.
  4. Beal and Bohlen (1957) found that at the trial stage when information regarding application of the recommended practice is needed, friends and neighbors top the list of sources of information. Beal and Rogers (1957, and Copp et al. (1958, pp 146-157) found that it is especially

likely to be true for practices closely related to existing farming operations and where highly specialized information is not required. For many commercial products, they also found that local dealers rate very high.

5. At the adoption stage, Beal and Bohlen (1957) found that a farmer's own experience and the experience of his fellow farmers is the most important source of information. Chang (1963, p 76) states that since learning is an individual process, individual contacts are, in many instances, necessary in order to get a farmer to adopt a new practice. He must know the farmer and his situation well and have his confidence, before he can convince him to adopt it. These contacts would include farm and home visits, office visits, and telephone calls.

The stages of adoption in relation to the different methods of extension teaching mentioned above can be illustrated in Figure 2.

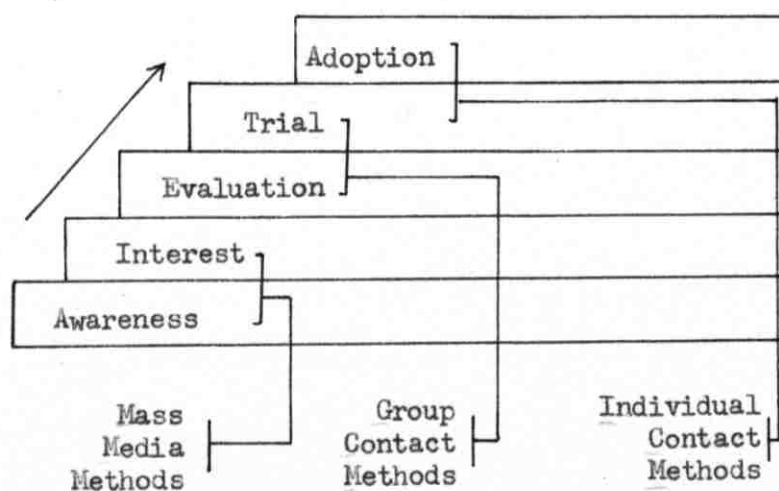


Figure 2. Stages of adoption in relation to different extension teaching methods.

## Extension Methods Effective in the Process of Teaching

To transmit the new knowledge regarding improved techniques in agriculture to the farmers, and to encourage its application, the extension worker must realize the importance of the teaching done and its effect on the "learners". A knowledge of the steps involved in teaching, and the selection of methods is helpful in devising effective extension teaching methods. A discussion of each follows:

### Steps in effective teaching

1. Get the learner's attention.
2. Stimulate his interest in the new change.
3. Arouse his desire for information.
4. Convince him to take action.
5. Obtain his action.
6. Help him recognize satisfaction.

### Selection of methods

Knowing that not everyone wants or needs to move at the same speed or in the same direction, the extension teacher must be able to analyse each individual, family, or community, to determine what "step" or "stage" they are in and what is the next logical step toward achieving adoption. (Fenley and Williams, 1962, pp 13-14)

There are many factors to be considered when selecting methods, and based on information from literature cited the following generalizations can be made:

1. Mass media methods are suited to attract attention and stimulate interest and desire for further information.

2. Group contact methods are usually well suited to bring specific information about practices and to help move the individual through the stages of "interest" to "conviction" and sometimes to action.
  3. Individual contact methods usually are superior for conviction and action because of the face-to-face relationship between a teacher and a learner.
  4. Another factor affecting the selection of methods is the length of tenure in the job. Newer and younger workers need to give more emphasis to individual contacts, as their knowledge of the local situation grows, their confidence grows, and they will be prepared to concentrate more on group contact methods.
- Wilson and Gallup (1955, pp 12-16) discuss the effectiveness of

methods as being determined by three factors:

1. The success of the method in influencing people to take desired changes.
2. The amount of teaching effort expended on it.
3. Effectiveness of methods as measured by cost.

The latter two factors were not investigated in the study for the main reason that the purpose of the study was to determine the effectiveness of methods in terms of adoption of the recommended practices, and it would need a lot more time to study the amount of teaching effort expended on the method and the cost involved. However, if investigated, these would have strengthened the results and generalizations on the effectiveness of the extension methods used.

## Factors Affecting the Adoption of Recommended Practices

### Social Factors

People do not live apart from others and independent of their influence. Whether a farmer lives in a neighborhood or a community, he always has neighbors. He is not at liberty to disregard their interests and expectations, at least if he has any concern about what they think of him. This means that neighbors must be and are considered in many of the decisions that people make. (Lionberger, 1966, pp 69-73)

#### 1. Locality Groups

Locality groups are composed of people in a specific geographic area who have developed a feeling of belonging and who tend to associate with each other more than with outsiders.

- a. Neighborhoods tend to establish norms which serve as guiding principles for those who live within the area. Group pressures operate to keep people in line with local expectations regarding many aspects of life, including the adoption of farm practices.

Marsh and Coleman (1954b) found that farmers residing in high adoption neighborhoods made much greater use of all sources of farm information, especially agricultural agency representatives and farm meetings. Also, the same authors in another study (1954a) found that farmers in high farm practice adoption neighborhoods tended to look to farmers with higher adoption scores than themselves as sources of information, while those living in low adoption neighborhoods tended to look to those about like themselves. Duncan and Kreitlow (1954) found that People living in heterogeneous neighborhoods from the stand-

point of religion and ethnic background were more favorable to new farm and educational practices than people living in homogeneous neighborhoods.

Marsh and Coleman (1954b) concluded that the extent to which farmers adopt recommended practices is, in part, a function of the operator's neighborhood of residence.

- b. **Communities:** It is within the organizational context of the community that the most interpersonal patterns of communication occur. Hoffer and Gibson (1941) found that farm practice adoption rates were higher in communities favorable to change than in those that were not.

## 2. Family

Many studies (Hess and Miller, 1954, Lionberger and Coughenour, 1957, Rogers and Beal, 1958, Wilkening, 1953) have shown that family members often serve as referents in decisions to adopt new farm and home practices.

Wilkening (1953) also found that family values positively associated with the acceptance of innovations or improvements in farming were:

- a. Desire for high educational attainment of children and assignment of priority to this over expenditures for farming operations,
- b. high value placed on social status and participation in formal social groups, and
- c. high priority on the possession of improvements and conveniences in the home as a family goal.



### 3. Social cliques

According to Lionberger (1966, pp 75-80) these are composed of a small number of persons who accept each other as social equals and associate as close friends. Cliques are important social structures in the diffusion of farm information. As social systems they involve, both, active and passive mechanisms of social relationships.

### 4. Reference groups

Lionberger (1966, pp 80-82) explains it as a group to which an individual refers when forming an opinion, making a judgment, or deciding to act.

Reference groups may exert an important influence even though they are amorphous and fleeting in nature. Lewin (1943) in his series of experiments to change food habits of women not previously acquainted with each other showed ten times as many women changed food habits when exposed to group discussion and decision methods than when a straight lecture method was used. Joint decision seemed to provide a compulsion to conformity that was essentially absent when individuals arrived at decisions independently.

### 5. Formal groups

These were identified by Lionberger (1966, pp 82-84) as groups that elect officers, appoint committees, adopt a constitution, and plan programs. Like other groups, they provide some compulsion to act according to group expectations. Lionberger and Coughenour (1957) and Wilkening (1952) further explain that formal groups, being selective of persons who are inclined to the adoption of new

farm practices; they provide a favorable climate for meeting and talking to other competent farmers, who commonly are strongly influential in the decisions either to change or not to change farm practices.

#### 6. Status factors

The way people rate each other on a social status or prestige hierarchy is important to the communication of information and the exercise of personal influence, because such differences may set limits on the kind of persons who are sought for information by given individuals. (Lionberger, 1966, pp 84-89)

Katz and Lazarsfeld (1955) found that personal influence and communication about a wide variety of matters was generally confined to people of about the same social status.

### Cultural Factors

#### 1. Culture and its influence

Culture is the total man-made part of man's environment. The ideas and beliefs of man and the material things he has to work with set limits on what he can do at a given time and place and very often on how it may be done. (Lionberger, 1966, p 90)

Perhaps the influence of cultural factors in farming stands out in clearest perspective when the behavior of people with different cultural backgrounds are compared. In a study of the adoption of farm practices in Wisconsin (Pedersen, 1951, pp 37-49), it was found that Danish farmers had adopted many more improved dairy practices than Polish farmers. Examination of the philosophy and practice that prevailed in the countries from where they came provided likely

explanations of the differences found. Danish farmers place high value upon education, they respect the intellectual decisions and freedom of choice for individuals. They had been accustomed to dairy farming in their own country. The Polish farmers placed a high premium on security and primary group conformity. Sons were expected to farm as their fathers did and not to make decisions independent of them.

## 2. Values and Attitudes

Values may be regarded as important ratings which people attach to things, conditions, and circumstances. They may also be regarded as good objects to which people orient their thinking, actions, and feelings. As such they become important organizing themes in the behavior of individuals.

In a Michigan study (Hoffer and Stangland, 1958) of values related to the adoption of four improved corn-growing practices, farmers who identified themselves with efficiency and self-reliance models presented to them by the researchers were much more likely to have adopted each of the four practices considered than those who did not.

### Personal Factors

The reasons for some people to adopt new ideas and improved practices more quickly than others relate in part to the individual himself.

#### 1. Age

While there is not unanimous support for this generalization from the available research studies, elderly farmers seem to be somewhat

less inclined to adopt new farm practices than younger ones (Copp et al., 1958, pp 146-157, Gross and Taves, 1952, Marsh and Coleman, 1955, Wilkening, 1952).

Wilson and Gallup (1955, p 22) concluded that age is not an important factor in extension teaching. Al-Haj's study (1968, p 27) revealed a strong bearing of age on the adoption of recommended practices.

Several studies (Hoffer and Stangland, 1958, Beal and Rogers, 1960, Sheppard, 1960) found that older age was associated with innovativeness. Perhaps the explanation to this finding could be due to the wide difference between age at the time of adoption of the practice and that at the time the interview was conducted.

## 2. Education

Schooling has been valued as a means of increasing knowledge about new farm technology. The assumption is that schooling facilitates learning, which in turn is presumed to instill a favorable attitude towards the use of improved farm practices.

Here, as with other variables associated with the adoption of farm practices, clear-cut relationships are hard to establish because years of schooling is related to other factors which affect the rate of adoption, such as income and age of the operator. (Copp, 1958, 1956)

Al-Haj (1968, p 27) in his study confirmed his hypothesis, where farmers with more education are more receptive to technical change.

### Psychological Factors

These include the rationality, mental flexibility, dogmatism, orientation toward farming and the innovative proneness of the individual farmers. They tend to affect adoption.

When rationality is defined in terms of maximizing profits in farming, it may operate as an intervening variable between contacts with educational agencies and the adoption of new farm practices (Dean et al., 1958, pp 121-135). Exposure to reliable sources of farm information may create a state of rationality which in turn predisposes an individual to the adoption of new practices.

### Situational Factors

Reasons why farmers adopt farm practices more quickly at one time than another relate to the situation in which they find themselves when alternative courses of action become known.

#### 1. Farm income

High income nearly always is associated with high farm practice adoption levels (Copp et al., 1958, pp 146-147, Wilkening, 1952, Wilkening, 1953). Alertness to change and quick adoption of new farm practices suited to prevailing farming conditions lead to higher incomes. This in turn makes more capital available to the adoption of new farm practices.

In the study conducted in Lebanon, (Al-Haj, 1968, pp 28-29) it was found that farmers earning most of their income from agricultural pursuits were more concerned with the technical improvement of their cultural operations and more receptive to technical change.

## 2. Size of farm

Size of farm is nearly always positively related to the adoption of new farm practices (Copp et al., 1958, pp 146-157, Wilkening, 1952, Wilson and Gallup, 1955, p 23). Many new technological advances require large-scale operations and substantial economic resources for their use.

In Al-Haj's study (1968, pp 29) the relationship between size of farm and the adoption of an improved practice was positively correlated.

## 3. Land tenure status

It is well known that farm operators, who are owners, have more complete control over farming operations than tenants. Owners can make decisions to adopt new practices, but tenants must often obtain the concurrence of the owner before trial or use. This was found by Lionberger (1966, p 101). Consequently, Copp et al. (1958, pp 146-157) and Wilkening (1952) found that adoption rates are usually higher for farm owners than for those who rent their farms.

Wilson and Gallup (1955, pp 23-24), however, found that the tenure status of the farmer has little bearing on the adoption of recommended practices. Similar results were found by Al-Haj (1968, p 28).

## 4. Community prestige

Where alertness to new developments in farming and quick successful acceptance is a status factor, a person's standing in the community is almost certain to be positively related to the adoption of new farm practices (Lionberger, 1959). Under such circumstances, farmers with high social standing are expected to constantly remain

well informed regarding new developments in farming. Those with low prestige may properly look to the improvements in farming operations as a means of climbing the social ladder.

#### 5. Sources of information used

Hoffer (1942) and Lionberger (1951) found that the number of sources used or contacts with information sources is positively related to the adoption rates.

In other studies (Copp et al., 1958, pp 146-157, Hoffer, 1942, Lionberger and Coughenour, 1957, Wilkening, 1952) a high positive correlation is particularly evident with the use of such sources as the county agent, the college of agriculture, and the vocational agricultural teacher.

#### 6. Level of living

Rogers (1962, pp 175-176) found that wealth and innovativeness seem to go hand in hand. Greatest profits go to those who adopt, and some new ideas are costly to adopt and require large initial outlays of capital.

#### 7. The nature of the practice

Lionberger (1966, pp 104-105), when investigating the various factors that affect the adoption of recommended practices, found that the speed with which adoption will take place is partly dependent upon the nature of the practice itself such as:

- a. Cost and complexity of the practice.
- b. Capital involved.
- c. Compatability with the existing farming operations.
- d. Communicability.
- e. Decision-making involved in the adoption.

All the various factors affecting the diffusion and adoption of innovations have a great significance, in that they give an overall picture of their effect on improvement of farm practices. However, selected factors were investigated in this study. Reviewing them in this chapter, and presenting findings on some factors which were not used in the analysis will give, both, the researcher and the reader a better basis of understanding and comprehending the existence of an inter-relationship of various factors affecting the acceptance and application of improved technology and practices.



### III. METHODOLOGY

The research design of this study was patterned after the evaluation study by Al-Haj (1968) to allow for some comparison in the findings. The general purpose of Al-Haj's study was to determine the rate of adoption by wheat growers of some recommended cultural practices, and the factors affecting the process of adoption. Such a comparison would provide a stronger basis for recommendations of improved teaching methods. Other studies and literature by Wilson and Gallup (1955), Lionberger (1966), and Rogers (1962), where the adoption process was fully discussed in terms of effectiveness of teaching, the effectiveness of learning, the suitable extension teaching methods effecting change, the characteristics of the adopters, the situation, and the special characteristics of the individual practices also served as a basis for comparison.

The field survey was conducted in Abey county of Mount Lebanon and one village, Baysoor, in the neighboring Aley county. The area under study was characterized by part-time farming. The study was limited to one commercial enterprise, namely, olives. Nine villages where this crop constituted the greatest part of agriculture were selected for the survey.

#### Sampling

Data were collected by personal interviews with 160 olive growers. The sample was selected at random from the list of olive growers

provided by the extension agent. The following two criteria were considered in the selection:

1. The farmer respondents should hold an olive growing area of at least three dunums.
2. The majority of the farmers should have had some contacts with the extension agent regarding agricultural matters.

The proportion of the sample from each village was as follows:

<u>Village</u>	<u>Number of respondents</u>	<u>Percent</u>
Aynab	23	14
Ayn Enoub	10	6
Baysoor	15	9
Bennay	11	7
Bshamoun	20	13
Dakkoun	19	12
Fsakin	34	22
Rimhala	21	13
Shwayfat	7	4
Total	160	100

Four practices applicable to every olive grower were chosen and each was viewed in terms of whether or not it was followed in the recommended manner. The practices consisted of (1) applying the right combination of nutrient elements to the soil<sup>1</sup>, and (2) at the recommended

- 
1. Three kg ammonium sulfate to two kg superphosphate to one kg potassium chloride per tree, or a ready mix of compound fertilizer with a similar proportion of nutrient elements.

time<sup>1</sup>, (3) pruning the olive trees<sup>2</sup>, and (4) controlling the pests on the olive trees<sup>3</sup>. The recommendations of the extension subject-matter specialists and the results furnished through local demonstrations served as the basis for determining the recommended standards for each practice.

#### Plan for Analysis

The relationship between selected independent variables and the respondents' adoption pattern of the olive growing practices was studied. The independent variables were: respondents' farming experience, age, level of education, land tenure, contacts with the extension agent, percentage of income derived from farming, size of farm operated, and degree of satisfaction in regard to the services rendered to them by the Extension Organization.

The interview schedules were divided into two main sections:

1. Face data, including background characteristics about the respondents.
2. Adoption data including (a) questions regarding the different practices applied to olive trees, (b) sources of information regarding the practices learned, (c) effective extension teaching methods for learning or adopting the recommended practices, and (d) willingness of the respondents to adopt or continue

- 
1. Main application in November and December, and the balance of nitrogen in February, or all in November and December.
  2. Cut a big branch each year, for three years, and leave the young branches that carry the buds.
  3. Use chemicals and poisons to control the commonly encountered pests.

to use the practice, and if not, reasons for dropping.

The last three questions in the interview schedule dealt with the degree of satisfaction the respondents had from the educational services rendered by the Extension Organization, and what services would they render to farmers if they were themselves the extension agents. The farmers' responses to those questions would reflect their attitude towards the government's extension program. Also a list of the farmers' self-expressed needs was obtained.

The information in the completed interview schedules was coded, and punched into IBM cards with the assistance of the AUB computer center. The computations were obtained on IBM 1620 computer. Frequency and percentage tables were prepared on the face data as well as the adoption data. Percentage distributions, chi squares  $X^2$ , and the corrected contingency coefficient  $\bar{C}$  were used to determine the significance and amount of relationship between the selected independent variables and the respondents' adoption behavior.

### Hypotheses

The following hypotheses were tested in the study:

- Hypothesis 1. The rate of adoption of the recommended practices is inversely related to the age of the farmers.
- Hypothesis 2. Farmers with more educational training tend to adopt new practices faster than those with low or no educational background.
- Hypothesis 3. The percentage of farmers adopting new practices tends to increase with the size of farm operated and the income

derived from agriculture respectively.

- Hypothesis 4. Whether the farmer owns or rents the farm on which he lives, has little bearing upon the extent of use of extension information.
- Hypothesis 5. There is a positive relationship between farmers' degree of satisfaction with the services rendered by the Extension Service and the farmers' adoption of recommended practices.
- Hypothesis 6. Farmers with more experience in farming tend to be slower in adopting new practices than those with less farming experience.
- Hypothesis 7. The extension agent is the most important source of information for technical change.
- Hypothesis 8. Result and method demonstrations are more effective in inducing adoption by farmers than other extension teaching methods.
- Hypothesis 9. Farmers who had contacts with the government extension agent were more receptive to adopt the recommended practices than others who had no contacts.

#### IV. RESULTS AND DISCUSSION

This chapter of the study deals with four main sections, namely, (1) background characteristics of the interviewees, (2) the respondents' rate of adoption and the effectiveness of teaching methods used, (3) the association or relationship between some independent variables and the adoption of recommended practices, and (4) farmers' self-expressed needs and self-expected responsibility as government extension agent.

##### Background Characteristics

The background characteristics constituted the independent variables that were used to study possible relationship with the adoption pattern of recommended practices.

##### Experience in Farming

Table 1 shows the classification of respondents by years of experience in farming. Approximately, one half of the sample had less than 20 years of experience, and the other half had above 21 years of experience in farming. However, it should be taken into consideration that the years of experience were overestimated, because farmers tended to even include their childhood experience when helping parents on the farm.

Table 1. Respondents classified by experience in farming.

<u>Experience in farming</u>	<u>Number</u>	<u>Percent</u>
10 years or less	35	22
11 - 20 years	45	27
21 - 30 years	28	18
31 - 40 years	25	16
41 years and above	27	17
Total	160	100

### Age

One third of the respondents were less than 45 years old, and one half were in the higher age-groups, being 46 - 65 years. Only 15% were older than 66 years, as shown in Table 2.

Table 2. Respondents classified by age.

<u>Age</u>	<u>Number</u>	<u>Percent</u>
35 years or less	27	17
36 - 45 years	29	18
46 - 55 years	35	22
56 - 65 years	45	28
66 years and more	24	15
Total	160	100

### Education

Table 3 shows that over one half of the sample had elementary education, and one fourth had secondary education. Only 14% of the sample were illiterate.

Table 3. Respondents classified by educational level.

<u>Educational level</u>	<u>Number</u>	<u>Percent</u>
Illiterate	23	14
Elementary education	95	60
Secondary education and above	42	26
Total	160	100

Land Tenure

The information in Table 4 shows that 94% of the total interviewees were owner-operators, while six percent were tenants, i.e. share-croppers and cash-renters.

Table 4. Respondents classified by land tenure.

<u>Land tenure</u>	<u>Number</u>	<u>Percent</u>
Owner-operator	151	94
Tenant	9	6
	<hr/>	
Total	160	100

Farm Income

Table 5 shows that one half of the interviewees derived only 25% of their income or less from agriculture, and one third of the respondents derived three fourths to all of their income from farming. These findings indicated the existence of part-time farming in the area, whereby non-farm jobs were considered important sources of income for livelihood.

Table 5. Respondents classified by percent income derived from farming.

<u>Farm income</u>	<u>Number</u>	<u>Percent</u>
25 percent or less	85	53
26 - 50 percent	22	14
51 - 75 percent	2	1
76 - 100 percent	51	32
	<hr/>	
Total	160	100

Size of Farm

One third of the respondents owned a farm of 11 - 20 dunums, one fourth owned a farm of 21 - 40 dunums and an equal proportion owned



a farm of 40 dunums and above (See Table 6). Small to average-size farm is the most common type in the area.

Table 6. Respondents classified by size of farm.

<u>Size of farm</u>	<u>Number</u>	<u>Percent</u>
10 dunums and less	30	19
11 - 20 dunums	52	32
21 - 40 dunums	40	25
40 dunums and more	38	24
Total	160	100

#### Contacts with the Extension Agent

The information in Table 7 shows that over three fourths of the respondents had contacts with the government extension agents and nearly one fourth had no prior direct contacts whatsoever.

This was one criterion upon which the sampling was partly based, since the purpose of the study was to evaluate the effectiveness of various extension teaching methods through which farmers were contacted. However, the effect of indirect influence on adoption was not overlooked in the analysis.

Table 7. Respondents classified by contacts with the extension agent.

<u>Contact</u>	<u>Number</u>	<u>Percent</u>
Yes	125	78
No	35	22
Total	160	100

#### Degree of Satisfaction with the Extension Service

The data in Table 8 show that two fifths of the sample were fairly satisfied with the services rendered by the Extension Service,

and an equal proportion was not at all satisfied.

Table 8. Respondents classified as to degree of satisfaction with the services of the Extension Organization.

<u>Degree of satisfaction</u>	<u>Number</u>	<u>Percent</u>
To a great extent	28	18
To a fair extent	68	42
Not at all	64	40
Total	160	100

### General Sources of Information

This section deals with the most frequent sources of information to which the respondents referred regarding agricultural matters, and the various extension teaching methods through which they adopted recommended practices.

#### Contacts with Various Sources of Information

Table 9 shows the various sources from which farmers sought information regarding agricultural matters. Over one half of the respondents claimed to get their information from the government extension agent, while one fourth did not ask anybody for information. They depended mainly on their past experience. Family friends and neighbors were also an important information source, as was mentioned by 14% of the interviewees.

Table 9. Respondents classified by intensity of contacts with various information sources.

<u>Source of information</u>	<u>Number</u>	<u>Percent</u>
Extension agent	92	58
Subject matter specialist	3	2
Merchants and dealers	3	2
Family, friends and neighbors	22	14
Nobody, i.e. past experience	38	23
Other sources	2	1
Total	160	100

The relative importance of the various sources of information as mentioned by the Abey county farmers are illustrated in Figure 3.

#### Extension Teaching Methods Most Effective in Learning

The figures in Table 10 show that the greatest number of respondents learned about agricultural practices through the farm and home visits. This group constituted 74% of the sample. Only 20% learned through farmers' group meetings, which was the second most effective extension teaching method. The effect of office calls, demonstrations, farm radio program, and publications on their learning about improved agriculture was very low.

Table 10. Respondents classified by methods used.

<u>Method</u>	<u>Number</u>	<u>Percent</u>
Office call	2	2
Farm and home visits	94	74
Farmers' group meetings	25	20
Demonstrations	4	3
Farm radio program	0	0
Publications	1	1
	<hr/>	
Total	126	100

#### Adoption Information

##### Rate of Adoption

Technical information related to several practices on olive production was extended by the government extension agent to the olive growers. The recommended practices included: (1) Application of the proper kind and rate of fertilizer, (2) proper time of fertilization, (3) proper method of pruning, and (4) pest control, i.e. treatment of olive leaf spot and olive fruit fly. The interviewees were asked how

WHERE THE ABEY COUNTY FARMER  
GETS HIS INFORMATION

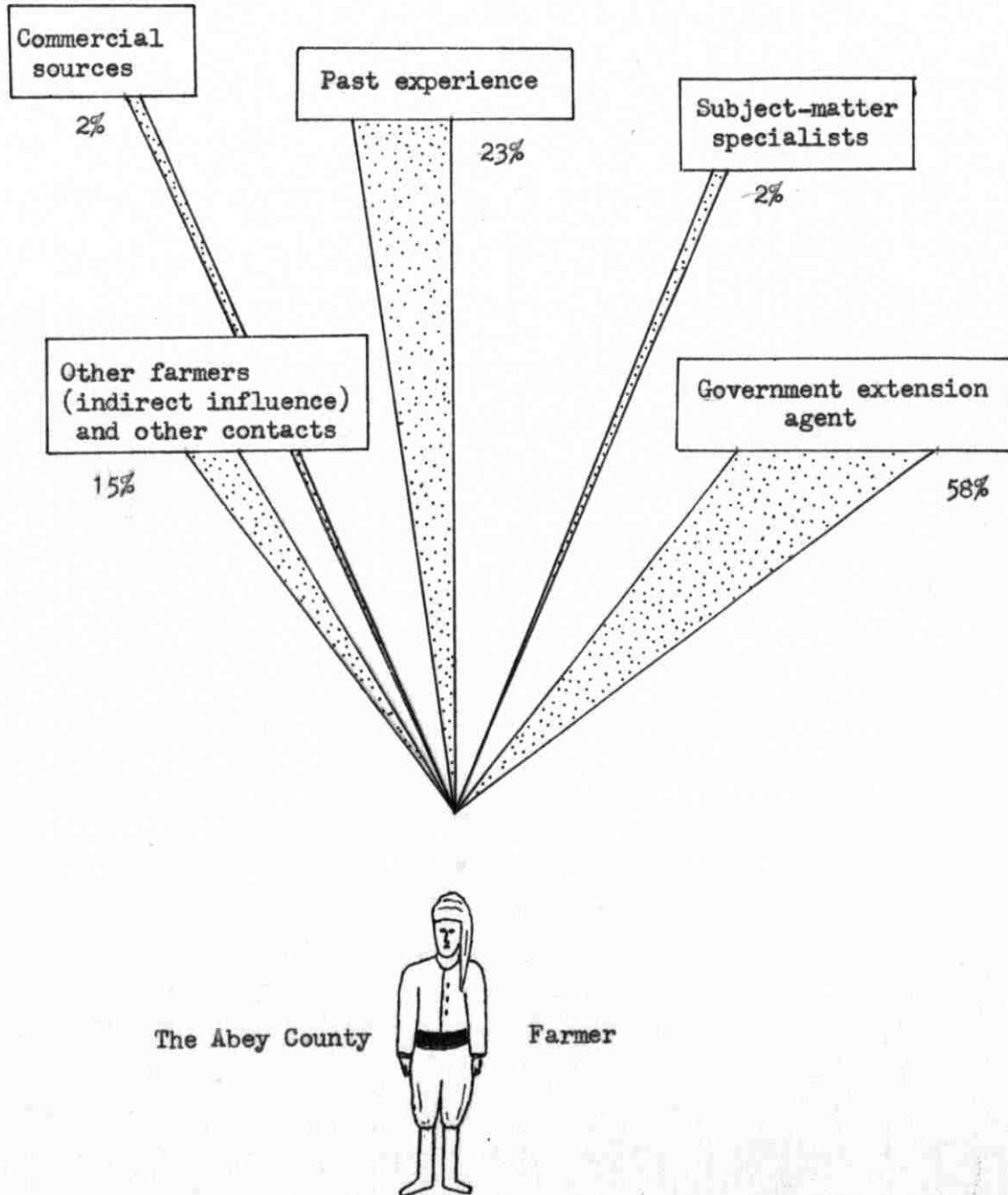


Figure 3. How farmers obtain information on agricultural matters.

they performed each of the four above-mentioned practices. Those who followed the practices as recommended by the government extension agent were considered adopters.

The data in Table 11 show a wide variation in acceptance or adoption of the recommended practices. That was partially due to the unique characteristics of the individual practices and other related factors that will be discussed later. Four fifths of the sample population pruned in the proper manner. Three fourths used the proper rate and combination of fertilizer, and over one half applied it in the proper time. Only one fourth of the olive growers interviewed controlled their olive trees against the commonly encountered diseases. Treatment of olive leaf spot was practically not adopted. A comparison could be made here between adoption of olive leaf spot treatment and proper pruning method. It was found that a very high percentage (80%) of the respondents adopted the latter while only two percent treated their crops against olive leaf spot disease. This is because pruning is an inexpensive and simple practice, and successful results in production are quickly seen, whereas control of olive leaf spot disease is costly, needs some equipment and technical know how, and results are not immediate.

a comparison between the rate of adoption of different practices applied on olive trees is illustrated in Figure 4.

#### Sources of Information

Table 12 shows the sources of information effective in extending to the farmer respondents the recommended practices on olive production. The indirect influence was the most important source of information in effecting technical change. Farmers tended to learn from some of their

Table 11. Rate of adoption of recommended practices on olives followed by 160 farmers.

<u>Recommended practices</u>	<u>Adopters of recommended practices</u>	
	<u>Number</u>	<u>Percent</u>
Proper rate of fertilizer	119	74
Proper time of fertilization	87	54
Proper pruning	131	82
Pest control	39	24
Treatment of olive leaf spot	3	2
Treatment of olive fruit fly	39	24

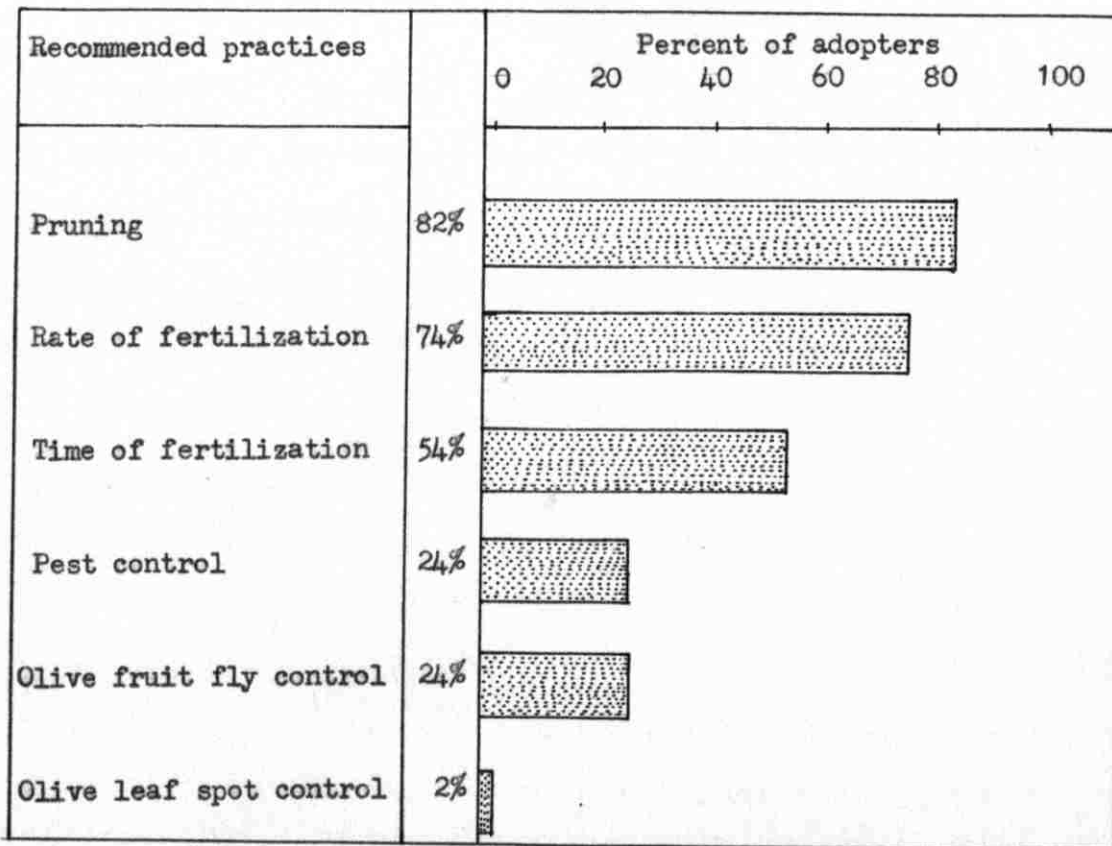


Figure 4. Percentage of farmers adopting recommended practices for olive production.

family members, friends and neighbors about the improved practices. In another study conducted in Lebanon, Al-Haj (1968, pp 18) found similar results. "Indirect influence", which is defined as the ability of extension or any other out-of-school educational agency to reach the masses of farmers, and spread technical change through their own influential lay leaders, was the most frequently cited reference source of information. This has a definite implication for extension. The extension agent should work closely with the lay leaders and influentials in the community who in turn would influence the community members to adopt the recommended practices.

For pest control, the government extension agent was the most important source of information, and this is, probably, because pest control is a new practice, it needs technical information which fellow farmers will not be in a position to give. Though the total number of adopters of the olive fruit fly treatment was only 37, 68% learned about it from the government extension agent, compared to two percent from indirect influence. Results on treatment of olive leaf spot seem to follow the same trend, but the number of adopters was so small that no conclusion could be drawn.

The fertilizer agent was important only in the case of fertilization practices, and this is where they tend to influence farmers to use their commercial product, and, probably, at a rate which helps them sell a large part of it, irrespective of the volume of outcome in yield.

#### Effective Extension Teaching Methods

It was hypothesized that demonstrations are the most effective extension teaching methods since they appeal to all the human senses.

Table 12. Relative importance of sources of information as indicated by adopters of recommended practices on olives.

Source of information	- Rate of fertilizer		Time of application		Pruning		Treatment of olive leaf spot		Treatment of olive fruit fly			
	No.	% rank	No.	% rank	No.	% rank	No.	% rank	No.	% rank		
Government extension agent	40	33	2	36	32	2	30	22	2	25	68	1
Subject-matter specialist	0	0	-	2	2	-	3	2	3	3	8	-
Fertilizer agent	34	28	3	24	22	3	0	0	-	3	8	-
Dealers and merchants	1	1	-	0	0	-	0	0	-	0	0	-
Family, friends (Indirect influence)	43	37	1	47	43	1	104	76	1	4	11	2
Other	1	1	-	1	1	-	0	0	-	2	5	-
Total	119	100	-	110	100	-	137	100	-	37	100	-



The data in Table 13 support the hypothesis. Farmers learned about the rate of fertilization and proper methods of pruning through the demonstrations conducted. Forty-two percent of the total adopters of proper rate of fertilization practice learned through demonstrations conducted in their local area and 52% pruned properly after attending pruning demonstrations. This was in contrast to the effectiveness of the farm and home visits in influencing the adoption of the two above mentioned practices, where only 31% were influenced to apply the proper rate of fertilizer and 33% to prune in the recommended manner. Demonstrations were effective when farmers needed to see the correct technique of applying the desired practices.

As for fertilizing at the proper time and controlling the pests on the trees, the farm and home visits ranked first in effectiveness. The extension agent who needs to convince the farmers to apply fertilizers at the proper time and control the pests on their trees, does so when personally visiting them in their homes or farms, rather than with a group in a demonstration. Thirty-nine percent of the olive growers interviewed were convinced with the value of applying fertilizers in the proper season compared to 31% who were influenced by demonstrations. Sixty-seven percent learned about pest control through personal visits with the extension agent, and only 33% learned about it through demonstrations.

One possible explanation to the effectiveness of the farm and home visits and demonstrations as teaching methods is that the extension agent spends more time and effort on them. The total influence of a particular method of teaching may be large because of the emphasis placed

Table 13. Extension teaching methods effective in applying the recommended practices.

Methods used	Rate of fertilizer			Time of application			Pruning			Treatment of olive leaf spot		
	No.	%	Rank	No.	%	Rank	No.	%	Rank	No.	%	Rank
Office calls	4	9	4	3	8	4	0	0	-	0	0	-
Farm and home visits	13	31	2	15	39	1	11	33	2	2	67	1
Group meetings	7	16	3	8	21	3	5	15	3	0	0	-
Demonstrations	18	42	1	12	31	2	17	52	1	1	33	2
Farm radio program	1	2	5	0	0	-	0	0	-	0	0	-
Publications	0	0	-	0	0	-	0	0	-	0	0	-
<b>Total</b>	<b>43</b>	<b>100</b>	<b>-</b>	<b>38</b>	<b>100</b>	<b>-</b>	<b>33</b>	<b>100</b>	<b>-</b>	<b>3</b>	<b>100</b>	<b>-</b>

upon it in the extension teaching plan. Meetings were also an important teaching method. The extension agent should then try to find ways and means to make his visits and demonstrations more effective, to meet the farmers' needs, and to influence the largest number of them possible.

#### Attitude Toward the Recommended Practices

The respondents were asked to express their future plans with regard to the adopted practices.

Almost one half of the adopters will surely continue to fertilize their trees, using the proper rate and applying fertilizer in the proper time. An equal percentage will not adopt or continue to use the fertilization practice. Reasons for such an attitude will be discussed in the next section.

As to the pruning practice, 82% will continue to prune, as recommended and 18% are not willing to adopt the practice.

Eighty-one percent of the population will not adopt the pest control practice and some of those who have adopted it will stop using it. Only 18% will continue to use the practice as suggested. This information is shown in Table 14.

Table 14. Attitude of the respondents towards continuance of the recommended practices.

<u>Attitude toward continuing the practice</u>	<u>Fertilization</u>		<u>Pruning</u>		<u>Pest control</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Surely	78	49	131	82	29	18
Maybe	3	2	-	-	2	1
No	79	49	29	18	129	81
Total	160	100	160	100	160	100

The attitudes of the interviewees differed with the individual practices, and this is attributed to the different characteristics and nature of the practices, as well as their requirements for adoption.

#### Reasons for Non-adoption or Discontinuance of the Recommended Practices

The respondents were asked to indicate reasons for not adopting or not continuing the application of the improved practices recommended by the extension agent. The results of those questions are indicated in Table 15, which shows that one half dropped the fertilization practice because the results were not convincing. This could be due to two reasons:

1. The greatest number of farmers followed the instructions of their family members, neighbors and friends, who in turn may not have known the proper method of fertilization, and hence produced unsuccessful results. Personal experience was also highly depended on, and this is a cause of dissatisfaction, because the farmers themselves did not have the technical know-how of fertilization.
2. Farmers who used the proper rate of fertilizer applied it at the wrong time, and therefore, results were disappointing, yields were lower than expected.

One fourth of the sample did not fertilize in the recommended manner because they lacked the necessary technical information. One possible reason to be mentioned here is that the extension agent was not able to reach all the individuals in the village, and should emphasize more group contacts rather than individual contacts to reach as great a number of the farmers as possible.

Table 15. Reasons for non-adoption or discontinuance of the application of recommended practices as listed by the respondents.

<u>Reasons for dis- continuance or non-adoption</u>	<u>Fertilization</u>		<u>Pruning</u>		<u>Pest control</u>	
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>
Lack of information	19	24	7	24	19	16
Informed but not convinced	42	51	7	24	11	9
No facilities	7	9	5	17	62	50
Too expensive	9	11	4	14	13	11
Have animal manure	4	5	-	-	-	-
Carelessness	-	-	3	10	13	11
No markets	-	-	3	11	4	3
Total	81	100	29	100	122	100

Lack of information about the proper pruning practice was also the main reason for not adopting the practice. Twenty-four percent of the respondents indicated that as the reason when answering the question, and an equal percentage had the necessary information but was not convinced of its effectiveness.

Twenty-nine percent of the population who will not adopt or will discontinue the pest control practice claimed the lack of facilities to be the main reason. They expressed their needs for more help from the government in terms of supplying them with sprayers, pesticides, and conducting a mass spraying program by helicopter planes, if possible, as it is the case in other parts of the country.

The extension agent should work closely with the people or their representatives or lay leaders, discuss their needs and problems, and try as much as possible to overcome the factors that lead to rejection

or discontinuance of the recommended methods he preaches. No doubt some farmers were careless, as shown in Table 15, but those were few, and could also be stimulated in various ways, especially through the expected and potential economic incentives.

Association Between Selected Independent Variables  
and the Respondents' Behavior in Adoption

This section of the study deals with the analysis of possible relationships between selected independent variables and the adoption pattern by farmers of recommended practices. The independent variables were:

1. Experience in farming.
2. Age.
3. Education.
4. Land tenure.
5. Farm income.
6. Size of farm.
7. Contacts with the government extension agent.
8. Degree of satisfaction with the services rendered by the Government Extension Service.

Percentage distributions, chi squares  $X^2$  and the corrected contingency coefficients  $C$  were used to determine significance and strength of relationship between the variables.

Chi squares are used to study whether or not a relationship exists, and that this relationship is significant. The existence of a significant relationship does not necessarily indicate the strength of the relationship, thus, the corrected contingency coefficient was used.

Its computation is based on chi square. McCormick (1941, p 207) states that "The coefficient of contingency C has the defect that it understates the amount of correlation actually present in inverse proportion to the number of cells in the table. It is possible to correct C to some extent for the above weakness by using the corrected contingency coefficient  $\bar{C}$ ".

The percentage distribution shows the direction of the relationship or association between the selected independent variables and the adoption behavior. The computed chi squares and corrected contingency coefficients are shown in Table 16, and percentage distributions are shown in Appendix B, Tables 1 through 32.

#### Experience in Farming

It was hypothesized that farmers with more farming experience tend to be slower in adopting new practices than those with less farming experience.

Considering the adoption of the four recommended practices, Table 16 shows that there was no significant relationship between the respondents' years of experience in farming and their adoption behavior. The hypothesis was thus rejected.

Experience in farming could be associated with age of the farmers, since usually older farmers tend to have more experience and tend to be less inclined to change the cultural practices that he has learned and practiced for so many years.

#### Age

The hypothesis stated that there is an inverse relationship between the age of the farmers and the rate of adoption of improved

practices. Table 16 shows no significant relationship. Among the sample population in this study, there was an almost equal distribution of age groups, and no matter whether the farmers were young or old, the same pattern of adoption was encountered. Younger farmers were more introduced or exposed to innovations than older ones, but many of them go to town for jobs and don't care much about agriculture. Older farmers on the other hand, though their activity decreases with age, stay on their land and with the help of some of their family members get information about improved practices and try to apply them.

Since, as has been previously discussed, the age factor cannot be isolated and studied, keeping all other factors constant, because adoption is the result of an interrelationship of a series of static and dynamic factors affecting the adoption process, being a communication process.

### Education

It was assumed that education is positively related to the adoption pattern of recommended practices. Table 16 shows that there is a significant relationship between the level of education of the respondent and the adoption of the proper fertilization practice in terms of proper rate and time of application. Appendix B, Table 9, shows that there was an increase in the number of respondents with elementary and secondary education who use the recommended practices. Farmers with elementary education showed highest adoption of the "rate of fertilization" practice while those with secondary education, fertilized more at the right time.

There was no significant relationship between education and the pruning or pest control practice. This is because factors affecting



the practice introduced should also be considered. Table 9 in Appendix B shows that 55% and 63% of the respondents with elementary education applied the "recommended" and "accepted" formulae of fertilization respectively, while only 12% and 14% of the illiterates applied the same.

As to applying fertilizers at the proper time, Table 10, Appendix B shows that the percentage of respondents applying fertilizers at the proper time increased with an increase in educational level.

Again, it is necessary to emphasize that education, like any other factor studied, is not the only factor affecting adoption. The extension teaching methods used, the teacher himself, the nature of the practice, as well as other factors lead to the adoption of one practice and cause the rejection or discontinuance of another.

#### Land Tenure

Table 16 shows the results of the test of the hypothesis which states that whether the farmer owns or rents the farm on which he lives has little bearing upon the extent of use of extension information.

The only significant association found with land tenure was the control of pests on olive trees, which was significant at the 5% level, as shown in Table 16. This shows that there was some relationship between the land tenancy status and the adoption of certain recommended practices. Table 16 in Appendix B shows the strong direction of the relationship, in that there is a vast difference between the adoption behavior of an owner-operator and a tenant. The difference may not have been that significant if an equal representation of the two categories was considered in the sample. A practice like pest control, which requires

money, equipment, and technical knowledge, needs the authority and, possibly, the financial support from the land-owner.

### Farm Income

The hypothesis stated that there is a direct relationship between the amount of income derived from farming and the receptivity of farmers towards the adoption of recommended practices.

This hypothesis was rejected according to the chi square figure in Table 16. There was no significant difference between farmers who depended to a great extent on income from farming and those who depended very little on it and their adoption behavior.

The area from which the sample was drawn was characterized by part-time farming, and a little over one half of the population interviewed depended mainly on their income from non-agricultural jobs. Apparently, a variable that could be suggested here to have some bearing on the adoption of recommended practices is the total income, irrespective of its source, particularly for those practices which involve some capital. Reasons other than financial could also be attributed, and therefore, further investigations could be done to find those out.

### Size of Farm

The size of farm should indirectly give an idea about the income derived from farming, and directly would suggest the kind of operations needed on the farm and the benefits received from adopting improved techniques in agriculture. In one practice, applying fertilizers at the right time, there was a significant association between the size of the farm a farmer operates and the recommended practice. The direction of

this association is seen in Table 22 of Appendix B, where 44% of the large-size-farm-operators applied fertilizers at the right time, compared to only nine percent who operated a small-size farm.

The hypothesis, that operators of larger farms are generally more receptive to improved methods of agriculture, was supported by the data.

#### Contacts with Government Extension Agent

It was assumed that farmers who had any kind of contact with the government extension agent would be more willing to adopt recommended practices and techniques. Government extension agents are expected to carry to the farmers results of various research carried out by subject-matter specialists regarding improved agricultural practices, and also results furnished by local demonstrations. Since their job is educational in nature, they are also expected to use those means and methods that would influence the farmers most, more than any other information source, and be most objective in wanting to help farmers help themselves with no personal advantage or benefit. This was probably the reason behind the confirmation of the hypothesis which stated that farmers who have contacts with the government extension agent tend to be more receptive to applying the recommended practices. The figures in Table 16 show a significant relationship between applying fertilizers at the proper rate and time and the presence of contact with the government extension agent.

Pruning, however, showed no significance, because the practice may not need much technical skill, and most of the farmers learned to prune from their ancestors and the heavy snow attack in the area in 1929. Tables 25, 26, and 28 in Appendix B show that there was a positive significant difference between those who had some kind of contact with the government extension agent and those who had none in terms of the adoption

Table 16. Association between independent variables and recommended practices followed.

Independent variables	Rate of fertilization		Time of application of fertilizers	
	$\chi^2$	d.f.	$\bar{C}$	$\bar{C}$
5 experience in farming	3.8580	8	0.1929	10.0512
6 age	7.4301	8	0.2648	1.5287
7 education	8.2783*	4	0.3060	16.8882**
8 land tenure	0.1125	2	0.0394	0.7521
9 farm income	5.1628	6	0.2291	9.1474
10 size of farm	7.7366	6	0.2782	13.6826*
12 contact with government extension agent	9.8439**	2	0.3575	7.7494*
46 satisfaction with the extension services	5.4766	4	0.2511	11.9254*
	T.N = 154			T.N = 153

\* significant at 0.05 level

\*\* significant at 0.01 level

Table 16. (Continued)

Independent variables	Proper pruning		Pest control	
	$\chi^2$	d.f.	$\chi^2$	d.f.
5 experience in farming	3.8632	4	15.3570	12
6 age	2.1501	4	14.6559	12
7 education	3.2431	2	0.7433	6
8 land tenure	0.0507	1	7.3705*	3
9 farm income	2.2406	3	10.4318	9
10 size of farm	0.8135	3	4.1680	9
12 contact with government extension agent	0.4988	1	4.4261	3
46 satisfaction with the extension services	2.3591	2	12.2174*	6
	T.N = 144		T.N = 160	

\* significant at 0.05 level

of the selected recommended practices.

Degree of Satisfaction with the Services Rendered by the Extension Organization

Respondents who were fairly satisfied with the services rendered by the Extension Organization tended to apply the fertilizers at the proper time, adopt the proper pruning technique, and control the pests. This can be shown in Appendix B, Tables 30, 31 and 32.

Chi square and corrected contingency coefficient figures in Table 16 show a significant relationship between farmers' degree of satisfaction with the Extension Organization and the application of fertilizers at the recommended time, and controlling the pests on their olive trees.

Farmers' Self-Expressed Needs and Self-Expected Responsibility as Government Extension Agent

The last two questions in the interview schedule dealt with farmers' self-expressed needs, and what services would they render to other farmers if they themselves held the position of the government extension agent.

Among the most commonly desired service is the provision of pest control facilities. Farmers need sprayers, pesticides, help from the government in terms of a mass spraying program by helicopter planes.

They wanted more efforts on the part of the government extension agent, that is, use more teaching methods, demonstrations, group meetings, more frequent personal visits, radio programs, and some go as far as asking for personal help from the agent or at least from hired workers that he should bring with him. They wanted more visits by the subject-

matter specialists as well as more technical advice. The extension agent should concentrate on a smaller number of villages and on more work in those villages. In their opinion, the government should hire more extension workers, and divide the responsibility among all, in order for the results of improvements to be quick. If farmers were influenced to adopt the recommended practices they refrain from that partly because of the cost involved in the practices recommended and partly, because of the inavailability of marketing facilities. "Why doesn't the government stop the import of vegetable oils and use our olive oil?" This was an answer to the question given by 49 respondents and was a common comment made when they were asked about reasons for not adopting or discontinuing the use of certain practices.

To overcome many of those problems encountered, about one fourth of the respondents asked for the establishment of a cooperative. They also asked for more intensive research to be carried out in the area in soil analysis, and determination of suitable crops, and suitable varieties to be grown in the area, and some healthy tree transplantings to be provided. The importance of, and need for irrigation canals, opening of agricultural roads that can reach their land, and tractors and machinery were not overlooked by many of the respondents.

As to the services they would render to fellow farmers if they were in the extension agent's position, the same items were asked for, but given a different degree of importance. Here, the respondents probably had in mind the fact that some things cannot be easily provided by the extension agent as they think, and they therefore "may" do it for their fellow farmers "if" they could. This is shown in Table 17.

Table 17. The respondents self-expressed needs and their perception of the "ideal" role of the extension agent.

<u>Items</u>	<u>Self-expressed needs</u>		<u>Self-expected responsibility</u>	
	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Pest control facilities	100	63	61	38
More extension teaching	60	38	106	66
Fertilization facilities	54	34	25	16
Marketing facilities	49	31	34	21
Agricultural research	32	20	13	8
Establishment of cooperatives	23	14	22	14
Building of roads and irrigation facilities	21	13	16	10
Farm machinery	9	6	9	6



## V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

### Summary

The purpose of this study was to determine the effectiveness of the Extension program and the various extension teaching methods on the rate of adoption of some agricultural practices in Abey county of Mount Lebanon. Identification of the most important sources of information for effecting technical change among farmers, was one of the specific objectives of the study.

The research design was patterned after the Evaluation study conducted by Al-Haj, in 1968, to allow for some comparison in the findings in order to strengthen the generalizations on the results.

The field survey was conducted in eight villages in Abey county and a ninth in a neighboring county with 160 olive growers selected at random. Respondents selected should hold an olive growing area of at least three dunums and the majority of them should have had some personal contacts with the extension agent.

The four practices on which the rate of adoption was judged were (1) applying the proper rate of fertilizers to the olive trees, and (2) at the right time, (3) pruning the olive trees, and (4) controlling the pests.

To determine possible associations between selected independent variables and the respondents' adoption pattern of the olive-growing practices,  $\chi^2$  and  $\bar{C}$  were computed.

The majority of the farmers interviewed had 20 years or less of farming experience, fell in the age-group of 46-65 years, and had elementary education. They owned the farm which they were operating, and derived only up to one fourth of their income from agriculture.

✓ Their degree of satisfaction with the Extension Organization was little.

✓ Fifty-eight percent of the interviewees mentioned the extension agent being the most commonly consulted person regarding general agricultural matters. They contacted him mostly through farm and home visits.

Pruning practices were adopted by almost everyone. One half to three fourths fertilized in the recommended manner, but very few controlled the pests on the trees. The government extension agent and the indirect influence were most important in effecting change. Demonstrations and farm and home visits were most effective.

All the respondents were willing to prune as recommended, but many of them were reluctant to fertilize, and even refuse to control the pests. Farmers were not convinced of the relative profitability of the practices, and lacked the facilities.

In studying the relationship between the selected independent variables and the recommended practices, it was found that age, experience in farming and percent of income derived from agriculture had no bearing on the rate of adoption of recommended practices. On the other hand, farmers with some degree of education, and owners of a relatively large-  
✓ size farm who are in contact with the government extension agent and who are fairly satisfied with the Extension Service, tended to adopt some of the improved techniques in agriculture. The freely expressed needs by the respondents consisted of additional spraying and fertilization facilities, increased help from the extension agent, and a solution to

the marketing problems they face.

### Conclusions

The following conclusions were drawn as a result of analysis of the data collected based on the hypotheses made at the beginning of the study.

1. No significant relationship was found between the age of the farmer and the adoption of recommended practices.
- ✓ 2. Farmers with more educational training tended to adopt new practices faster than those with low or no educational background.
- ✓ 3. A significant relationship was found between the size of farm the olive growers operated and the adoption of improved practices. However, no such association was present between the income derived from farming and the application of modern technology.
- ✓ 4. Land tenure status of the farm-operator affected his pattern of adoption.
- ✓ 5. Farmers who were satisfied with the services rendered by the Extension Organization tended to adopt more practices than those who were not satisfied.
6. There was no significant relationship between years of farming experience and practicing improved techniques in olive production.
7. The extension agent was the most important source of information regarding general agricultural matters. For the olive growing practices, "indirect influence" and the extension agent were most important.
8. The farm and home visits and the demonstrations conducted proved

- ✓ to be the most effective teaching methods in disseminating to the farmers improved knowledge on olive production.
- ✓ 9. Contacts with the extension agent were significantly related to the adoption of improved techniques.

### Recommendations

Based on the data collected from this research study, the following suggestions could be recommended:

The adoption process is a complex process involving an inter-relationship of factors. Adoption could be studied in terms of the different stages, and the extension teaching methods most effective at each stage. Farmers could have been classified in the adopter categories, and their characteristics studied in terms of their adoption behavior.

The extension teaching methods in this research were studied in terms of their effectiveness in influencing people to make the desired changes in the respondents to adopt improved technology. In addition, the effectiveness of the extension teaching methods could be investigated based on the amount of teaching expended, their relative cost, and their index of effectiveness.

It is suggested that total income be considered in adoption studies, and also some dynamic variables like farmers' participation in organizations, their degree of understanding of the philosophy and purpose of extension, their desire to have high school or college education for their children.

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APPENDICES

## APPENDIX A

### Instruction Sheet

Note to the interviewer: Please read carefully the instruction sheet and the questionnaire more than one time in order to understand every point illustrated in them, before you start your work.

This is a purely scientific study; its success depends fully on the accuracy of the work which will be done by you.

The general purpose of this study is to determine the effectiveness of the extension program and the various extension teaching methods on the rate of adoption of some agricultural practices in Abey county of Mount Lebanon. The result of this study is hoped to render valuable contribution to the improvement in the selection and use of the various extension teaching methods effecting technical change.

You are urged to read carefully the following instruction items before you start your interviews with the respondents.

#### Introducing yourself and the purpose of your study

Although you can introduce yourself to the people in any manner you desire, it is recommended that you follow the same pattern with all the respondents.

I am           (your name)           . I am helping in the collection of data for a study as a partial fulfillment for a Master's degree if properly done, it would provide us with valuable suggestions in planning the extension program with the people of this area in a way that would be more efficient and helpful to you. Therefore, we would like to get information about what olive growers think and suggest about the practices applied to olive trees and the teaching methods used by the extension staff.

It must be pointed out that your information will be kept strictly confidential and that this study has no relationship to government helps, legislation, regulations or taxation. It is meant to give us better direction on how to help you better.

Since it is practically impossible to go to every farmer, we had to choose a small number of farmers to talk with. We are fortunate to have you among the farmers who were selected to help us in this study. I would like to have your frank and honest opinion and ideas about some questions that I believe you will find interesting.

### Filling out the interview schedule

Before you start with your questions, be sure that the respondent understands the purpose of the interview and he is in a favorable mood to cooperate with you. If you notice that he is not interested, or is too busy at the present time, do not insist on interviewing him.

Use always the Arabic version for the interview schedule in order to maintain uniformity with all respondents as to the structure of each question.

Read the questions with the same voice tone without giving any emphasis or signs on one choice over others of the same question.

Read the whole question before the respondent indicates his answer and reread the question slowly and over if needed.

If the farmer does not understand the question, try to restate in a simpler form without changing the meaning.

When each interview is completed and the respondent is complimented for his cooperation, please indicate to him that upon completion of the report on this study the results will be made available to people in the area and/or discussed with them in groups.

Note: If you (the interviewer) encounter any difficulty or problem in conducting the interviews, please report it and/or discuss it immediately with:

Fawzi M. Al-Haj  
FAS-AUB - Beirut

Interview Schedule for Relative Effectiveness of  
Various Extension Methods and Programs in  
Abey Area of Mount Lebanon  
Section I - Face Date

<u>Column No.</u>	<u>Code</u>	
		1. Name of respondent _____
1, 2, 3	( )	2. Number of respondent
4	( )	3. Village
		1 _____ Aynab
		2 _____ Ayn Enoub
		3 _____ Bshamoun
		4 _____ Dakkoun
		5 _____ Bennay
		6 _____ Fsakin
		7 _____ Rimhala
		8 _____ Shwayfat
		9 _____ Baysoor
5	( )	4. How long have you been farming ? _____ years.
6	( )	5. What is your age now ? _____ years.
7	( )	6. What is your educational level ?
		1 _____ Illiterate
		2 _____ Elementary education
		3 _____ Secondary education and/or above



Column No.Code

- 1 \_\_\_\_\_ Government extension agent  
 2 \_\_\_\_\_ Subject matter specialists  
 3 \_\_\_\_\_ Merchant from whom you purchased your seeds, fertilizers, etc. and/or dealer to whom you sell your product  
 4 \_\_\_\_\_ Family, neighbors and/or friends  
 5 \_\_\_\_\_ Nobody  
 6 \_\_\_\_\_ Others, who ? \_\_\_\_\_

14, 15

( )

13. What kind of contacts do you have with the government extension agent ?

- 1 \_\_\_\_\_ Office calls  
 2 \_\_\_\_\_ Farm and home visits  
 4 \_\_\_\_\_ Farmers' group meetings  
 8 \_\_\_\_\_ Demonstrations (method and result)  
 16 \_\_\_\_\_ Farm radio program  
 32 \_\_\_\_\_ Bulletins, pamphlets and publications  
 64 \_\_\_\_\_ None

16

( )

14. What kind of contact did you have most with the government extension agent ?

- 1 \_\_\_\_\_ Office calls  
 2 \_\_\_\_\_ Farm and home visits  
 3 \_\_\_\_\_ Farmers' group meetings  
 4 \_\_\_\_\_ Demonstrations (method and result)  
 5 \_\_\_\_\_ Farm radio program  
 6 \_\_\_\_\_ Bulletins, pamphlets and publications

- | <u>Column No.</u> | <u>Code</u> |   |
|-------------------|-------------|---|
|                   |             | 7 _____ Other, what ? _____   |
| 17                | ( )         | 15. Do you have any cooperative or a supplement to a cooperative in your village ?              |
|                   |             | 1 _____ Yes   |
|                   |             | 2 _____ No  |
| 18                | ( )         | 16. Are you a member of it ?  |
|                   |             | 1 _____ Yes   |
|                   |             | 2 _____ No  |
| 19, 20            | ( )         | 17. What, in your opinion, is the purpose of the cooperative, or in what way does it help you ? |
|                   |             | 1 _____ Helps in selling your product   |
|                   |             | 2 _____ Sale center for pesticides, seeds, fertilizers, etc. at cost price                      |
|                   |             | 4 _____ Avoids the interference of a middleman  |
|                   |             | 8 _____ Lends you money, seeds, fertilizers with little or no interest                          |
|                   |             | 16 _____ Other, what ? _____  |

Section II - Adoption Data

Olive trees

- |    |     |  |
|----|-----|--|
| 21 | ( ) | 18. How many dunums do you have planted with olive trees ? |
|    |     | _____ dunums   |
| 22 | ( ) | 19. Do you use any fertilizer for your trees ?             |
|    |     | 1 _____ Yes  |
|    |     | 2 _____ No   |

- | <u>Column No.</u> | <u>Code</u> |   |
|-------------------|-------------|---|
| 23                | ( )         | 20. What kind of fertilizer do you apply for your trees ? ( <u>Check only one</u> )   |
|                   |             | 1 _____ Pure ammonium sulfate   |
|                   |             | 2 _____ Animal manure   |
|                   |             | 3 _____ Recommended amount of 3 kg ammonium sulfate, 2 kg super-phosphate and 1 kg potassium chloride per tree mixed by the farmer                                      |
|                   |             | 4 _____ Commercial ready mixed fertilizer having similar proportion of components as in alternate 2   |
|                   |             | 5 _____ Other, what ? _____   |
| 24                | ( )         | 21. If alternate 2 or 3 is followed, then from whom did you hear about it ? ( <u>Check only one</u> )   |
|                   |             | 1 _____ Government extension agent  |
|                   |             | 2 _____ Subject matter specialist   |
|                   |             | 3 _____ Fertilizer agent  |
|                   |             | 4 _____ Dealer to whom you sell product   |
|                   |             | 5 _____ Family, neighbors and/or friends  |
|                   |             | 6 _____ Other, who ? _____  |
| 25                | ( )         | 22. If your source of information was the extension agent or the subject matter specialist, then through what method did you learn about it ? ( <u>Check only one</u> ) |
|                   |             | 1 _____ Office calls  |
|                   |             | 2 _____ Farm and home visits  |
|                   |             | 3 _____ Farmers' group meetings   |
|                   |             | 4 _____ Demonstrations (method and result)  |



Column No.Code

- 5 \_\_\_\_\_ Farm radio program
- 6 \_\_\_\_\_ Bulletins, pamphlets and publications
- 7 \_\_\_\_\_ Other, what ? \_\_\_\_\_
- 26 ( ) 23. As for the time of application of the fertilizer, when do you apply it ?
- 1 \_\_\_\_\_ All at one time in February
- 2 \_\_\_\_\_ All in November and December
- 3 \_\_\_\_\_ Mainly in November and December and the balance of nitrogen in February
- 4 \_\_\_\_\_ Other, when ? \_\_\_\_\_
- 27 ( ) 24. If you apply it as in alternates 2 or 3, then from whom did you hear about it ? (Check only one)
- 1 \_\_\_\_\_ Government extension agent
- 2 \_\_\_\_\_ Subject matter specialist
- 3 \_\_\_\_\_ Fertilizer agent
- 4 \_\_\_\_\_ Dealer to whom you sell product
- 5 \_\_\_\_\_ Family, neighbors and/or friends
- 6 \_\_\_\_\_ Other, who ? \_\_\_\_\_
- 28 ( ) 25. If alternates 1 or 2 were your choice, then through what method did you learn about it ? (Check only one)
- 1 \_\_\_\_\_ Office calls
- 2 \_\_\_\_\_ Farm and home visits
- 3 \_\_\_\_\_ Farmers' group meetings
- 4 \_\_\_\_\_ Demonstrations (method and result)

- | <u>Column No.</u> | <u>Code</u> |   |
|-------------------|-------------|---|
|                   |             | 5 _____ Farm radio program  |
|                   |             | 6 _____ Bulletins, pamphlets,<br>publications   |
|                   |             | 7 _____ Other, what ? _____   |
| 29                | ( )         | 26. Will you continue to fertilize your<br>olive trees in the same manner as<br>recommended ?               |
|                   |             | 1 _____ Surely  |
|                   |             | 2 _____ Maybe   |
|                   |             | 3 _____ No  |
| 30                | ( )         | 27. If you don't fertilize or you continue<br>to use the local practice, then it is<br>because              |
|                   |             | 1 _____ You lack information about<br>the proper method   |
|                   |             | 2 _____ You are informed but not con-<br>vinced   |
|                   |             | 3 _____ You are informed and con-<br>vinced, but not able to apply<br>it because of lack of faci-<br>lities |
|                   |             | 4 _____ Treatment is too expensive  |
|                   |             | 5 _____ Other, what ? _____   |
| 31                | ( )         | 28. Do you prune your olive trees ?   |
|                   |             | 1 _____ Yes   |
|                   |             | 2 _____ No  |
| 32                | ( )         | 29. If yes, then the way you do it is that<br>you   |
|                   |             | 1 _____ Cut at once all the big<br>branches with the small ones<br>on them                                  |
|                   |             | 2 _____ Cut a branch each year for 3<br>years and leave the small   |

Column No.Code

branches on the big ones

3 \_\_\_\_\_ Other, how ? \_\_\_\_\_

33

( )

30. If you use the method 2, then from whom did you hear about it ? (Check only one)

1 \_\_\_\_\_ Government extension agent

2 \_\_\_\_\_ Subject matter specialist

3 \_\_\_\_\_ Fertilizer agent and/or dealer to whom you sell your product

4 \_\_\_\_\_ Family, neighbors and/or friends

5 \_\_\_\_\_ Other, who ? \_\_\_\_\_

34

( )

31. If your source of information was 1 or 2, then through what method did you learn about it ? (Check only one)

1 \_\_\_\_\_ Office calls

2 \_\_\_\_\_ Farm and home visits

3 \_\_\_\_\_ Farmers' group meetings

4 \_\_\_\_\_ Demonstrations (method and result)

5 \_\_\_\_\_ Farm radio program

6 \_\_\_\_\_ Bulletins, pamphlets, publications

7 \_\_\_\_\_ Other, what ? \_\_\_\_\_

35

( )

32. Will you continue to prune your olive trees as recommended ?

1 \_\_\_\_\_ Surely

2 \_\_\_\_\_ Maybe

3 \_\_\_\_\_ No

Column No.Code

36

( )

33. If no, then it is because

- 1 \_\_\_\_\_ You lack information about the proper method
- 2 \_\_\_\_\_ You are informed but not convinced
- 3 \_\_\_\_\_ You are informed and convinced, but not able to apply it because of lack of facilities
- 4 \_\_\_\_\_ Treatment is too expensive
- 5 \_\_\_\_\_ Other, what ? \_\_\_\_\_

37

( )

34. Do you take any measures in controlling diseases and insects on your olive trees ?

- 1 \_\_\_\_\_ Regularly
- 2 \_\_\_\_\_ Sometimes
- 3 \_\_\_\_\_ When needed only
- 4 \_\_\_\_\_ Never

38

( )

35. If yes, then what are the diseases and/or insects you most commonly encounter ?

- 1 \_\_\_\_\_ Olive leaf spot
- 2 \_\_\_\_\_ Olive fruit fly
- 3 \_\_\_\_\_ Both
- 4 \_\_\_\_\_ Other, what ? \_\_\_\_\_

39

( )

36. For the olive leaf spot disease, you

- 1 \_\_\_\_\_ Spray in February with copper-oxy-chloride
- 2 \_\_\_\_\_ Don't do anything
- 3 \_\_\_\_\_ Other, what ? \_\_\_\_\_

- | <u>Column No.</u> | <u>Code</u> |  |
|-------------------|-------------|--|
| 40                | ( )         | <p>37. If your answer was alternate 1, then from whom did you learn about it ?<br/>(<u>Check only one</u>)</p> <p>1 _____ Government extension agent</p> <p>2 _____ Subject matter specialist</p> <p>3 _____ Fertilizer and/or pesticide agent, dealer to whom you sell product, etc.</p> <p>4 _____ Family, neighbors and/or friends</p> <p>5 _____ Other, who ? _____</p>                |
| 41                | ( )         | <p>38. If your source of information was alternate 1 or 2, then through what method did you learn about it ?<br/>(<u>Check only one</u>)</p> <p>1 _____ Office calls</p> <p>2 _____ Farm and home visits</p> <p>3 _____ Farmers' group meetings</p> <p>4 _____ Demonstrations (method and result)</p> <p>5 _____ Bulletins, pamphlets, publications</p> <p>6 _____ Other, what ? _____</p> |
| 42                | ( )         | <p>39. If you encounter the olive fruit fly, you</p> <p>1 _____ Spray some branches with poison and sugary substance</p> <p>2 _____ Don't do anything</p> <p>3 _____ Other, what ? _____</p>   |
| 43                | ( )         | <p>40. If alternate 1 is used then from whom did you hear about it ? (<u>Check only one</u>)</p> <p>1 _____ Government extension agent</p>   |

Column No.Code

- 2 \_\_\_\_\_ Subject matter specialist
- 3 \_\_\_\_\_ Fertilizer and/or pesticide agent, dealer to whom you sell product
- 4 \_\_\_\_\_ Family, neighbors and/or friends
- 5 \_\_\_\_\_ Other, who ? \_\_\_\_\_
- 44 ( ) 41. Will you continue to control your crops against insects and diseases ?
- 1 \_\_\_\_\_ Surely
- 2 \_\_\_\_\_ Maybe
- 3 \_\_\_\_\_ No
- 45 ( ) 42. If no, then it is because
- 1 \_\_\_\_\_ You lack information about the proper method
- 2 \_\_\_\_\_ You are informed but not convinced
- 3 \_\_\_\_\_ You are informed and convinced, but facilities are unavailable
- 4 \_\_\_\_\_ Practice is too expensive
- 5 \_\_\_\_\_ Other, what ? \_\_\_\_\_
- 46 ( ) 43. Are you receiving all the services you expect from the Government Extension Service ?
- 1 \_\_\_\_\_ To a great extent
- 2 \_\_\_\_\_ To a fair extent
- 3 \_\_\_\_\_ Not at all
- ( ) 44. What are the services you expect to get from the Government Extension Service ?

Column No.Code

( )

45. If you were an extension agent, then what services would you render to the farmers in your area ?

APPENDIX B

Table 1. Experience in farming in relation to the adoption of the "rate of fertilization" practice.

Experience in farming	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
10 years or less	2	40	5	14	16	21	12	27
11-20 years	1	20	11	32	19	26	13	30
21-30 years	0	0	7	20	16	21	5	11
31-40 years	2	40	5	14	12	16	6	14
41 years or more	0	0	7	20	12	16	8	18
Total	5	100	35	100	75	100	44	100

Table 2. Experience in farming in relation to the adoption of the "time of fertilization" practice.

Experience in farming	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
10 years or less	8	12	16	30	8	24
11-20 years	25	38	11	20	7	22
21-30 years	11	16	10	19	7	22
31-40 years	12	18	6	11	5	16
41 years or more	11	16	11	20	5	16
Total	67	100	54	100	32	100



Table 3. Experience in farming in relation to the adoption of the "pruning" practice.

Experience in farming	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
10 years or less	5	31	2	15	28	21
11-20 years	4	25	3	23	38	29
21-30 years	1	6	5	39	22	17
31-40 years	3	19	1	8	21	16
41 years or more	3	19	2	15	22	17
Total	16	100	13	100	131	100

Table 4. Experience in farming in relation to the adoption of the "pest control" practice.

Experience in farming	Regularly		Sometimes		When needed only		Never	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
10 years or less	4	27	1	11	2	13	28	23
11-20 years	4	27	0	0	4	28	37	31
21-30 years	3	20	3	33	5	33	17	14
31-40 years	3	20	4	45	2	13	16	13
41 years or more	1	6	1	11	2	13	23	19
Total	15	100	9	100	15	100	121	100

Table 5. Age in relation to the adoption of the "rate of fertilization" practice.

Age	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
35 years or less	0	0	3	9	12	16	11	25
36 - 45 years	1	20	9	26	13	18	6	14
46 - 55 years	2	40	6	17	19	25	8	18
56 - 65 years	1	20	13	37	19	25	12	27
66 years or more	1	20	4	11	12	16	7	15
Total	5	100	35	100	75	100	44	100

Table 6. Age in relation to the adoption of the "time of fertilization" practice.

Age	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
35 years or less	12	18	10	18	4	13
36 - 45 years	11	16	10	18	7	21
46 - 55 years	14	21	10	18	8	25
56 - 65 years	20	30	15	28	9	28
66 years or more	10	15	9	17	4	13
Total	67	100	54	100	32	100

Table 7. Age in relation to the adoption of the "pruning" practice.

Age	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
35 years or less	2	13	2	15	23	18
36 - 45 years	4	25	2	15	23	18
46 - 55 years	2	13	5	39	28	21
56 - 65 years	5	31	3	23	37	28
66 years or more	3	18	1	8	20	15
Total	16	100	13	100	131	100

Table 8. Age in relation to the adoption of the "pest control" practice.

Age	Recommended and accepted practices					
	Regularly	Sometimes	When needed only	Never		
	No.	Percent	No.	Percent	No.	Percent
35 years or less	3	20	0	0	2	14
36 - 45 years	3	20	2	23	2	14
46 - 55 years	7	47	3	33	5	33
56 - 65 years	2	13	3	33	5	33
66 years or more	0	0	1	11	1	6
Total	15	100	9	100	15	100
					121	100

Table 9. Level of education in relation to the adoption of the "rate of fertilization" practice.

Level of education	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula	
	No.	Percent	No.	Percent	Mixed by farmers	Commercial ready mix
Illiterate	1	20	7	20	9	6
Elementary education	1	20	25	71	41	28
Secondary education or above	3	60	3	9	25	10
Total	5	100	35	100	75	44
						100

Table 10. Level of education in relation to the adoption of the "time of fertilization" practice.

Level of education	All in February		All in Nov. and Dec.		Recommended and accepted time	
	No.	Percent	No.	Percent	Nov., Dec., and Some N later in Feb.	Percent
Illiterate	11	16	8	15	3	9
Elementary education	48	72	32	59	13	41
Secondary education or above	8	12	14	26	16	50
Total	67	100	54	100	32	100

Table 11. Level of education in relation to the adoption of the "pruning" practice.

Level of education	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
Illiterate	4	26	1	8	18	14
Elementary education	6	37	11	84	78	59
Secondary education or above	6	37	1	8	35	27
Total	16	100	13	100	131	100

Table 12. Level of education in relation to the adoption of the "pest control" practice.

Level of education	Recommended and accepted practices							
	Regularly		Sometimes		When needed only		Never	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Illiterate	2	13	1	11	3	20	17	14
Elementary education	9	60	5	56	8	53	73	60
Secondary education or above	4	27	3	33	4	27	31	26
Total	15	100	9	100	15	100	121	100

Table 13. Land tenure in relation to the adoption of the "rate of fertilization" practice.

Land tenure	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula	
	No.	Percent	No.	Percent	Mixed by farmers	Commercial ready mix
Owner-operator	5	100	33	94	71	95
Tenant	0	0	2	6	4	5
Total	5	100	35	100	75	100
					44	100

Table 14. Land tenure in relation to the adoption of the "time of fertilization" practice.

Land tenure	All in February		All in Nov. and Dec.		Recommended and accepted time	
	No.	Percent	No.	Percent	Nov., Dec., and some N later in Feb.	Percent
Owner-operator	62	93	51	94	31	97
Tenant	5	7	3	6	1	3
Total	67	100	54	100	32	100

Table 15. Land tenure in relation to the adoption of the "pruning" practice.

Land tenure	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
Owner-operator	16	100	12	92	123	94
Tenant	0	0	1	8	8	6
Total	16	100	13	100	131	100

Table 16. Land tenure in relation to the adoption of the "pest control" practice.

Land tenure	Recommended and accepted practices					
	Regularly	Sometimes	When needed only	Never		
	No.	Percent	No.	Percent	No.	Percent
Owner-operator	12	80	9	100	15	100
Tenant	3	20	0	0	0	0
Total	15	100	9	100	15	100
					115	95
					6	5
					121	100

Table 17. Farm income in relation to the adoption of the "rate of fertilization" practice.

Farm income	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
25 percent or less	3	60	18	51	40	53	24	55
26 - 50 percent	0	0	2	6	11	15	8	18
51 - 75 percent	0	0	0	0	1	1	1	2
76 - 100 percent	2	40	15	43	23	31	11	25
Total	5	100	35	100	75	100	44	100

Table 18. Farm income in relation to the adoption of the "time of fertilization" practice.

Farm income	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and Some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
25 percent or less	34	52	27	50	20	62
26 - 50 percent	7	10	7	13	7	22
51 - 75 percent	1	1	0	0	1	3
76 - 100 percent	25	37	20	37	4	13
Total	67	100	54	100	32	100



Table 19. Farm income in relation to the adoption of the "pruning" practice.

Farm income	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
25 percent or less	9	56	8	62	68	51
26 - 50 percent	1	6	3	23	18	14
51 - 75 percent	1	6	0	0	1	1
76 - 100 percent	5	32	2	15	44	34
Total	16	100	13	100	131	100

Table 20. Farm income in relation to the adoption of the "pest control" practice.

Farm income	Recommended and accepted practices				Never			
	Regularly	Sometimes	When needed only	No.	Percent	No.	Percent	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
25 percent or less	5	33	3	33	7	47	70	58
26 - 50 percent	4	27	2	22	3	20	13	11
51 - 75 percent	1	7	0	0	0	0	1	1
76 - 100 percent	5	33	4	45	5	33	37	30
Total	15	100	9	100	15	100	121	100

Table 21. Size of farm in relation to the adoption of the "rate of fertilization" practice.

Size of farm	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
10 dunums or less	0	0	9	26	10	13	11	25
11 - 20 dunums	0	0	15	43	25	34	12	27
21 - 40 dunums	1	20	7	20	19	25	12	27
41 dunums or more	4	80	4	11	21	28	9	21
Total	5	100	35	100	75	100	44	100

Table 22. Size of farm in relation to the adoption of the "time of fertilization" practice.

Size of farm	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and Some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
10 dunums or less	14	21	13	24	3	9
11 - 20 dunums	24	36	16	30	11	34
21 - 40 dunums	18	27	16	30	4	13
41 dunums or more	11	16	9	16	14	44
Total	67	100	54	100	32	100

Table 23. Size of farm in relation to the adoption of the "pruning" practice.

Size of farm	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
10 durums or less	2	13	2	15	26	20
11 - 20 durums	5	31	5	39	42	32
21 - 40 durums	4	25	4	31	32	24
41 durums or more	5	31	2	15	31	24
Total	16	100	13	100	131	100

Table 24. Size of farm in relation to the adoption of the "pest control" practice.

Size of farm	Regularly		Sometimes		When needed only		Never	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
10 durums or less	4	27	1	11	2	13	23	19
11 - 20 durums	5	33	4	45	4	27	39	33
21 - 40 durums	2	13	1	11	5	33	32	26
41 durums or more	4	27	3	33	4	27	27	22
Total	15	100	9	100	15	100	121	100

Table 25. Contact with the government extension agent in relation to the adoption of "rate of fertilization" practice.

Contact with government extension agent	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Yes	5	100	21	60	65	87	33	75
No	0	0	14	40	10	13	11	25
Total	5	100	35	100	75	100	44	100

Table 26. Contact with the government extension agent in relation to the adoption of "time of fertilization" practice.

Contact with government extension agent	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and Some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
Yes	46	69	42	78	30	94
No	21	31	12	22	2	6
Total	67	100	54	100	32	100

Table 27. Contact with the government extension agent in relation to the adoption of the "pruning" practice.

Contact with government extension agent	No pruning		Very heavy pruning		Recommended method	
	No.	Percent	No.	Percent	No.	Percent
Yes	14	.87	9	69	102	78
No	2	13	4	31	29	22
Total	16	100	13	100	131	100

Table 28. Contact with the government extension agent in relation to the adoption of the "pest control" practice.

Contact with government extension agent	Regularly		Sometimes		When needed only		Never	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Yes	13	.87	9	100	10	67	93	77
No	2	13	0	0	5	33	28	23
Total	15	100	9	100	15	100	121	100

Table 29. Degree of satisfaction with the Extension Service in relation to the adoption of the "rate of fertilization" practice.

Degree of satisfaction with the Extension Service	No fertilizers		Pure ammonium sulfate or animal manure alone		Recommended and accepted formula Mixed by farmers		Commercial ready mix	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
To a great extent	1	20	7	20	13	17	7	16
To a fair extent	0	0	11	31	39	52	17	39
Not at all	4	80	17	49	23	31	20	45
Total	5	100	35	100	75	100	44	100

Table 30. Degree of satisfaction with the Extension Service in relation to the adoption of the "time of fertilization" practice.

Degree of satisfaction with the Extension Service	All in February		All in Nov. and Dec.		Recommended and accepted time Nov., Dec., and Some N later in Feb.	
	No.	Percent	No.	Percent	No.	Percent
To a great extent	11	17	5	9	11	34
To a fair extent	27	40	24	45	15	47
Not at all	29	43	25	46	6	19
Total	67	100	54	100	32	100

Table 31. Degree of satisfaction with the Extension Service in relation to the adoption of the "pruning" practice.

Degree of satisfaction with the Extension Service	No pruning		Very heavy pruning		Recommended method	
	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent
To a great extent	4	25	4	31	20	15
To a fair extent	3	19	4	31	61	47
Not at all	9	56	5	38	50	38
Total	16	100	13	100	131	100

Table 32. Degree of satisfaction with the Extension Service in relation to the adoption of the "pest control" practice.

Degree of satisfaction with the Extension Service	Regularly		Sometimes		When needed only		Never	
	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent	No. Percent
To a great extent	4	27	2	22	1	7	21	18
To a fair extent	9	60	6	67	9	60	44	36
Not at all	2	13	1	11	5	33	56	46
Total	15	100	9	100	15	100	121	100

APPENDIX C

List of Abbreviations

American University of Beirut	AUB
December	Dec.
February	Feb.
for example	e.g.
International Business Machine	IBM
kilogram	kg
nitrogen	N
November	Nov.
number	No.
that is	i.e.
total number	T.N.