

IDENTIFICATION OF IRRIGATION PROBLEMS THAT SHOULD
BE INCLUDED IN ADULT EDUCATION PROGRAMS
IN SOUTHWESTERN OKLAHOMA

By

CHARLES CECIL BARNEY

Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1949

Submitted to the faculty of the Graduate School of
The Oklahoma State University in partial
fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
Summer, 1958

IDENTIFICATION OF IRRIGATION PROBLEMS THAT SHOULD
BE INCLUDED IN ADULT EDUCATION PROGRAMS
IN SOUTHWESTERN OKLAHOMA

Thesis Approved:

Roy W. Dugger

Thesis Adviser

Chris White

Robert W. ...

Dean of the Graduate School

ACKNOWLEDGEMENTS

I wish to express sincere gratitude to Doctor Roy W. Dugger who served as thesis adviser and to Professors, Clarence L. Angerer, Chris C. White, and Don M. Orr, for the encouragement, counsel, advice and correction given during the preparation of this thesis.

I am also indebted to the vocational agriculture teachers, and county agents of southwestern Oklahoma for the assistance rendered in obtaining information necessary to complete the study.

Deep appreciation is extended to the 50 irrigation farmers who supplied needed information, vital to the text of my thesis.

I also must express special appreciation to my wife, Doris, and our children Peggy Sue and Max for the encouragement, devotion and assistance given during the preparation of my research.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Statement of the Problem	3
Purpose of the Study	5
Need for the Study	5
Scope of the Study	8
Method of Procedure	9
II. DESCRIPTION OF SOUTHWESTERN OKLAHOMA	11
Part I	11
Part II	
Topography and Drainage	12
Part III	
Climatic Conditions	13
Part IV	
Growing Season, Frost dates and Temperatures	15
Part V	
Crops, Livestock and Farming Methods	16
III. PRESENTATION AND ANALYSIS OF DATA	19
Problems of Beginning Irrigation Farmers	19
Problems of Experienced Irrigation Farmers	36
IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	47
Summary and Conclusions	48
Recommendations	51
BIBLIOGRAPHY	52
APPENDIX	54
A. Interview Schedules	55

LIST OF TABLES

Table	Page
I. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Irrigation Planning Problems to Them When They Were Beginning Irrigation Farmers	20
II. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Well Development Problems to Them When They Were Beginning Irrigation Farmers.. . . .	22
III. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Well Completion Problems to Them When They Were Beginning Irrigation Farmers	24
IV. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Purchasing Equipment Problems to Them When They Were Beginning Irrigation Farmers	26
V. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Problem with Calculating the System to Them When They Were Beginning Irrigation Farmers	27
VI. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Irrigation Power Unit and Fuel Problems to Them When They Were Beginning Irrigation Farmers	29
VII. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Servicing Irrigation Equipment to Them When They Were Beginning Irrigation Farmers	30
VIII. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Problems in Using Irrigation Water on Crops When They Were Beginning Irrigation Farmers	32
IX. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Flood Irrigation Problems to Them When They Were Beginning Irrigation Farmers	34

Table	Page
X. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Relative Importance of Miscellaneous Irrigation Problems to Them When They Were Beginning Irrigation Farmers	35
XI. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning more About Irrigation Planning Problems . . .	36
XII. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Costs of Irrigation	38
XIII. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Irrigation Soil Problems	39
XIV. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Weed and Insect Control Problems .	41
XV. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Water Application Problems	43
XVI. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Crop and Fertilizer Problems . . .	44
XVII. Percentage Distribution of Responses of 50 Irrigation Farmers Concerning Their Degree of Interest in Learning More About Miscellaneous Irrigation Problems	45

CHAPTER I

INTRODUCTION

Agriculture today is constantly undergoing vast changes. Many new ideas and methods coupled with new materials and tools are pointing the way to more economical and much greater agricultural production. All of these things make farming easier, save labor, and enable one man to do the work that formerly required many men. By the same token the changes in a farm operation have eliminated many of the less efficient, poorer educated people that once were farmers. Many of them have long ago moved from the land to seek employment in other fields of endeavor, and the trend still continues along the same pattern.

This shifting of rural population releases the land once tilled by these people to the farmer with more initiative and aggressiveness; the more progressive and proficient man is left to produce the food and fiber required by the nation. That the American farmer has been equal to this task is quite evident by the bulging warehouses and storage facilities of surplus farm commodities.

The farmers have had to cope with a number of problems embracing the business of farming. The inflated dollar, scarcity of labor, and increased costs have forced them into more efficient operation in order to maintain their holdings.

Acreage controls have made it necessary for the farmers to use every available method to get the most production possible from each acre of land. One such method pressed into use the past few years is irrigation. The use of this supplemental moisture has been hastened somewhat by the drought conditions in the southwest in recent years.

Some very good yields and increased profits have been made by the farmers that had the means of supplying moisture in lieu of natural rainfall during the critical periods during the production of their crops. Every indication in the area is that where water can be found in sufficient supply, irrigation will eventually follow.

The fact that irrigated acres in the state jumped from a total of 34,071 in 1949, to an estimated 224,684 in 1957, is ample evidence that the farmers in Oklahoma plan to utilize irrigation to increase crop production. As the water resources of the state are developed, many more acres will come under irrigation. Some sources estimate that by 1962, more than one million acres will produce irrigated crops. There is little doubt that this will give a tremendous boost to the prosperity of Oklahoma agriculture.

All reports indicate increased yields and profits per acre under irrigation over crops produced on dryland. Yet irrigation poses many complex problems and requires considerable money; therefore, it must be a very carefully calculated risk. Many of the farmers that pioneered the field of irrigation in Western Oklahoma, have stated that had they had the advice and counsel of some person or persons who knew the basic fundamentals and had a knowledge of the problems

involved, much time, trouble, and extra expense could have been saved. Few farmers can afford to experiment and must plan to get a successful system with the minimum of expense.

The farmers of this section of Oklahoma for the most part are good farmers; many of them have constructed terraces and contour lines. They have built ponds and waterways; many have had a complete soil analysis made, they plant cover crops, practice crop rotation, and the use of commercial fertilizers has steadily increased from year to year. All these things have increased production and at the same time increased the value of the farms. The limiting factor has been water, at a time when the plant needed it most.

All of the farmers are familiar with the erratic weather pattern that is characteristic for the area and have been willing to pit their skill and knowledge against the ever present possibility of crop failure due to lack of rainfall at the critical time. Yet it is always discouraging to see crops wither and fail completely, or have the yield seriously impaired.

Irrigation seems to be the answer to a very real problem for the farmers in Oklahoma. There is little doubt that it will continue to grow and develop.

Statement of the Problem

The problem concerning irrigation in this western part of the state is real and somewhat acute. Many times when the farmer has given the possibility of a system of irrigation due consideration and finally decided to risk the necessary capital, he has become impatient

and thought that he should drill a well one day and start irrigating within the next day or two. Of course, this is some-what exaggerated but has happened in an instance or two, probably prompted by observing the prospects for a bountiful harvest suffering from lack of moisture.

The farmers of this area need people with whom they can discuss their problems; individuals that have competent working knowledge of the problems and the necessary planning involved in setting up an irrigation system. It should be people with whom the farmers feel free to talk and who will give impartial opinions.

The vocational agriculture teachers of this area have direct contact with the farmers of Western Oklahoma and as agents of adult education in the communities have a responsibility to the farmers of the school service area. Many of the teachers of the area are not able to be of much assistance to the farmers in planning and developing irrigation systems, because irrigation is rather new and many of the teachers did not receive any technical training in irrigation while attending college.

Therefore, it is the responsibility of the vocational agriculture teachers of the area to become acquainted with the problems of irrigation so as to carry out their obligations to the farmers.

Of course, it would be folly to expect teachers to become irrigation engineers but by the same token a teacher should know the nearest engineer to his particular community and how to contact him if and when his services are needed. The teachers need to know the problems which confront the farmer. The where, what, why, when and

how much concerning irrigation is essential information that should be readily available to teachers and farmers.

The problem of this study was to identify and ascertain the degree of importance which farmers in Southwestern Oklahoma attach to certain irrigation farming problems.

Purpose of the Study

The purpose of this study is to identify problems which vocational agriculture teachers should include in educational programs for irrigation farmers in Southwest Oklahoma.

Need for the Study

People concerned with the education of our farm population must be equipped with the proper knowledge of procedures and fundamentals in order to carry forth this vital work with confidence and efficiency.

Ezra Taft Benson states, "We have to stop wasting water, we have to use it more efficiently in industry, in towns and cities, in general farming and in irrigation, which is destined to be adopted in all parts of the nation."¹

The aim of vocational education in agriculture is, "To train present and prospective farmers for proficiency in farming."²

¹Ezra Taft Benson, Forward statement in the Yearbook of Agriculture for 1955. Water. Preface, p. 5

²Aim of Vocational Education in Agriculture in Monograph Number 21, Education Objectives in Vocational Agriculture, U.S. Department of Health Education and Welfare, Office of Education, p. 3

This task that agriculture workers have before them is many sided, and one that involves numerous segments. Irrigation farming is one such segment that is rapidly becoming a definite part of our dynamic agriculture in America. It is imperative that the chief irrigation problems be determined.

Elco L. Greenshields, states, "A continued expansion of irrigation may be expected in the west. Much additional feasible development of surface water for irrigation will be carried out. Individual farmers will continue to expand the use of ground water for irrigation."³

With all indications pointing the way toward more irrigation in the very near future, it is the obligation of people working with farmers to be in a position to help them with the problems they will face concerning irrigation.

Many agriculture workers directly concerned with youth and adult instruction did not receive training in irrigation while attending college; therefore, they would be handicapped while attempting to help farmers with irrigation problems. To alleviate this situation, a general knowledge of the problems must be gained so that the educational needs of the people in the various communities of Southwest Oklahoma may be met.

³Elco L. Greenshields. Expansion of Irrigation in the West
1955 Yearbook of Agriculture. Water. p. 256

Glen C. Cook, expresses the type of instruction that should be given to agricultural patrons. "Farm youth and farmers need and want the kind of training which will help them to become successfully established in farming or to increase their proficiency if already established in farming."⁴

The costs of farming have increased rapidly in recent years and this has made it necessary for the farmers to produce as much from each acre of land as possible in order to meet the costs of operation. Irrigation has helped and will continue to help the farmer cope with this problem.

Elco L. Greenshields states that, "Irrigation has brought a new agriculture to the valleys of the West -- a greater variety of crops, many specialty crops, diversity in farming enterprises, longer seasons, a larger measure of stability."⁵

In outlining the responsibilities of Vocational Agriculture teachers to adult education this objective is listed, "Extend vocational education in agriculture for adults as a definite responsibility of a local department of vocational agriculture."⁶

Irrigation in Southwest Oklahoma varies in type from sprinklers and deep wells to flood systems, and may use various combinations of all methods for using supplemental water. Farmers need to follow a definite plan in developing irrigation, one that fits their particular situation.

⁴Glen C. Cook, A Handbook for Teaching Vocational Agriculture, chapter 1, p. 17

⁵Elco L. Greenshields. 1955 Yearbook of Agriculture Water, p. 249

U. S. Department of Interior, Office of Education
Monograph No. 19, Agricultural Education Programs, p. 16

In order to ascertain what the various problems are that farmers face when planning for irrigation a study is needed. Review and reading available literature and publications have failed to reveal such information. Most of the material deals with technical data that is too comprehensive for the average farmer.

In view of these facts it seems reasonable that information should be obtained that will be of some value to the farmers and to the people working with them. An attempt is made in this thesis to ascertain the information concerning Irrigation that is needed by farmers in Southwest Oklahoma.

Scope of the Study

The scope of this thesis includes information gathered from fifty selected irrigation farmers in Beckham, Greer, Harmon, Jackson, Tillman, Comanche, Kiowa and Washita counties in Southwest Oklahoma. These fifty farmers were asked to respond to questions in the interview schedule shown in Appendix A. Their responses were tabulated and used to identify problems that are of concern to irrigation farmers and which should be included in educational programs for irrigation farmers in Southwest Oklahoma.

Method of Procedure

In order to complete this thesis a study was made for the purpose of drawing some definite conclusions as to the problems of irrigation farmers. The information obtained in this study was analyzed, grouped, and studied, for the purpose of arriving at and developing certain conclusions. The steps of the procedure are outlined as follows:

1. To determine the problems most likely to be paramount to farmers concerning irrigation, it was necessary to review available literature, consult with irrigation specialists, farm specialists, equipment dealers and certain leading experienced irrigation farmers.
2. From the information gathered a tentative interview schedule was formulated containing what was believed to be the factors most important in planning for irrigation.
3. A small group of farmers was asked to respond to this tentative interview schedule for purposes of checking clarity of communication, completeness, and method of conducting the interviews.
4. Upon analysis it was decided to group the list of questions into two parts. The first part included questions about the problems most apt to be encountered when first planning for irrigation and while actually setting up systems of irrigation. The second part included questions about the problems most frequently encountered by farmers after experience with irrigation systems. The question sheets were formulated in a manner that enabled the relative importance of the selected problems to be determined when the questions were answered by the selected farmers. Copies of the final interview schedule are included in Appendix A of this thesis.
5. Vocational Agriculture Teachers and County Agriculture Extension Agents were asked to identify irrigation farmers who were considered by them to be better than average farmers and who had had at least one season of experience in irrigation. From this group of farmers fifty were selected to be interviewed on the basis of the prepared interview schedule.

6. Fifty selected farmers were interviewed individually in Beckham, Greer, Harmon, Jackson, Tillman, Comanche, Kiowa, and Washita counties.
7. After the interviews were completed the information was tabulated, grouped, and tables compiled to clarify the results of the study. Problems of irrigation farmers in Southwest Oklahoma were identified and the relative importance of each problem was ascertained in accordance with opinions expressed by the farmers interviewed.
8. After careful study of the completed interview schedules, certain conclusions were drawn regarding the problems which vocational teachers should include in educational programs for adult farmers in Southwest Oklahoma. Certain recommendations were made regarding the need for additional research in this area.

CHAPTER II

DESCRIPTION OF SOUTHWESTERN OKLAHOMA

Part I

The eight counties comprising Southwestern Oklahoma consist of 4,375,680 acres which is divided into over 12,000 farms and ranches. Agriculture is the main source of income for the people residing in the area. There are nine principal towns in these eight counties. They are: Elk City, Cordell, Mangum, Lawton, Hobart, Frederick, Sayre, Altus and Hollis. In addition there are numerous smaller towns and villages distributed over the counties.

Located within the region are three military bases, the largest of these is the Field Artillery Training Center at Ft. Sill near Lawton, in Comanche County. In addition there is the Strategic Air Command base near Altus, Jackson County and the Burns Flat Strategic Air Command air base in the process of construction, located between Elk City, in Beckham County, and Cordell, in Washita County.

Several of the counties in the group have some oil and natural gas production. Small industries are present in some sections but they are rather limited as to economic importance.

Part II

Topography and Drainage

The topography varies over the eight counties from the Wichita mountain range in Comanche and Kiowa counties to the blackland flats in Jackson and Tillman counties. Washita, Beckham, and Greer counties consist mostly of rolling red prairies while Harmon county has rolling deep sandy land.

In general, the land is classified as gently rolling prairies. Drainage is from the northwest to the southwest with four main streams and numerous creeks and branches draining into the main streams. The main streams are; North Fork of the Red, Salt Fork of the Red, a small portion of the Washita River and the Red River. All of these streams and their tributaries empty into the Red River, which serves as the boundary between Texas and Oklahoma, and is also the southern limit of Harmon, Jackson and Tillman counties. The North Fork of the Red is the main stream flowing into Lake Altus also known as Lake Lugert, which furnishes irrigation water for the Altus Irrigation District in Jackson County. Most all of these streams have rather wide sandy beds, and do not have surface flow continuously during the year. The one exception is the Washita River, which has some flow in the hot summer months when the others are reduced to occasional water holes. Many of the creeks and branches do not flow the year around, however a few of them are spring fed and are fairly dependable as a source of water for livestock. The water supply from the streams is not dependable enough to offer much encouragement for irrigation from them in most instances.

Elevation ranges from 1,117 feet above sea level at Lawton to 1,916 feet at Sayre. The highest point in the entire area is Mt. Scott, in the Wichita Range, which rises to the elevation of 2,500 feet.

Part III

Climatic Conditions

The prevailing wind for Southwest Oklahoma is from the south-southwest during the spring and continues through the growing season. During the spring and early summer, surface wind is very strong at times causing much of the sandy soils to blow severely, the result is erosion damage to valuable topsoil as well as injury or destruction of young growing crops. This condition is most prevalent when the area is experiencing a dry winter and below average rainfall condition in the spring. Dry cycles seem to occur in the area about two years in each decade.

The south-southwest winds pick up moisture from the gulf and are thus responsible for the moisture this portion of Oklahoma receives. During the winter and early spring months some north-northwest winds sweep across Western Oklahoma causing the temperature to drop into the lower teens, and occasionally bringing in considerable snowfall.

The weather conditions over the eight counties are very erratic; which is due to the tendency for warm moisture laden fronts moving over the area from the Gulf of Mexico meeting cold air masses spilling over the Rocky Mountains. The collision of warm moist air and cold dry air often cause severe thunderstorm activity to break over the area. Many times the results are heavy cloud burst type rainfall, hail,

severe straight winds or tornado type winds. This phenomena is most likely to occur during the spring and early summer months and gradually diminish during the growing season.

During the dry years, that occur periodically, great clouds of dust originating in other sections of the Southern Great Plains drift over the area; many tons of fallout material has been deposited over the acres included in this study.

The 18 to 24 inch annual rainfall belt embraces most of southwest Oklahoma, but due to the weather pattern, described previously, as little as seven inches to as much as 36 inches has been recorded. Snowfall during the winter months is very spasmodic by nature, with several winters passing without snow to an occasional winter blizzard, when as much as one and one half or two feet may blanket the area. Many times strong north winds accompany the snow, causing much drifting in fence lines and east-west roadways.

The area is more apt to be subject to freezing drizzle or rain than snowfall during the winter months. In general the southern counties will have less snow and sleet, than the northern ones.

PART IV

Growing season, Frost dates and Temperatures

The eight counties in this study have an average growing season 218 days in length, the extremes are from 226 days in Jackson county to 209 days in Beckham and Washita counties. The last killing frost in the spring usually occurs between March 26, and April 8, each year, with the first frost in the fall occurring between October 31, and November 9. The earliest frost free date recorded for the area was on February 21, and the latest in the spring was on April 17; in the fall killing frost has been recorded as early as October 19, and as late as November 30.

The difference in January average temperature and July average temperature is a little over 43 degrees F., in the area. The January average is 39.6 degrees and the July average is 83.4 degrees; temperatures of 100 degrees or higher may be expected in the area from June to September, the maximum temperature recorded for the eight county area is 119 degrees and the minimum on record is - 17 degrees.

PART V

Crops, Livestock and Farming Methods

The principal crops grown in Oklahoma are; wheat, cotton, grain sorghums and alfalfa. Some others of lesser importance are, oats, barley, rye, sweet clover, vetch, cowpeas, castor beans and peanuts. Several crops have been introduced into the area with the advent of irrigation, they are, sweet potatoes, irish potatoes, cantaloupes, watermelons and cucumbers. The government acreage control program has caused the farmers to search for new crops and to experiment with such crops as, guar and sesame. There has been some grasses planted for seed harvesting; besides the native varieties, some new ones, such as, blue panic, sorghum alum and others, are being tried.

More acres are devoted to wheat production than to any other crop in the entire area and almost two thirds of the total cotton acreage grown in Oklahoma is planted in the eight southwest counties. Cotton and wheat are about equal in value as cash crops. Grain sorghums have been grown over the entire area for many years and serve as feed for livestock as well as cash grain. Both alfalfa hay and seed are grown; mostly along the creek and river botton land. Oats and barley have always been grown as feed grains and planting has increased because of curtailed wheat production. Rye serves the sandy sections very well, both as a cover crop and for livestock pasture.

The most reliable soil building legume is sweet clover, and it is used extensively by farmers in crop rotation and soil building programs.

Quite a lot of silage is made each year and stored in trench silos for use with beef cattle and dairy operations; cattle certainly account for a large portion of the income for the people in the eight counties. Most of the rougher, thinner, soils are devoted to pastures and grazing land; many acres of the pastures were once cultivated fields that eroded away during the period of intensive diversification and have been turned back to grass within the past 15 to 20 years.

Almost thirty per cent of the total land area is devoted to pasture and livestock raising, dairying is practiced throughout the area, but the major portion of the cattle are beef type. There are some swine and sheep in rather small herds and flocks scattered through the eight counties.

Southwestern Oklahoma has undergone quite a change in farming practice during the fifty years since statehood, and is still in the process of changing at the present time. At one time the entire area was highly diversified, with each 30 to 160 acres supporting a farm family. These units were self supporting as far as food was concerned, because each one had a home grown supply of fruit and vegetables, milk, meat, and poultry.

With the improvement of machinery, the depression and drought of the 1930's, many farmers either became discouraged or were forced to leave their land and seek employment in other fields of endeavor. The result of this rural migration was an increase in the size of the average farm and a tendency away from diversification toward specialization in crop and livestock raising. This trend is still in

progress, and has been spurred on by World War II, the Korean conflict, acreage controls and more recently the rapid expansion of irrigation over the entire eight counties.

Improved transportation facilities and expansion of all-weather roads, have influenced many farmers in moving to towns and villages near their land in order to take advantage of better schools, churches, markets, shopping facilities and social life offered in the urban communities. The farming operation is usually only a few minutes drive from town, and is not considered a handicap.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

Each of the 50 selected irrigation farmers was asked to respond to the interview schedules shown in Appendix A. The data received concerning problems in irrigation farming for Southwest Oklahoma, have been arranged to show the degree of importance of each problem. The problems are submitted to serve as a foundation against which certain conclusions may be drawn to ascertain the need for vocational agriculture departments to include irrigation problems in the curriculum for adult classes in Southwestern Oklahoma. They may also serve as a basis for further research concerning irrigation.

Tables I through X are arranged to show the importance of certain problems confronted by farmers when planning for and during the establishment of irrigation systems. Tables XI through XVII, identify the problems, and the degree of interest expressed by farmers in learning more about the problems, after having experience with irrigation farming.

Irrigation Planning. Table I shows that general planning for irrigation posed a major problem to 68 percent, and was important to 22 percent of the farmers, while only 10 percent considered this to be a minor problem; none of the interviews had no irrigation planning problems. To 24 percent of the interviewees, finding information

about irrigation was a major problem while 43 percent considered it an important problem, and 28 percent indicated this to be a minor problem, none of the farmers had no problems finding irrigation information. Securing water rights for irrigation was of major concern to only 3 percent, while 12 percent thought this important; to 64 percent of the farmers, this was a minor problem, and to 16 percent it was of no importance.

TABLE I
 PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION
 FARMERS CONCERNING RELATIVE IMPORTANCE OF
 IRRIGATION PLANNING PROBLEMS TO THEM
 WHEN THEY WERE BEGINNING
 IRRIGATION FARMERS

Irrigation Planning	% Farmers Reporting Problem to Have Been			
	Major	Important	Minor	Not Applicable
General planning for irrigation	68%	22%	10%	0%
Finding information about irrigation	24	43	28	0
Securing water rights for irrigation	3	12	64	16
Methods of financing the system	32	22	36	10
Infiltration rate of the soil to be irrigated	16	34	44	6

Financing irrigation systems was a major problem to 32 percent of the interviewees, and important to 22 percent while 36 percent considered this a minor problem and 10 percent had no problem with finance. Infiltration rate of soil to be irrigated, presented a major problem to 16 percent and 34 percent considered this an important problem; to 44 percent, infiltration was a minor problem, only 6 percent had no problem.

Over 60 percent of these fifty farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. General planning for irrigation.
2. Finding information about irrigation.

From 40 to 59 percent of the selected farmers indicated that the following problems were of importance to them as beginning irrigation farmers:

1. Methods of financing the system.
2. Infiltration rate of the soil to be irrigated.

A definite majority of the 50 farmers expressed the opinion that, securing water rights for irrigation was of minor importance to them as beginning irrigation farmers.

Well development problems. Table II shows that well location was a major problem to 34 percent of the farmers and important to 22 percent, while 32 percent expressed the opinion that this was of minor importance. Twelve percent had no well location problems. Some of the selected farmers are located in the Lake Altus, irrigation district and do not have irrigation wells.

Finding reliable well drillers was a major problem to 24 percent of the interviewees, while to 24 percent it was important, 30 percent found this to be a minor problem, and to 22 percent it was of no concern. Drilling test wells was of major importance to only 10 percent, and important to 24 percent of the farmers interviewed. Forty Six percent viewed this as a minor problem and 20 percent had no problem. Actual drilling of the irrigation well was of major importance to 14 percent of the interviewees, 26 percent considered well drilling important while 40 percent deemed this a minor problem and 20 percent had no problem with it.

TABLE II

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING RELATIVE IMPORTANCE OF WELL DEVELOPMENT
PROBLEMS TO THEM WHEN THEY WERE
BEGINNING IRRIGATION FARMERS

Well Development Problems	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Locating the well	34%	22%	32%	12%
Finding reliable well driller	24	24	30	22
Drilling test wells	10	24	46	20
Drilling the irrigation well	14	26	40	20
Determining water bearing formation	14	26	40	20
Test pumping the well	14	26	42	18

Water bearing formations were considered to be very important by 14 percent of those interviewed and important to 26 percent, 40 percent considered this of minor importance, to 20 percent this posed no

problem. Test pumping the well presented a major problem to 14 percent and was important to 26 percent; 42 percent thought this to be a minor problem and 18 percent had no concern with this factor.

From 40 to 58 percent of the selected farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. Locating the well.
2. Finding reliable well driller.
3. Drilling the irrigation well.
4. Determining water bearing formation.
5. Test pumping the well.

A definite majority of the fifty farmers expressed the opinion that, drilling test wells was of minor importance to them as beginning irrigation farmers.

Well completion. Table III shows that methods of completing the irrigation well was a major problem to 20 percent while 26 percent thought the problem important and 32 percent expressed the opinion that this was a minor problem. Twenty Two percent had experienced no problems with well completion. Only 8 percent of the interviewed farmers considered selection of the sand screen a major problem, while 20 percent thought this was important and 32 percent classified it as a minor problem and 40 percent had no problem with sand screen selection.

TABLE III

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
 CONCERNING RELATIVE IMPORTANCE OF WELL COMPLETION
 PROBLEMS TO THEM WHEN THEY WERE
 BEGINNING IRRIGATION
 FARMERS

Well Completion	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Methods of completing the well	20%	26%	32%	22%
Selecting the sand screen	8	20	32	40
Where to place sand screen in the water bearing formation	14	26	40	20
Casing the well	10	18	52	20
Gravel packing the well	16	10	42	32

Placement of the sand screen in the water bearing formation presented a major problem to only 14 percent while to 26 percent this was an important problem, and 40 percent of the interviewees considered it a minor problem, to 20 percent no problem was encountered. Casing the irrigation well drew major consideration from 10 percent and was important to 18 percent of the farmers while 52 percent viewed this problem as a minor one, 20 percent had no problem with well casing.

Gravel packing the irrigation well was a major problem to 16 percent, and important problem to 10 percent; however, only minor consideration was given by 42 percent and to 32 percent it was of no importance.

From 40 to 46 percent of the selected farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. Methods of completing the well.
2. Where to place sand screen in the water bearing formation.

A definite majority of the fifty farmers expressed the opinion that the following problems were of minor importance to them as beginning irrigation farmers:

1. Casing the well.
2. Selecting the sand screen.
3. Gravel packing the well.

Purchasing equipment. Table IV indicates that the farmers rely considerably on the recommendation of the equipment dealers when purchasing irrigation equipment. The type of pump to purchase was a major problem to 34 percent of the interviewees and to 16 percent it was important while 42 percent thought this a minor problem, and only 8 percent considered it unimportant. In considering the size of the irrigation pumps, 34 percent thought of this as a major problem while to 26 percent it was important, 32 percent considered this a minor problem and 8 percent had no problem. The amount of pipe to purchase for the system was a major problem to 18 percent of the interviewees and important to 26 percent while 32 percent indicated minor importance and 24 percent had no problems with pipe purchase. The size of pipe to buy for the system was of major importance to 28 percent of the farmers and considered important by 18 percent, this was a minor problem to 34 percent, and of no importance to 20 percent of those interviewed.

TABLE IV

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
 CONCERNING RELATIVE IMPORTANCE OF PURCHASING
 EQUIPMENT PROBLEMS TO THEM WHEN THEY
 WERE BEGINNING IRRIGATION
 FARMERS

Purchasing Equipment	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Type of pump to buy	34%	16%	42%	8%
Size of pump to purchase	34	26	32	8
Amount of pipe to buy	18	26	32	24
Size pipe to buy	28	18	34	20
Kind and type of sprinklers to buy	14	26	14	46

Only 14 percent of the interviewees considered sprinkler purchase to be a major problem while to 26 percent this was important, to 14 percent this presented a minor problem, and 46 percent indicated no problem.

Sixty percent of these fifty farmers indicated that the size pump to purchase, was a problem of importance to them as beginning irrigation farmers.

From 40 to 58 percent of the selected farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. Type of pump to buy.
2. Amount of pipe to buy.
3. Size pipe to buy.
4. Kind and type of sprinklers to buy.

Calculating the Irrigation System. Table V indicates that calculating the irrigation system was a problem to most of the farmers. Pump efficiency was of major concern to 20 percent of the interviewees, and important to 34 percent, 34 percent indicated this to be a minor problem, only 12 percent had no problem. The gallon per minute output of the irrigation well posed a major problem to 13 percent and was important to 24 percent, while 33 percent gave minor consideration to this problem and 20 percent had no problem.

TABLE V

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS CONCERNING RELATIVE IMPORTANCE OF PROBLEMS WITH CALCULATING THE SYSTEM TO THEM WHEN THEY WERE BEGINNING IRRIGATION FARMERS

Calculating The Irrigation System	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Determining pump efficiency	20%	34%	34%	12%
Determining the g.p.m. output of the well	13	24	33	20
Figuring friction loss	36	24	26	14
Designing the system to fit the well	40	12	30	18

Figuring the friction loss was listed as a major problem to 36 percent of the farmers and an important one to 24 percent, to 26 percent this was of minor importance and only 14 percent indicated no friction loss problems. Designing the irrigation system to fit the irrigation well was of major concern to 40 percent of those interviewed and important to 12 percent, to 30 percent of minor importance, 18

percent had no problem.

Sixty percent of these fifty farmers indicated that figuring friction loss was a problem of importance to them as beginning irrigation farmers.

From 42 to 54 percent of the selected farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. Determining pump efficiency.
2. Designing the system to fit the well.
3. Determining the g.p.m. output of the well.

Power unit and fuel problems. Table VI indicates that determining the size of power unit purchase was a major problem to 34 percent and important to 38 percent of the interviewees, to 22 percent this was a minor problem and only 6 percent had no problem.

In selecting the kind of power to use, 20 percent indicated this to be a major problem and 32 percent thought it important, while 42 percent deemed this a minor problem, only 6 percent had no problem in power selection.

TABLE VI

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING RELATIVE IMPORTANCE OF IRRIGATION POWER
UNIT AND FUEL PROBLEMS TO THEM WHEN THEY
WERE BEGINNING IRRIGATION FARMERS

Power Unit And Fuel Problems	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Determining size of the power unit	34%	38%	22%	6%
Selecting the kind of power to use	20	32	42	6
Selecting the kind of fuel to use	8	22	43	22

Fuel selection was given major consideration by only 8 percent of the farmers, to 22 percent this was important while 43 percent indicated minor concern and 22 percent did not have fuel selection problems.

Seventy two percent of these fifty farmers indicated that the following problem was important to them as beginning irrigation farmers:

1. Determining the size of the power unit to buy.

Fifty two percent of the selected farmers indicated that the following problem was important to them as beginning irrigation farmers:

1. Selecting the kind of power to use.

A definite majority of the fifty farmers expressed the opinion that the following problem was of minor importance to them as beginning irrigation farmers:

1. Selecting the kind of fuel to use.

Servicing irrigation equipment. Table VII shows that 10 percent of the interviewees considered servicing the irrigation pump a major problem and 28 percent thought it important, to 52 percent this was a minor problem, 10 percent had no pump servicing problems.

Servicing the pipe and sprinklers was a major problem to only 8 percent of the interviewees and this was important to 18 percent, 36 percent indicated this to be a minor problem and 38 percent had no problem servicing this equipment.

TABLE VII

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING RELATIVE IMPORTANCE OF SERVICING
IRRIGATION EQUIPMENT TO THEM WHEN THEY
WERE BEGINNING IRRIGATION FARMERS

Servicing Irrigation Equipment	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Servicing the pump	10%	28%	52%	10%
Servicing the pipe and sprinklers	8	18	36	38
Servicing the power unit	6	24	62	8
Learning to trouble shoot system	20	34	38	8

Servicing the power unit was a major problem to only 6 percent and important to 24 percent, 62 percent indicated this was a minor problem and 8 percent had no problem. Trouble shooting the irrigation system posed a major problem to 20 percent of those interviewed and was important to 34 percent, to 38 percent this was a minor problem and 8 percent had no problem. The high degree of mechanical skill of the

farmers is reflected in Table VII. Servicing of irrigation equipment was not found to be a difficult problem to most of the farmers interviewed.

Fifty four percent of the selected farmers indicated that the following problem was important to them as beginning irrigation farmers:

1. Learning to trouble shoot system.

A definite majority of the fifty farmers expressed the opinion that the following problems were of minor importance to them as beginning irrigation farmers:

1. Servicing the pump.
2. Servicing the pipe and sprinklers.
3. Servicing the power unit.

Using irrigation on crops. Table VIII show that farmers have problems using irrigation on their crops as indicated by a majority of the interviewees. The quantity of water available for irrigation was a major problem to 46 percent of the interviewees and important to 30 percent, while to 20 percent this was a minor problem, only 4 percent indicated no problem. Quality of the available water was indicated to be a major problem to 30 percent and important to 18 percent, while 40 percent considered this a minor problem, 12 percent did not have a problem with water quality. In considering the number of acres to irrigate, 28 percent deemed this to be a major problem and 42 percent considered this important, to 26 percent the problem was minor, only 4 percent indicated no problem.

TABLE VIII

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING RELATIVE IMPORTANCE OF PROBLEMS IN USING
IRRIGATION WATER ON CROPS WHEN THEY WERE
BEGINNING IRRIGATION FARMERS

Using Irrigation On Crops	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Quantity of water available for irrigation	46%	30%	20%	4%
Quality of the water available	30	18	40	12
Number of acres to irrigate with the system	28	42	26	4
Preparing the seedbed for irrigation	22	38	34	6
Time to apply water to crops	54	30	14	2
Amount of water to apply	48	32	18	2
Finding extra labor needed	20	28	44	8
Controlling weeds	48	18	28	6

Seedbed preparation was a major problem to 22 percent of those interviewed and important to 38 percent, to 34 percent this was of minor importance and to 6 percent, no problem was encountered. Time of water application was a major problem to 54 percent of the interviewees and important to 30 percent, it was minor to 14 percent, only 2 percent did not have problems with water application. The amount of water to apply was given major consideration by 48 percent and was important to 32 percent, to 18 percent of the farmers it was a minor problem, only 2 percent had no problem. Finding extra labor needed

when irrigating, was a major problem to 20 percent of the farmers and an important problem to 28 percent, to 44 percent this was a minor problem and 8 percent indicated no problem. Weed control was deemed a major problem by 48 percent of the interviewees while 18 percent considered this important, to 28 percent a minor problem and 6 percent had no weed problems.

Sixty to eighty four percent of these fifty farmers indicated that the following problems were important to them as beginning irrigation farmers:

1. Time to apply water to crops.
2. Amount of water to apply.
3. Quantity of water available for irrigation.
4. Number of acres to irrigate with the system.
5. Controlling weeds.
6. Preparing the seedbed for irrigation.

Forty eight percent of the selected farmers indicated that the following problems were of importance to them as beginning irrigation farmers:

1. Quality of the water available.
2. Finding extra labor needed.

Flood irrigation problems. Table IX shows that 44 percent of the interviewees expressed the opinion that leveling land to be irrigated was a major problem and 18 percent thought the problem important, only 12 percent considered this a minor problem while 26 percent did not have land leveling problems.

TABLE IX

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
 CONCERNING RELATIVE IMPORTANCE OF FLOOD IRRIGATION
 PROBLEMS TO THEM WHEN THEY WERE BEGINNING
 IRRIGATION FARMERS

Flood Irrigation Problems	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Leveling land to be irrigated	44%	13%	12%	26%
Locating ditches	34	18	18	30

Locating irrigation ditches was a major problem to 34 percent of the farmers, and was important problem to 18 percent while 18 percent indicated a minor problem, 30 percent of the interviewees did not have ditching problems. Several of the selected farmers were irrigating from wells and using sprinkler lines on rolling land, others were using wells and flooding while some of the farmers use water from the Lake Altus, system, which accounts for the high percentage not having flood irrigation problems.

Sixty two percent of these fifty farmers indicated the following problem to be of importance to them as beginning irrigation farmers.

1. Leveling land to be irrigated.

Fifty two percent of the selected farmers indicated the following problem to be important to them as beginning irrigation farmers:

1. Locating ditches.

Miscellaneous irrigation problems. Table X shows that moving and resetting pipe was a major problem to 12 percent of the interviewed farmers, and was important to 28 percent, 30 percent considered this a minor problem and 30 percent had no problem. Figuring production costs was a major problem to 24 percent and important to 44 percent, to 28 percent this was of minor importance, only 4 percent expressed the opinion that the problem was not important.

Changing machinery to fit irrigation farming was a major problem as expressed by 18 percent of the interviewees and important to 40 percent while 34 percent considered this a minor problem, only 8 percent indicated that this was not a problem.

TABLE X

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING RELATIVE IMPORTANCE OF MISCELLANEOUS
IRRIGATION PROBLEMS TO THEM WHEN THEY WERE
BEGINNING IRRIGATION FARMERS

Miscellaneous Irrigation Problems	% Farmers Reporting Problem To Have Been			
	Major	Important	Minor	Not Applicable
Efficiency in moving and resetting pipe	12%	28%	30%	30%
Figuring production costs	24	44	28	4
Changing machinery to fit irrigation farming	18	40	34	8

Sixty eight percent of these fifty farmers indicated the following problem to be important to them as beginning irrigation farmers:

1. Figuring production costs.

From 40 to 58 percent of the selected farmers indicated that the following problems were of importance to them as beginning irrigation farmers:

1. Changing machinery to fit irrigation farming.
2. Efficiency in moving and resetting pipe.

Table XI through XVII represents the analysis of data received from 50 selected irrigation farmers after they had had at least one season experience with irrigation. Their interest in learning more about the problems they confronted is found in the following tables.

Irrigation planning. Table XI shows that 38 percent of the interviewees expressed the opinion that they would be very interested in learning more about irrigation planning and 46 percent were highly interested, 14 percent indicated little interest with only 2 percent not interested.

TABLE XI

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION
FARMERS CONCERNING THEIR DEGREE OF INTEREST
IN LEARNING MORE ABOUT IRRIGATION
PLANNING PROBLEMS

Irrigation Planning	Percent Farmers Reporting Their Degree of Interest To Be			
	Very High	High	Little	None
Planning for irrigation	38%	46%	14%	2%
General terms and nomenclature	13	36	38	8
Oklahoma Water Laws	28	38	20	14
The Water Facilities Act	22	40	18	20
Methods of financing irrigation	20	28	20	32

This table also shows that 18 percent had very high interest in learning more about terms and nomenclature, 36 percent expressed high interest. Of those interviewed, 38 percent had little interest and 8 percent expressed no interest.

Oklahoma water laws drew very high interest from 28 percent and high interest from 38 percent of the interviewees, 20 percent of the farmers expressed little interest and 14 percent were not interested. The Water Facilities Act was of very high interest to 22 percent of the interviewees while 40 percent were highly interested, 18 percent had little interest, 20 percent expressed no interest. To 20 percent of the farmers, methods of financing irrigation was of very high interest and 28 percent indicated high interest, 20 percent had little interest and 32 percent had no interest.

Sixty two to eighty four percent of these fifty farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Planning for irrigation.
2. Oklahoma Water Laws.
3. The Water Facilities Act.

Forty eight to fifty four percent of the selected farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. General terms and nomenclature.
2. Methods of financing irrigation.

Cost of irrigation. Table XII shows that 50 percent of the interviewees were very highly interested in learning more about figure-production costs with irrigation and 42 percent expressed high interest

while only 6 percent indicated little interest, 2 percent were not interested. The use of irrigation for greater profits was of very high interest to 88 percent of the interviewed farmers and the remaining 12 percent expressed high interest. Figuring fixed costs was of very high interest to 30 percent of those interviewed while 50 percent expressed high interest, only 20 percent had little interest, none of the farmers indicated lack of interest.

TABLE XII

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST IN LEARNING
MORE ABOUT COSTS OF IRRIGATION

Cost Of Irrigation	% Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Figuring costs of production with irrigation	50%	42%	6%	2%
How to use irrigation for greater profits	88	12	0	0
Figuring fixed costs	30	50	20	0
Calculating operation costs	34	44	18	4

Calculation of operating costs was of very high interest to 34 percent of the farmers interviewed and of high interest to 44 percent, 18 percent indicated little interest, only 4 percent expressed lack of interest.

Seventy eight to one hundred percent of the fifty farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Figuring costs of production with irrigation.

2. How to use irrigation for greater profits.
3. Figuring fixed costs.
4. Calculating operation costs.

Soil problems. Table XIII shows that 44 percent of the interviewees expressed a very high degree of interest in testing soils, 48 percent indicated high interest, only 8 percent had little interest, none of the farmers interviewed expressed lack of interest. The effect of irrigation on soil was of high interest to 56 percent of the interviewees and of high interest to 26 percent, 8 percent had little interest while 10 percent indicated no interest. Infiltration rate of soils was of very high interest to 30 percent of the interviewees while 36 percent were highly interested, 28 percent had little interest, only 6 percent weren't interested.

TABLE XIII

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST
IN LEARNING MORE ABOUT IRRIGATION
SOIL PROBLEMS

Soil Problems	Percent Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Testing Soils	44%	48%	8%	0%
Study the effect irrigation has on soils	56	26	8	10
Infiltration rate of soils	30	36	28	6
Tillage methods on irrigated land	40	46	14	0
Leveling and grading land for irrigation	40	22	14	24

Tillage methods on irrigated land was important to the farmers interviewed as indicated by 40 percent, expressing very high interest and 46 percent highly interested, 14 percent had little interest, none of the interviewees indicated lack of interest. To 40 percent of the farmers, leveling and grading land for irrigation was of very high interest, while 22 percent indicated high interest, 14 percent had little interest and 24 percent were not interested. Several of the farmers interviewed are using sprinkler systems on rolling land and were not concerned with land leveling problems.

Sixty two to ninety two percent of the fifty farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Testing soils.
2. Tillage methods on irrigated land.
3. Study the effect irrigation has on soils.
4. Infiltration rate of soils.
5. Leveling and grading land for irrigation.

Weed and insect problems. Table XIV deals with weed and insect problems on irrigated land, these problems are accelerated with irrigation as indicated by 66 percent of the interviewees expressing very high interest in learning more about weed control methods, to 24 percent this problem was of high interest, 6 percent had little interest, only 4 percent expressed lack of interest.

TABLE XIV

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST IN LEARNING MORE
ABOUT WEEDS AND INSECT CONTROL PROBLEMS

Weed And Insect Problems	% Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Better methods of weed control	66%	24%	6%	4%
Kinds of and proper use of herbicides	54	30	10	6
Kinds and uses of various insecticides	76	20	4	0
Study of beneficial and harmful insects common in the area	66	24	8	2
Sprayer and duster operation	52	36	10	2
Pre-emergence weed control measures	56	26	16	2

The kinds and proper use of herbicides was of very high interest to 54 percent of the interviewees and 30 percent expressed high interest, 10 percent had little interest and 6 percent indicated no interest.

The group of interviewed farmers indicated a very intense interest in the kinds and use of various insecticides; 76 percent expressed very high interest and 20 percent indicated high interest, only 4 percent had little interest and there were none that did not have any interest. The study of beneficial and harmful insects in the area was of very high interest to 66 percent of the farmers while 24 percent were highly interested, 8 percent had little interest, only 2 percent indicated no interest. Sprayer and duster operation was indicated to be of very high interest to 52 percent while 36 percent expressed high interest, 10 percent had little interest with only 2 percent indicating no

interest. The use of pre-emergence weed control measures was of very high interest to 56 percent of the interviewees and 26 percent were highly interested, 16 percent indicated little interest and only 2 percent had no interest.

Eighty two to ninety six percent of the fifty farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Kinds and uses of various insecticides.
2. Study of beneficial and harmful insects common in the area.
3. Better methods of weed control.
4. Sprayer and duster operation.
5. Kinds of and proper use of herbicides.
6. Pre-emergence weed control measures.

Water application problems. Table XV shows that farmers with irrigation systems are interested in learning more about applying and using irrigation water. Measuring water flow was of very high interest to 24 percent of the interviewees and of high interest to 46 percent, 18 percent expressed little interest and 12 percent had no interest. Very high interest was expressed by 44 percent of the farmers in the use of pre-irrigation, and 30 percent indicated high interest, 18 percent expressed little interest and 8 percent had no interest. Moisture requirements for various crops was of very high interest to 48 percent of interviewed farmers, while 42 percent expressed high interest, only 10 percent indicated little interest,

TABLE XV

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST IN LEARNING
MORE ABOUT WATER APPLICATION PROBLEMS

Water Application Problems	% Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Measuring water flow	24%	46%	18%	12%
The use of pre-irrigation	44	30	18	8
Moisture requirements of various crops	43	42	10	0
Time to apply water to crops and the amount to apply	84	16	0	0

none of the farmers expressed lack of interest. Time and amount of water to apply to crops was indicated to be of very high interest to 84 percent of the farmers and 16 percent expressed high interest; not a single farmer indicated little or no interest.

Seventy to one hundred percent of the fifty farmers indicated that they were interested in learning more about the following problems after they were experienced irrigation farmers:

1. Time to apply water to crops and the amount to apply.
2. Moisture requirements of various crops.
3. The use of pre-irrigation.
4. Measuring water flow.

Crop and fertilizer problems. Table XVI shows that farmers are concerned with knowing more about cropping and fertilization in connection with irrigation. Agronomy of crops common in the area was of very high interest to 34 percent of the interviewees while 42 percent indicated high interest, 20 percent had little interest, only 4 percent

were not interested. Crops that have possibilities in the area was of very high interest to 52 percent of those interviewed while 28 percent were highly interested, 14 percent had little interest with only 6 percent indicating no interest.

TABLE XVI

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST IN LEARNING
MORE ABOUT CROP AND FERTILIZER PROBLEMS

Crop And Fertilizer Problems	% Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Agronomy of crops common in the area	34%	42%	20%	4%
Crops that have possibilities in the area	52%	28	14	6
Planning crop systems for maximum use of irrigation	76	22	2	0
Study of commercial fertilizers	70	26	0	4
Fertilizer application methods	66	22	6	6

Planning crop systems for maximum use of irrigation was expressed as being of very high interest to 76 percent of the interviewees while 22 percent indicated high interest, the remaining 2 percent had little interest. Study of commercial fertilizers was of very high interest to 70 percent of the farmers, 26 percent expressed high interest none of the farmers indicated little interest, and only 4 percent were not interested. To 66 percent of the interviewees, the methods of applying fertilizer was of very high interest while 22 percent were highly interested, 6 percent had little interest and 6 percent had no interest.

Seventy six to ninety eight percent of the fifty farmers indicated they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Planning crop systems for maximum use of irrigation.
2. Study of commercial fertilizers.
3. Fertilizer application methods.
4. Crops that have possibilities in the area.
5. Agronomy of crops common in the area.

Miscellaneous irrigation problems. Table XVII shows that 26 percent of the interviewees had very high interest in learning more about maintenance and repair of irrigation equipment, 50 percent expressed high interest while 14 percent indicated little interest and 10 percent were not interested.

TABLE XVII

PERCENTAGE DISTRIBUTION OF RESPONSES OF 50 IRRIGATION FARMERS
CONCERNING THEIR DEGREE OF INTEREST IN LEARNING
MORE ABOUT MISCELLANEOUS IRRIGATION PROBLEMS

Miscellaneous Irrigation Problems	% Farmers Reporting Their Degree Of Interest To Be			
	Very High	High	Little	None
Maintenance and repair of equipment	26%	50%	14%	10%
Ditch and border maintenance	36	22	10	32
Study and use of machinery necessary with irrigation farming	18	50	22	10
Determining pump efficiency	22	38	32	8

Ditch and border maintenance was indicated to be of very high interest to 36 percent of the interviewees while 22 percent expressed high interest, 10 percent had little interest and 32 percent were not interested. The study and use of machinery necessary with irrigation was of very high interest to 18 percent of those interviewed, 50 percent indicated high interest while 22 percent expressed little interest and 10 percent had no interest. Determining pump efficiency was of very high interest to 22 percent of the interviewees and of high interest to 33 percent, 32 percent expressed little interest, only 8 percent indicated no interest.

Sixty to seventy six percent of the fifty farmers indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers:

1. Maintenance and repair of equipment.
2. Study and use of machinery necessary with irrigation farming.
3. Determining pump efficiency.

Fifty eight percent of the selected farmers indicated that they were interested in learning more about the following problem, after they were experienced irrigation farmers:

1. Ditch and border maintenance.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

In this chapter is presented a summary and conclusions of the study based upon the findings, and recommendations relating to future research needed in determining the problems in connection with irrigation farming in eight southwest Oklahoma counties.

In order to evaluate the importance or interest of the problems presented to the fifty selected farmers, their responses to the problems in the interview schedules were grouped into three categories, which indicates their degree of importance to the interviewees as beginning irrigation farmers and after experience with irrigation farming. The problems that 60 to 100 percent of the fifty farmers indicated to be important or of interest to them is considered a definite majority and therefore should be given primary consideration when formulating educational programs concerning irrigation. The problems that 40 to 58 percent of the farmers indicated to be of interest or important to them are considered to be secondary problems, that may be included in formulating educational programs concerning irrigation. When less than 40 percent of the interviewees indicated the problem to be important or of interest to them, there would probably be little need to include them, when formulating programs of instruction concerned with irrigation.

SUMMARY AND CONCLUSIONS

Since a definite majority of the fifty farmers interviewed, indicated that the following problems were of importance to them as beginning irrigation farmers, one may conclude that these problems should be included in educational programs designed for beginning irrigation farmers.

1. General planning for irrigation.
2. Finding information about irrigation.
3. Size pump to purchase.
4. Figuring friction loss.
5. Determining the size of the power unit to buy.
6. Time to apply water to crops.
7. Amount of water to apply.
8. Quantity of the water available for irrigation.
9. Number of acres to irrigate with the system.
10. Controlling weeds.
11. Preparing the seedbed for irrigation.
12. Leveling land to be irrigated.
13. Figuring production costs.

The following problems may be included in educational programs, designed for beginning irrigation farmers, because between 40 to 58 percent of the fifty farmers interviewed indicated these were of some importance to them as beginning irrigation farmers.

1. Methods of financing the system.
2. Infiltration rate of the soil to be irrigated.
3. Locating the well.
4. Finding a reliable well driller.
5. Drilling the irrigation well.
6. Determining the water bearing formation.
7. Test pumping the well.
8. Methods of completing the well.
9. Where to place the sand screen in the water bearing formation.
10. Type of pump to buy.
11. Amount of pipe to buy.
12. Size pipe to buy.
13. Kind and type of sprinklers to buy.
14. Determining pump efficiency.
15. Designing the system to fit the well.
16. Determining the g.p.m. output of the well.

17. Selecting the kind of power to use.
18. Learning to trouble shoot the system.
19. Quality of the water available.
20. Finding extra labor needed.
21. Locating ditches.
22. Changing machinery to fit irrigation.
23. Efficiency in moving and resetting pipe.

According to the findings of this study, the following problems were of little importance to a majority of the fifty farmers interviewed, when they were beginning irrigation farmers and, therefore should probably be omitted from educational programs designed for beginning irrigation farmers.

1. Securing water rights for irrigation.
2. Drilling test wells.
3. Casing the irrigation well.
4. Selecting the sand screen.
5. Gravel packing the well.
6. Selecting the kind of fuel to use.
7. Servicing the pump.
8. Servicing the pipe and sprinklers.
9. Servicing the power unit.

Since a definite majority of the fifty farmers interviewed indicated that they were interested in learning more about the following problems, after they were experienced irrigation farmers; one may conclude that these problems should be included in educational programs designed for experienced irrigation farmers.

1. Planning for irrigation.
2. Oklahoma water laws.
3. Water Facilities Act.
4. Figuring the costs of production with irrigation.
5. How to use irrigation for greater profits.
6. Figuring fixed costs.
7. Calculating operation costs.
8. Testing soil.
9. Tillage methods on irrigated land.
10. Study the effect irrigation has on soil.
11. Infiltration rate of soils.
12. Leveling and grading land for irrigation.
13. Kinds and uses of various insecticides.
14. Study of beneficial and harmful insects common in the area.
15. Better methods of weed control.

16. Sprayer and duster operation.
17. Kinds and proper use of herbicides.
18. Pre-emergence weed control measures.
19. Time to apply water to crops and the amount to apply.
20. Moisture requirements for various crops.
21. The use of pre-irrigation.
22. Measuring water flow.
23. Planning crop systems for maximum use of irrigation.
24. Study of commercial fertilizers.
25. Fertilizer application methods.
26. Crops that have possibilities in the area.
27. Agronomy of crops common in the area.
28. Maintenance and repair of equipment.
29. Study and use of machinery necessary with irrigation farming.
30. Determining pump efficiency.

The following problems may be included in educational programs designed for experienced irrigation farmers, since 40 to 58 percent of the fifty farmers interviewed indicated that they would be interested in learning more about them, after they were experienced irrigation farmers.

1. General terms and nomenclature.
2. Methods of financing irrigation.
3. Ditch and border maintenance.

According to the findings of this study, none of the problems presented to the fifty farmers interviewed were of such little interest to them, as to be omitted from educational programs designed for experienced irrigation farmers.

RECOMMENDATIONS

Additional research is needed in the area of irrigation farming to determine, (1) what help farmers need to solve the problems involved in establishing irrigation systems, (2) how farmers solve the problems encountered in connection with irrigation farming, (3) the sources of assistance available to farmers with irrigation problems, (4) to ascertain additional problems that may have been omitted in this study, and (5) the facilities necessary to develop and carry out effective educational programs for irrigation farming.

A SELECTED BIBLIOGRAPHY

- Cook, Glen Charles. A Handbook on Teaching Vocational Agriculture. Danville, Illinois: The Interstate Printing Company, 1947.
- Deyoe, George P. Supervised Farming in Vocational Agriculture. Danville, Illinois: The Interstate Printing Company, 1947.
- United States Department of Agriculture. Climate and Man. Yearbook of Agriculture. Washington, D. C.: Government Printing Office, 1941.
- Sprinkler Irrigation Association. Sprinkler Irrigation. Washington 6, D. C.: Sprinkler Irrigation Association, 1955.
- Gray, Alfred S. Sprinkler Irrigation Handbook. Glendora, California: Rainbird Sprinkler Manufacturing Corporation, 1952.
- United States Department of Agriculture. Water. Yearbook of Agriculture, Washington, D. C.: Government Printing Office, 1955.
- United States Department of Commerce, Bureau of Census. United States Census of Agriculture. Volume 1, Part 25, Oklahoma. Washington, D. C.: Government Printing Office, 1954.
- Lovell, James Frederick. A Determination of Problems Concerning Irrigation Farming in the Oklahoma Panhandle with Implications for Teaching Vocational Agriculture. Masters Thesis, Oklahoma State University, 1958.
- Oklahoma State Water Study Committee. Proposed Water Policy for the State of Oklahoma. Oklahoma City, Oklahoma: State Capitol Building.
- State Board of Agriculture and the Agriculture Marketing Service, U.S.D.A. Oklahoma Agriculture 1957, Annual Report. Oklahoma City, Oklahoma: Oklahoma State Board of Agriculture.
- Husky, Ira C. Oklahoma Water Resources. Oklahoma City, Oklahoma: Oklahoma Planning and Resources Board, 1953.
- United States Office of Education, Vocational Division. Educational Objectives in Vocational Agriculture. Monograph Number 21, Washington, D. C.: Government Printing Office, 1940.
- Oklahoma State University Extension Service. Water in Oklahoma. Extension Circular. No. 628. Stillwater, Oklahoma:
- Oklahoma State University Extension Service. Irrigation for Oklahoma. Extension Circular. No. C-131. Stillwater, Oklahoma: 1948

Oklahoma State University Extension Service. Surface Irrigation Development. Extension Circular. 571. Stillwater, Oklahoma:

Oklahoma State University Extension Service. Irrigation Water from Wells. Extension Circular. 645. Stillwater, Oklahoma:

Oklahoma State University Extension Service. Sprinkler Irrigation. Extension Circular. No. 632. Stillwater, Oklahoma:

APPENDIXES

Instructions for Interview Schedule

As agriculture leaders in the community, vocational agriculture instructors and county agents may be called on to aid some farmer with problems concerning irrigation. In order to determine more accurately what they are, the following list of tentative problems have been compiled.

The farmer contacted should have a system of irrigation in operation for not less than one year.

There are two parts or sections; the first deals with problems that might have been of concern before or while the system was being installed on the farm and immediately after operation began. The second section deals with the points that the farmer would like to know more about after some experience with irrigation.

It is suggested that the teacher or agent fill in the answers while visiting with the farmer or after the visit rather than giving the form to the farmer to fill out.

Any problem that may arise when talking with the farmer and that is not covered in the material on this form, may be added to the last page, if in the opinion of the teacher or agent making the contact it is worthy of consideration.

Section I

The following questions are to determine the difficulties farmers with irrigation systems encountered when they first thought about irrigation and during the time that the system was being installed.

In order to find the problems in their degree of importance a choice of four answers is given; that is, major problem, somewhat of a problem, minor problem and no comment. Please check one answer only.

When planning the irrigation system and in the period immediately following the establishment of the system the following problems were encountered and were of some degree of concern.

Section I

Major Problem Important Problem Minor Problem Not Applicable

	Major Problem	Important Problem	Minor Problem	Not Applicable
1. General planning for irrigation.
2. Locating the well on the farm.
3. Leveling land to be irrigated.
4. Locating the ditches.
5. Finding information about irrigation.
6. Securing water rights for irrigation.
7. Methods of financing the system.
8. Finding a reliable well driller.
9. Drilling test wells.
10. Quantity or amount of water available for irrigation.
11. Quality of the water available.
12. Infiltration rate of the soil to be irrigated.
13. Caseing the well.
14. Gravel packing the well.
15. Controlling weeds.
16. Selecting a sand screen.
17. Determining the amount of water bearing formation in the well.
18. Where to place the sand screen in the formation.

Section I

Major Problem Important Problem Minor Problem Not Applicable

	Major Problem	Important Problem	Minor Problem	Not Applicable
19. How to complete well.
20. Size pump to buy for system.
21. Type of pump to buy.
22. Actual drilling of the well.
23. Test pumping the well.
24. Determining size power unit to buy
25. Selecting the kind of power to use.
26. Kind of fuel to use.(If engine driven)
27. Number of acres to irrigate with the system.
28. Size of pipe to buy.
29. Amount of pipe to buy.
30. Kind and type of sprinklers to buy.
31. Servicing the pump.
32. Servicing the pipe and sprinklers.
33. Servicing the power unit.
34. Designing the system to fit the well.
35. Determining the pump efficiency.
36. Figuring the friction loss.
37. Determining the g.p.m. output of the well.
38. Finding the extra labor needed to hire.

Section I

Major Problem Important Problem Minor Problem Not Applicable

39. Time to apply water to crops.	.....	.....	.....	.....
40. Amount of water to apply.	.....	.....	.....	.....
41. Efficiency in moving and re-setting the pipe.	.....	.....	.....	.....
42. Figuring production costs.	.....	.....	.....	.....
43. Preparing the seedbed for irrigation.	.....	.....	.....	.....
44. Changing machinery to fit irrigation farming.	.....	.....	.....	.....
45. Learning to trouble shoot the system.	.....	.....	.....	.....

Additional Problems not covered.

Section II

This section of the questionnaire is for the purpose of finding those problems concerning irrigation which the farmer would like to know more about after actual experience.

Adult and young farmer classes might be based on some phase or parts of this section.

To determine the degree of interest, again four choices are offered. Very interested, Interested, A little interested and not interested. Please check only one answer per problem.

As a farmer with experience in irrigation would you be interested in knowing more about the following problems concerning irrigation farming?

Section II

Very High High Little Not
Interest Interest Interest Interested

	Very High Interest	High Interest	Little Interest	Not Interested
1. Figuring the costs of production with irrigation.
2. Maintenance and repair of equipment.
3. General terms and nomenclature.
4. Measuring water flow.
5. Better methods of weed control.
6. Kinds and proper use of herbicides.
7. Ditch and border maintenance.
8. Study the effect irrigation has on soils.
9. The use of pre-irrigation.
10. Oklahoma water laws.
11. The Water Facilities Act.
12. Methods of financing irrigation.
13. Study and use of machinery necessary with irrigation farming.
14. Testing soils.
15. Kinds and uses of various insecticides.
16. Pre-emergence weed control measures.
17. Study of beneficial and harmful insects common in the area.
18. Sprayer and duster operation.

Section II

Very High High Little Not
Interest Interest Interest Interested

	Very High Interest	High Interest	Little Interest	Not Interested
19. Study of commercial fertilizers.
20. Fertilizer Application methods.
21. Infiltration rates of soils.
22. Agronomy of crops common in the area.
23. Crops that have possibilities in the area.
24. Moisture requirements of various crops.
25. Planning for irrigation.
26. Time to apply water to crops and the amount to apply.
27. How to use irrigation for greater profits.
28. Planning crop systems for maximum use of irrigation.
29. Figuring fixed costs.
30. Calculating operation costs.
31. Determining pump efficiency.
32. Tillage methods on irrigated land.
33. Levelling and grading land for irrigation.

Other items of interest not covered in the above.

VITA

Charles Cecil Barney

Candidate for the Degree of
Master of Science

Thesis: IRRIGATION PROBLEMS IN ADULT EDUCATION FOR SOUTHWEST
OKLAHOMA

Major Field: Agriculture Education

Biographical:

Personal data: Born near Ft. Cobb, Oklahoma, March 17, 1922,
the son of Elvin C. and Dora Barney.

Education: Attended grade school and graduated from Washita
High School, Washita, Oklahoma in 1939; attended Carnegie
Junior College, Carnegie, Oklahoma from September 1939
through May, 1941. Attended Trade School for Aircraft
Mechanics in Wichita Falls, Texas, for one year; served
thirty four months in Army Air Corps during World War II.
Received Bachelor of Science degree from the Oklahoma
State University with a major in Agriculture Education in
January, 1949; completed requirements for the Master of
Science degree at Oklahoma State University, with a major
in Agriculture Education in summer, 1953.

Professional experience: Serving as teacher of vocational
agriculture in Elk City, Oklahoma, since 1949.

Professional organizations: Oklahoma Education Association,
Oklahoma Vocational Association, America Vocational
Association, National Vocational Agriculture Teachers
Association.

THESIS TITLE: IRRIGATION PROBLEMS IN ADULT EDUCATION
FOR SOUTHWEST OKLAHOMA

AUTHOR: Charles Cecil Barney

THESIS ADVISER: Dr. Roy W. Dugger

TYPIST: Mrs. Gwyn Hollingshead