ALFALFA PRODUCERS' AWARENESS AND PERCEPTIONS OF INTEGRATED PEST MANAGEMENT PRACTICES IN A FOUR-COUNTY AREA IN SOUTH-CENTRAL OKLAHOMA

By

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CHAPTER I

INTRODUCTION

Integrated Pest Management (IPM) is an effective composite of chemical and biological methods to suppress pest populations (weeds, diseases, and insects) to a cost effective level, rather than using costly and time consuming eradication practices. Finley (1981) revealed that careful observation of crops and IPM combines all available pest control strategies in an effective crop production-management system.

Through utilizing different methods and combinations of methods to control pest populations, IPM minimizes adverse effects on people and the environment through timing, strategies, methods, and levels of application in controlling pest populations.

Oklahoma farmers depend heavily on alfalfa (*Medicago sativa*) as a cash crop, being second only to wheat (*Triticum aestivum*) in economic importance (Oklahoma Agricultural Statistics, 1992). With approximately 400,000 acres in alfalfa, averaging 3.3 tons/acre yield, close to 1.3 million tons of forage are harvested annually (Oklahoma Agricultural Statistics, 1992). Alfalfa, having a market value averaging

$85/ton, translates into approximately $110 million of potential gross income for Oklahoma alfalfa growers (Oklahoma Agricultural Statistics, 1992).

The Oklahoma growing season is usually adequate for two to five dryland cuttings, or five to seven cuttings with irrigation and intensive management. The longer alfalfa stands remain healthy and productive, the more costs are minimized and profits increased (Ward, 1987). Pest management, production management, and stand longevity are all leading component factors affecting alfalfa profitability.

Statement of the Problem

As pesticide restrictions became more apparent the public, regulators, and producers began to look for alternatives to chemical application. Even though producers were looking for alternative controls, few understood the purpose and process of IPM. Many Oklahoma alfalfa growers had little if any awareness of IPM practices, while others had unfounded or preconceived ideas. The question then becomes, how do we best prevent pest damage to crops, maintain cost effectiveness, and be environmentally friendly. Controlling pest problems, producing a quality product, and developing producer awareness and acceptance of alternative pest control practices is a challenge. Extension educators are busy finding answers for their

clientele while long-term solutions may be in the development of educational programs which lead to greater producer awareness and acceptance of IPM practices. Awareness of requirements and understanding of IPM practices allow the producer to review the possibilities of utilizing alternative pest controls to minimize chemical and application costs while enhancing product quality and profitability.

Purpose of the Study

The purpose of this study was to describe the awareness, perceptions and practices implemented with regard to IPM practices among selected alfalfa producers in a four-county area of South-Central Oklahoma.

Objectives of the Study

To accomplish the purpose of this study, the researcher established the following specific objectives:

1. To determine the awareness level among selected alfalfa producers of Integrated Pest Management practices in the four-county area.

2. To determine the perceptions of IPM practices among selected alfalfa producers in the four-county area with regard to:

a) major pest problems confronting producers,

b) sources of information concerning IPM practices,

c) and perceived advantages and disadvantages of IPM.

3. To determine IPM practices implemented by selected alfalfa producers in the four-county area.

4. To determine and compare the personal and production characteristics of selected alfalfa producers with IPM practices currently conducted in the four-county area of South-Central Oklahoma.

Assumptions of the Study

For the purpose of the study, the following assumptions were accepted by the researcher:

1. The selected alfalfa producers were representative of the alfalfa producers in the four-county area of South-Central Oklahoma;

2. The instrument elicited accurate responses from the selected alfalfa producers;

3. The instrument adequately assessed the alfalfa producers' awareness, perceptions, and practices implemented with regard to IPM.

Scope of the Study

The scope of this study included alfalfa producers who were members of their respective County Alfalfa Hay Growers

Association and/or identified as being growers from extension producers' directories in Caddo, Grady, Garvin and McClain Counties, located in South-Central Oklahoma.

Definition of Terms

The following definitions are presented as they apply to the study.

1) Awareness: Implies observation and understanding of what is occurring in or around a production unit and that the producer has the skills, ability and intellect to draw inferences from obserations, outside information sources and/or practices conducted.
2) Cooperative Extension Service: The organization created by the Smith-Lever Act of 1914 and which is a cooperative function between the United States Department of Agriculture (USDA), the Land-Grant University in each state, and local county governments.
3) Enrolled/Enrollment in an IPM Program: A participant in the process of learning IPM management skills, techniques, practices, etc. for the purposes of enhancing production and environmental benefits.
4) Holistic: Emphasizing the functional relationship between parts and wholes.
5) Integrated Pest Management (IPM): An effective composite of chemical and biological methods to

suppress pest populations to a cost effective level, rather than using costly and time consuming eradication practices.

6) IPM Practices: Techniques utilized by producers that utilize IPM theory.

7) IPM Programs: Opportunities offered by both government and private agencies to assist program clientele in learning IPM management skills, techniques and practices, but does not exclude consultation offered as a result of scouting services in which compensation is allocated for services rendered between producers and the scout or scouting agency/association.

8) Perception: The mental process of understanding in the light of one's experiences, observations, abilities and knowledge of a discipline practices, programs, agricultural production units, etc.

9) Pests: Includes weeds, diseases, and insects which are considered to be non-beneficial and economically damaging to the quality and yield of a crop.

10) Scouting Program: Routine or regular monitoring of fields by persons who have a knowledge of IPM and/or crop pests to detect pest problems.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The purpose of this chapter was to inform and orient the reader with reference information on the subject of alfalfa and Integrated Pest Management (IPM). This overview of reference information was divided into six major areas and a summary, which included: 1) History of Alfalfa; 2) History of Integrated Pest Management; 3) Effectiveness of Integrated Pest Management; 4) Integrated Pest Management: A Composite of Biological and Chemical Controls; 5) The Role of the USDA in Integrated Pest Management; and 6) The Role of OSU in Integrated Pest Management.

History of Alfalfa

Alfalfa, often called the "Queen of the Forages", is one of the most important forage plants grown in the United States (Barnes, et al, 1985).

Alfalfa originated near what is now known as Iran, but related forms and species are found growing wild throughout

central Asia and into Siberia (Barnes and Sheaffer, 1985). Alfalfa was brought to Greece by invading Persian armies to feed war horses and spread through the Greek culture to the Roman Empire. The Roman names for alfalfa were *Lucerne* and *Medica*, and Roman Legions introduced alfalfa throughout most of Europe, except Spain.

The Moslem influence in Spain explains the Arabic word of alfalfa, which Spanish explorers and missionaries brought to Mexico and South America in the sixteenth century (Hendry, 1923). Alfalfa was first introduced into the eastern United States during the mid 1700's, but these European varieties did not thrive. Bolton (1962) suggested that the acid soils and humid climate were responsible for the lack of success in those areas.

Spanish sources of alfalfa, often referred to as "Chilean clover", were introduced into the southwestern United States during the mid 1800's from Mexico and South America, and these varieties spread to northern California and as far east as Kansas (Barnes and Sheaffer, 1985). Various winter-hardy, nonwinter-hardy and intermediate winter-hardy germplasm strains were introduced into the United States between the late 1800's and the mid 1900's. In total, nine sources represent most of the basic alfalfa germplasm presently used in the United States cultivars (Barnes, et al., 1985).

Oklahoma alfalfa production began during the early 1900's with the Spanish varieties being grown from Kansas to

Colorado. The planted acreage of alfalfa in Oklahoma increased rapidly throughout the twentieth century, from about 250,000 acres during the 1920's to a high of 600,000 acres in the early 1970's, to the current figure of about 400,000 acres (Oklahoma Agricultural Statistics, 1992).

History of Integrated Pest Management

Throughout history, pests have threatened man's health and his food supply. Both rural and urban settlements have had to contend with a variety of unwanted and sometimes harmful insects, weeds, microorganisms, rodents, and other organisms - collectively known as "pests" (Bottrell, 1979). Some of the first methods of pest control were learning how to manipulate the environment so that it became less favorable to pests; some examples included flooding or burning fields and using scarecrows to keep birds away.

The utilization of natural enemies to control pests dates back several thousand years, and was recognized by the Chinese several centuries before Christ. Predatory ants were used in Chinese citrus orchards to control caterpillars and beetles. Materials with pesticidal properties, such as plant-derived chemicals (e.g., pyrethrum) and arsenic and sulfur were used sporadically and largely ineffectively from the time of the Greek and Roman Empires (Flint and van den Bosch, 1981).

Well before 2500 B.C., the Sumerians were using sulfur compounds to control insects and mites, and by 1200 B.C., in China, plant-derived insecticides had been used for seed treatment and fumigation.

Reamur discussed the significance of host-parasite relationships in pest outbreaks in the eighteenth century and suggested the use of entomophagous insects, specifically lacewings (*Neuroptera chrysopa*), to keep a greenhouse free of aphids (*Aphidae*) (Flint and van den Bosch, 1981).

Linnaeus suggested the use of ground beetles (*Coleoptera carabidae*), lady beetles (*Coleoptera coccinellidae*), lacewings, and parasites for the biological control of pests (Flint and van den Bosch, 1981).

Provisions of nesting boxes for insectivorous birds in orchards and forests began to be a common practice in Germany during the early 1800's.

Different suggested pest remedies ranged from hand-picking and shaking to encouraging natural enemies, employing various cultural practices, and constructing physical barriers to pests.

It was late in the nineteenth century that the importance of natural enemies for biological control was shown to be one of the most effective means of combatting insect (and later, weed) pests. Around the turn of the nineteenth century, six major approaches to pest control were well on the way to being established and put into use:

1) Biological control,

2) Mechanical and physical control,

3) Cultural control,

4) Chemical control,

5) The use of resistant varieties, and

6) Legal control, through the use of inspections and quarantines (Flint and van den Bosch, 1981, p. 64).

E. Dwight Sanderson's book (1915), Insect Pests of Farm, Garden, and Orchard, considered proper farming methods instrumental in pest control. These methods included crop rotation, arrangement of planting times, and destruction of weeds that competed with crops and harbor pests. Sanderson also pointed out the importance of proper fertilization and soil preparation in pest control, citing that a healthy crop can better withstand an outbreak of pests.

World War II prompted the development of the modern "miracle" pesticides, DDT, organophosphates, carbamates, and later, 2,4-D. The application of these pesticides became commonplace, both in urban and agricultural areas.

The new, easy to use chemicals fostered a new attitude of "spray now, think later", which killed many beneficial insects. Producers relied solely on chemicals and quit using the old pest control practices which were usually quite effective and environmentally sound. By 1975, 75 percent of the most serious agricultural insect pests in California had developed resistance to one or more of the major insecticides (Flint and van den Bosch, 1981).

> IPM was first articulated by insect control specialists and insect ecologists. It gained considerable attention and funding as an insect management approach before the concept came to include all classes of pests (Apple and Smith, 1976 p. 182).

Although many of the cultural, physical, and biological control methods associated with IPM were practiced during the first third of this century, IPM is not a throwback to obsolete or pre-chemical pest control methods.

> In the late 1940's, Ray F. Smith and others suggested the need for supervised control specialists who would carry out routine field monitoring of pest populations and their natural enemies and prescribe to the grower what, if any, control action was needed (Flint and van den Bosch, 1981, p. 78).

Over the last forty years, entomologists have developed several different methods of pest control that are consistent with the goals of the IPM concept and are minimally disruptive to the environment. During 1972, President Nixon directed agencies of the United States government to take immediate action toward developing pest management programs in order to protect: 1) the nation's food supply, 2) the health of the population, and 3) the environment (Smith, 1978). The President's directive prompted funding of a national research project involving 19 universities and various federal agencies, and was entitled "The Principles, Strategies, and Tactics of Pest Population Regulation and Control in Major Crop Ecosystems" (Finley, 1981).

Jimmy Carter, President of the United States, stated:

> I am instructing the Council on Environmental Quality, at the conclusion of its ongoing review of IPM in the United States, to recommend actions which the federal government can take to encourage the development and application of pest management techniques which emphasize the use of natural biological controls like predators, pest specific diseases, pest-resistant plant varieties and hormones, relying on chemical agents only as needed (cited by Goldstein, 1978, p. 57).

Goldstein (1978) also quoted the Secretary of the United States Department of Agriculture, Bob Bergland, as saying,

> It is the policy of the United States Department of Agriculture to develop, practice, and encourage the use of IPM methods, systems, and strategies that are practical, effective, and energy efficient (p. 57).

With this support, agriculture is moving to replace routine spraying with treat-when-necessary programs (IPM) which are based on monitoring of pest and parasite/predator populations (Smith and Pimentel, 1978).

Effectiveness of Integrated Pest Management

Despite the advances in modern chemical control and the large increase in the use of chemical pesticides, annual crop losses from all pests remain consistent.

> IPM is an approach that employs a combination of techniques to control the wide variety of potential pests that may threaten crops (Council on Environmental Quality, 1972, p. 9).

Crops under IPM need not produce low-quantity or low quality yields, and often both quality and quantity may be noticeably improved (Council on Environmental Quality, 1972).

> Since 1971 the Cooperative Extension Service has been demonstrating the advantages of IPM on a wide variety of field crops and livestock operations. For nearly every crop included in the demonstrations, in over 30 states, pesticide use has dropped significantly without a sacrifice in yield or quality and with increased profit to the farmer (Bottrell, 1979, p. ix).

Successful USDA IPM programs range from apples in the State of Washington and in Nova Scotia, to California cotton, citrus, and grapes (Council on Environmental Quality, 1972). Key, et al. (1985) stated that a high percentage of wheat producers reported that they thought IPM was profitable. They went on to add that IPM not only works well with crops in the field, but many wheat producers who stored grain thought IPM was a valuable resource in controlling stored grain pests.

The overall economic advantage of IPM is reasonably well established for crops such as cotton, apples, and citrus, which currently use relatively large amounts of pesticides to control pests. It was demonstrated that in some areas of Texas, cotton could be produced with 50-75% less insecticide. Equally encouraging results have been achieved in IPM programs in urban areas, public health, and forests (Bottrell, 1979).

Based on research by Senst and Berberet (1980), removal of fall alfalfa growth by grazing reduced stress on alfalfa plants resulting from insect and weed infestations. Increased yields, combined with higher quality alfalfa, which could be marketed at a higher price thus increasing profits (Ward, et.al., 1990). The greatest monetary savings to producers has occurred where pesticides were previously applied to crops routinely throughout the growing season, without regard to pest population levels. Average yields per acre actually increased on crops using surveillance to detect build-up of pests (Council on Environmental Quality, 1972).

The economic injury level indicates to farmers or crop protection specialists the level of pests that can tolerated without significantly damaging the crop. Only through monitoring and knowledge of economic injury levels can the real need for pest control be determined. (Council on Environmental Quality, 1972). With careful monitoring, disruption of the ecology can be minimized, allowing successful maintenance or even enhancement of crop yields (National Research Council, 1989).

In Texas, producers have organized a nonprofit association to promote increased use of IPM throughout the state (Bottrell, 1979). Miller (1984) reported that IPM practices have educated producers to get soil fertility samples, which have saved them money over routine applications of fertilizer. This supports the findings that

the value and effectiveness of IPM practices are often much more than just the savings associated with reduced spray costs. Increased stand life, improved soil fertility, yield enhancement, and reduced negative environmental impact are some of the many ways IPM has been effective.

Integrated Pest Management: A Composite of Biological and Chemical Controls

The IPM theory combines the use of naturally occurring pest controls, including weather, disease agents, parasites, and predators, in addition to using biological, physical, and chemical controls (Bottrell, 1979). By using available natural controls first, and chemicals as an option, the producer usually saves money over conventional methods while being environmentally friendly.

Ecological controls, such as those provided by naturally occurring predators, parasites, bacteria, and viruses are vital to the reduction of many pest problems (Bottrell, 1979).

Bottrell (1979) also indicated that methods for controlling pests should either use the naturally occurring controls or be very specific in their action against pests. The development of these alternative types of pest control depends on research and knowledge of the pest, and also the attitudes of the producers who will ultimately be using them.

Biological control, more commonly referred to as "the balance of nature", involves introduction and establishment of natural enemies or parasites of pests in areas where they did not naturally occur or where their populations were reduced. The lady beetle is an excellent example of biological control. It was introduced into California from Australia because it fed extensively on a major citrus scale pest (*Coccidae*). *Trichogramma*, a tiny wasp that is an egg parasite of most butterfly and moth pests, has been used successfully to control the cotton boll worm (*Heliothis zea*) (Council on Environmental Quality, 1972).

Senst and Berberet (1980) reported that winter grazing of dormant alfalfa, and the parasitic wasp (*Bathyplecetes curculionis*) were both important biological control methods for the alfalfa weevil (*Hypera postica*).

> The sequence in which crops are planted in an area can affect the level of important nematodes, insects, or disease incidence. More generally, changes in tillage practices, water management, fertilization, and in other crop production activities can alter the agro-ecosystem sufficiently to significantly affect the average densities of pests (Council on Environmental Quality, 1972, p. 7).

In control of the alfalfa weevil, the use of winter grazing by cattle has been shown to reduce over-wintering egg numbers and subsequent larval numbers in the spring Senst and Berberet, 1980).

Rommann (1991) stated that the use of harvest time as a pest control method has shown that alfalfa can be harvested

earlier than ten percent bloom in the spring without adverse effects and that it can be harvested or grazed during the fall without adverse effects on yield, persistence, or forage quality.

Metabolic control methods such as the use of hormones and sex attractants have had success in a variety of different situations. The gypsy moth (*Lymantria dispar*) was controlled by dropping strips of paper containing a sex pheromone. Mosquitos (*Culicidae*) have been controlled using a juvenile hormone, which occurs at low levels at various points in the insects' life cycle. When applied in greater quantities, a wide range of the insects' body functions are disrupted. Chemical growth regulators have been used extensively against weed pests. These are mostly weed growth inhibitors which usually have little or no effect on the crop plant, thus acting as a selective herbicide (Bottrell, 1979).

Breeding pest-resistant crops has been one of the most successful pest control techniques for pests other than weeds. Generally speaking, resistance factors for insects, diseases, and nematodes should be incorporated into every crop (Bottrell, 1979).

Microbial agents have proved a promising pest control technique. The use of pathogenic micro-organisms such as bacteria, viruses, protozoa, fungi, and their byproducts have been recognized since the turn of the century (Council on Environmental Quality, 1972). The European spruce sawfly

(*Diprion hercyniae*) population was virtually decimated by using a host specific virus. Another example was given by Mulder (1991):

> One example of a pathogenic organism that occasionally affects alfalfa weevil populations is a fungus, *Erynia* spp. This fungus was first reported in Oklahoma in 1983. When wet weather occurs during April, this disease often kills large numbers of alfalfa weevil larvae. If conditions are dry, the disease does not develop. The usual timing of fungal outbreaks is too late to prevent serious damage to alfalfa; however, the disease may be valuable in eliminating larvae that remain near the time of first harvest (p. 37)

Sterilization of insects was conceived as a possible control method during the 1930's, and has been used successfully numerous times; the most notable being the eradication of the screw worm (*Cochliomyia hominivorax*) in the Southeastern United States and its control in the Southwest. The sterilization technique has usually involved the mass rearing of an insect pest, then its sterilization by irradiation, which damages the insects' reproductive cells.

Despite the infusion of alternative pest control methods in IPM, pesticides will be needed against pests for which effective alternative methods have not been found (Bottrell, 1979). Narrowly specific pesticides are usually not available, because there has not been a demand to develop them. Selectivity with pesticides can be achieved by using techniques involving the timing of the application

and using the minimum amount needed to kill the target pest. Reduction in insecticide use during the growing season results in less harm to beneficial insects and monetary savings to the producer (Bottrell, 1979).

The Role of the USDA in Integrated Pest Management

The USDA is the major federal institution involved in pest control research, and has several major and minor national and regional research laboratories throughout the United States.

The agricultural research establishment in the public sector is the largest and most significant element in U.S. agriculture (Bottrell, 1979). According to Cutler (1978), one of the USDA's most progressive moves in the area of pest management was the Extension Integrated Pest Management Program, which was initiated in 1971.

> Significant federal support for IPM extension, research, and field studies began in 1972. The National Science Foundation (NSF), Environmental Protection Agency (EPA), and United States Department of Agriculture (USDA) jointly funded this work, known as the Huffaker Project, through the Cooperative State Research Service (CSRS) (National Research Council, (1989, p. 177).

Through regulatory action, education, and research, the federal government is involved in activities related to Integrated Pest Management (Bottrell, 1979). The

Secretary of Agriculture formalized the USDA's policy on IPM in 1977:

> It is the policy of the U.S. Department of Agriculture to develop, practice, and encourage the use of integrated pest management methods, systems, and strategies that are practical, effective, and energy efficient. The policy is to seek adequate protection against significant pests with the least hazard to man, his possessions, wildlife, and the natural environment. Additional natural controls and selective measures to achieve these goals will be developed and adopted as rapidly as possible (Bottrell, 1979, p. 101).

The Huffaker Project was reauthorized in 1979 as the Consortium for Integrated Pest Management, and in 1984 was reorganized to serve the Northeast, Northcentral, South, and Western portions of the United States. As a result, these IPM research projects now deal with a wider scope of pests on more crop varieties (National Research Council, 1989).

The USDA has a major role in IPM, not only as a governing agency responsible to the agricultural sector and general public of the United States, but also because the USDA has oversight responsibility for over 70 million acres of federal forests and 350 million acres of cropland (Finley, 1981).

The Role of Oklahoma State University in Integrated Pest Management

Oklahoma agriculture is a vital part of the states' economy. Agricultural products such as beef cattle, wheat, and alfalfa are a major portion of the livelihood of Oklahoma farmers and ranchers. The Oklahoma State University Division of Agricultural Sciences and Natural Resources' Cooperative Extension Service and Agricultural Experiment Station are involved with programs to help producers in all areas of production, with emphasis in the areas of pest detection and control, or IPM.

Alfalfa programs at OSU, developed with research and extension input, have emphasized integration of pest control and economic aspects of management (Ward, 1991). These programs have sought to increase the grower's net profit through improved pest management practices. To achieve these goals, the programs have utilized educational programs, field tours, demonstrations, and IPM scouting programs (Miller, 1984).

Finley (1981) stated,

> The essential element of IPM at OSU is a field monitoring or scouting program. In this program, trained scouts or growers themselves check fields to determine pest infestations and the need for and timing of pesticide applications. Some of the services provided by the field scout include soil sampling; insect, weed, and disease identification; and recommendations for their control (p. 19).

Oklahoma State University supports IPM for many crops in Oklahoma, including alfalfa, wheat, grain sorghums (*Sorghum bicolor*), peanuts (*Arachis hypogaea*), soybeans (*Glycine max*), and various other truck farm and row crops. According to Sholar (1978), OSU does so in two ways:

> 1) Strong continued support to existing farmer organizations and commercial concerns currently involved in IPM; and,
>
> 2) Educational emphasis for IPM in all Cooperative Extension Service on-going educational programs. It is OSU's strong belief that an intensive educational effort is a prerequisite to a successful IPM program (p. 2).

When Oklahoma State University initiated early extension IPM programs, the emphasis was totally on insects, weeds, and diseases. Presently the general goal of these activities is to optimize alfalfa profitability through improved ecological and economic management.

With a network of County Extension Agents and IPM specialists, producers throughout the State of Oklahoma have a volume of information available to them on alternative methods of pest control, known as Integrated Pest Management.

Summary

The review of literature presented an overview of information on key areas related to this study. Those areas

emphasized were: The History of Alfalfa, The History of Integrated Pest Management, The Effectiveness of Integrated Pest Management, Integrated Pest Management: A Composite of Biological and Chemical Controls, The Role of the USDA in Integrated Pest Management, and The Role of OSU in Integrated Pest Management.

Alfalfa represents a major portion of income for many producers and others involved in Oklahoma agriculture. Pests, whether they be insects, weeds, or diseases, are a constant threat to crops.

> Integrated Pest Management (IPM) is based on maximizing existing controlling factors, monitoring pest populations and natural enemy conditions, and using chemical pesticides when needed. An effective IPM program is an integral part of the overall farm, forest, or business operation (Council on Environmental Quality, 1972, p. vi).

Research, education, and demonstrations by the USDA, Land Grant Universities, and Cooperative Extension Service to the agriculture producers of the United States continually help them to adopt these innovative practices.

A thorough examination of IPM reveals that pest control can be improved, with reduced negative environmental impact, and often at lower costs to the producers implementing these practices.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

The purpose of this chapter was to illustrate the methods used and procedures followed in conducting the study. In order to collect data which would provide information relating to the purpose and objectives of this study, a population was determined and an instrument was developed for data collection. A procedure was established and methods of data analyses selected. Information was gathered during the months of July, August, and September, 1992.

This study was coordinated with the assistance and cooperation of the OSU Extension Integrated Pest Management Coordinator, IPM Agents in Grady and McClain Counties, County Extension Directors and Agricultural Agents in Caddo, Grady, Garvin and McClain Counties, Alfalfa Specialists in the Agronomy Department, and the researcher's Agricultural Education graduate committee members.

The telephone survey instrument developed for this study was designed to elicit information concerning the

awareness, perceptions and practices of South-Central Oklahoma Alfalfa producers concerning Integrated Pest Management (IPM).

To accomplish the purpose of this study, the researcher established the following specific objectives:

1. To determine the awareness level among selected alfalfa producers of Integrated Pest Management practices in the four-county area.

2. To determine the perceptions of IPM practices among selected alfalfa producers in the four-county area with regard to:

a) major pest problems confronting producers,

b) sources of information concerning IPM practices,

c) and perceived advantages and disadvantages of IPM.

3. To determine IPM practices implemented by selected alfalfa producers in the four-county area.

4. To determine and compare the personal and production characteristics of selected alfalfa producers with IPM practices currently conducted in the four-county area of South-Central Oklahoma.

Institutional Review Board (IRB) Approval

Federal regulations and Oklahoma State University policy require review and approval of all research studies that involve human subjects before investigators can begin

their research. The Oklahoma State University Research Services and the IRB conduct this review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with the aforementioned policy, this study received the proper surveillance, was granted permission to continue, and was assigned the following number: AG-93-001 on July 6, 1992 (Refer to Appendix A).

Population

A large portion of the state's alfalfa production is in the contiguous four-county area of Caddo, Grady, Garvin, and McClain Counties located in South-Central Oklahoma. The production of these four counties represents almost 20 percent of all the harvested alfalfa acreage (83,000 of the 430,000 total acres) in the state (Oklahoma Agricultural Statistics, 1992). Therefore, it was decided to concentrate the efforts of identifying a target population for this study in the four-county area (Caddo, Grady, Garvin, and McClain Counties) of South-Central Oklahoma. The researcher asked and received the assistance of the County Extension Directors and IPM Specialists in identifying the target population through the Extension Directors' "producers list", the membership directories of the State Alfalfa Hay Growers' Association, and the county organizations in Grady

and McClain Counties. As a result, a target population of 220 potential participants were identified along with addresses and telephone numbers. From this list, it was determined that 83 producers were either no longer producing alfalfa, deceased, or did not have a listed or currently working telephone number. Consequently, the actual study population consisted of 137 producers, of which 17 declined to participate. The 120 producer-respondents made up 87.6 percent of the total study participants contacted. Table I reflects the study population by county, while the location of the study area is shown in Figure I.

TABLE I

POPULATION AND NUMBER OF RESPONDENTS BY COUNTY

County	Number of Participants	Percentage	Number of Respondents	Percentage of Respondents
Garvin	57	41.6	51	42.5
McClain	28	20.4	24	20.0
Caddo	23	16.8	17	14.2
Grady	29	21.2	28	23.3
Total	137	100.0	120	100.0

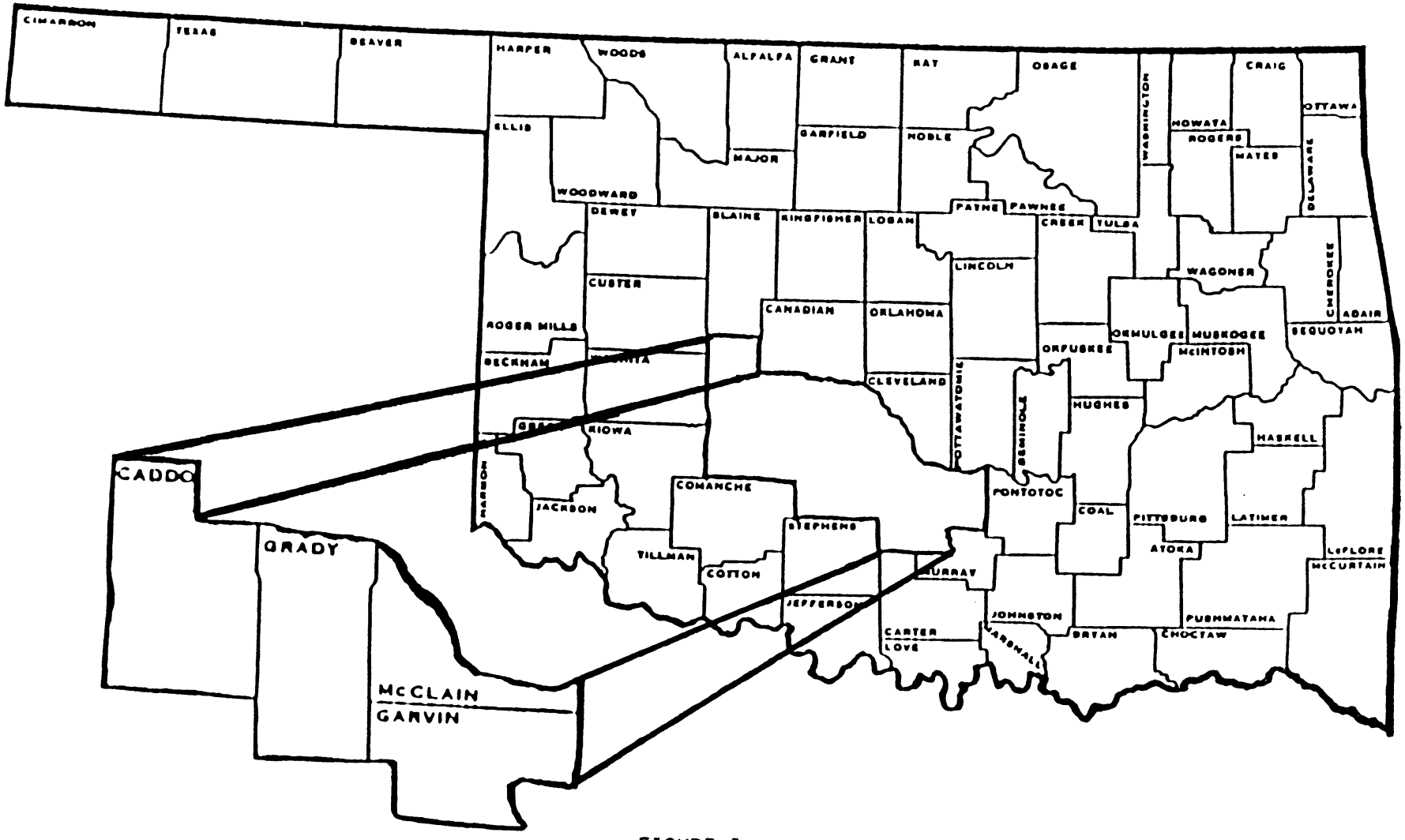

FIGURE I

GEOGRAPHICAL LOCATION OF THE STUDY

Development of the Instrument

A thorough review of previous studies was used to design an instrument which would fulfill the study objectives. Specifically, instruments from related studies developed by Finley (1981), Shelton (1991), and Wollenberg (1991) were evaluated concerning format, number of items, question content and methods of data collection. After analyzing the response rates of several studies, it was decided that the telephone survey would be most appropriate in terms of acquiring the highest possible level of participation.

Development of the instrument included dividing the survey into an introduction and three sections with a total of 28 items. One section consisted of eight demographic questions which dealt with the participants' experiences as alfalfa producer, farming status, alfalfa acres in operation, gender, age, formal education and percent of total income derived from alfalfa production. Three of the demographic questions followed the introduction, while the last five items came at the end of the survey instrument. Questions in the second section, 11 items, were directed specifically toward awareness, perceptions, and practices concerning IPM. Questions in section three corresponded to the nine items addressing problems and pests associated with alfalfa production.

Six items ascertained short specific answers, while 12 questions elicited possible responses from mutually exclusive categories, and 10 survey items had categories which required the study participants to rank order their responses. In addition, the scales to which the participants responded via telephone consisted of 1) nominal items which were basically non-numerical and designed to gather factual information about the respondents and/or practices which they utilized in their alfalfa operations, 2) ordinal scales to which the alfalfa producers responded by ranking the categories according to their preferences, and 3) the Likert-type scale which was utilized to determine the growers' perceptions.

The questions were primarily forced response items where potential participants gave specific answers, selected one response from several categories, and/or rank ordered a list of possible responses.

Collection of the Data

After analyzing various methods of data collection, a telephone survey was deemed the most efficient method to obtain participation from the alfalfa producers. Wallace (1954) indicated that mail questionnaires were practical and economical methods for gathering data; however, the tendency for incomplete responses, missing data and low return rates made researchers reluctant to rely on mail surveys as

efficient methods of data collection. More recently, Wollenberg (1991) and Paret (1990) utilized the telephone survey as an efficient and practical means of collecting data and involving the participants in order to acquire more accurate responses of their perceived attitudes toward specific issues.

To enhance producer participation, the telephone survey was preceded by a copy of the questionnaire and a cover letter (Appendix B) to the four County Extension Directors and the two IPM Agents which identified the researcher, study committee and explained the purpose and nature of the study.

The researcher conducted the survey in the evening hours between 8:00 and 10:00 p.m., throughout the week, during July, August and September 1992. Major consideration was given to time constraints in answering the questions. The telephone interview was designed to take no more than twenty minutes of the producers' time. If producers seemed hesitant about answering a particular question, the response was dismissed and the interview continued. One hundred twenty (87.6%) of the identified alfalfa producers in the four-county area participated in the study.

Analysis of the Data

The information gathered involved producer attitudes, perceptions, and subjective judgements which resulted in both qualitative and quantitative data. Data were analyzed at the OSU Computer Center, and the information was then put into narrative form and tables. Primarily, descriptive statistics which included frequency distributions, percentages, and mathematical means were utilized to describle the data. Key (1981) pointed out,

> The primary use of descriptive statistics is to describe information or data through the use of numbers. The characteristics of groups of numbers representing information or data are called descriptive statistics (Section S1, p. 175).

However, ordinal data was derived from questions eliciting rank ordered responses from alfalfa producers concerning problems, practices, and/or their perceptions of IPM. Linton and Gallo (1975), in their discussion concerning ordered data, emphasized each possible response is assigned a rank that represents a position along some ordered dimension. Ordered data are obtained when reliable scores or continuous data are difficult to obtain, but responses can be ranked from high to low regarding the dimensions of the participants' responses.

To compare producer characteristics with levels of awareness, attitudes, practices, and problems, the OSU

mainframe computer system (IBM System 370, Model 158) was employed to create cross-tabulations.

To determine a mean score from the information ascertained in question seven of the survey using the Likert-type scale, numerical values and real limits were established. The numerical values were: 4 = "very effective", 3 = "effective", 2 = "somewhat effective", 1 = "not effective", while a value for "unknown" was not determined. Therefore, real limits and corresponding interpretations for the specific categories were: 0.5 to 1.49 (not effective), 1.5 to 2.49 (somewhat effective), 2.5 to 2.49 (effective), and 3.5 to 4.49 (very effective).

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The purpose of this chapter was to report the results from the questionnaire used to conduct the study. The purpose of the study was to describe the present awareness, perceptions and practices implemented with regard to Integrated Pest Management (IPM) practices among alfalfa producers in a four-county area of South-Central Oklahoma.

The scope of this study included alfalfa growers in Caddo, Grady, Garvin and McClain Counties, located in South-Central Oklahoma. The population of alfalfa producers were members of their county Hay Growers Association and also were identified by County Extension Agents and IPM specialists. A telephone survey was utilized to elicit responses from the alfalfa producers.

Extent of Respondents' Participation

A total of 120 respondents participated in the study survey; however, all did not answer every question and some responded with multiple responses. Specifically, survey questions which asked for respondents' rankings/ratings

either received fewer responses than the total respondents (N = 120) or the respondents provided a first and second ranking or mentioned a particular situation as a minor problem. As can be readily observed in Table IV, only the 96 respondents who were "aware" or "somewhat aware" of IPM answered this question, (but some did provide multiple responses), while the data in Tables V, VI, and VII reflected the responses (N = 24) of only the individuals "enrolled" in an IPM program. However, the data shown in Tables XIII, XIV, XV, XVI, XVII, XVIII, XIX, and XXI indicated that respondents to the questions provided multiple responses. To determine the percent of total N, the total number mentioned was divided by the total number of growers responding to each of the specific questions.

Findings of the Study

The data revealed in Table II grouped the respondents by their awareness level concerning IPM. Eighty-two (68.3%) of the producers said "Yes" they were aware of IPM, while 24 (20.0%) said "No" they were not aware of IPM, and 14 (11.7%) said they were "somewhat" aware of IPM.

TABLE II

A DISTRIBUTION OF RESPONDENTS BY WHETHER OR NOT THEY WERE AWARE OF IPM

Awareness Level	Frequency Distribution N=120	Percent(%)
Yes	82	68.3
No	24	20.0
Somewhat	14	11.7
Total	120	100.0

The data illustrated in Table III showed the number of respondents by whether or not they were enrolled in Extension IPM programs. The results indicated "Yes" 24 (20.0%) of the respondents were enrolled in an IPM program, while "No" 96 (80.0%) were not.

TABLE III

A DISTRIBUTION OF RESPONDENTS BY WHETHER OR NOT THEY ARE PRESENTLY ENROLLED IN IPM

Enrollment Status	Frequency Distribution N=120	Percent(%)
Yes	24	20.0
No	96	80.0
Total	120	100.0

The data shown in Table IV revealed the major sources of information concerning IPM practices as ranked by the respondents. County Extension Agents were rated number one, with 77 of the respondents (80.2%), ranking them either number one or two, followed by Newsletters and Publications with 23 respondents ranking the printed medium as an information source (one or two) and 13 others mentioning it, for a total of 36 (37.5%). IPM Area Specialists were third with 34 (35.4%) responses, while Hay Grower Association Meetings were fourth with eight respondents ranking it one or two and three others mentioned, for a total of 11 (11.5%); Extension Fact Sheets received three "votes" ranking it one or two; Other Farmers were ranked as one or two by 8 respondents, while Applicators received a first or second endorsement from one respondent. Neither Independent Private Consultants or Vocational Agriculture Teachers received rankings. Even though only 96 of the 120 growers responded to the items illustrated in Table IV, it received a total of 176 responses since the respondents ranked each source of information with either first, second, or mention.

The data shown in Table V described the perceptions of IPM effectiveness as indicated by the 24 grower-respondents who stated they were "enrolled in an IPM program". Only 24 growers responded to this item with five (20.8%) considering the program having been "Very Effective"; 13 (54.2%) thought it was "Effective", four (16.7%) found it "Somewhat

TABLE IV

A DISTRIBUTION OF RESPONDENTS' RATINGS OF INFORMATION SOURCES CONCERNING IPM PRACTICES BY SELECTED SOURCE

Selected Sources	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
County Extension Agent	77	--	77	80.2
Newsletters/Publications	23	13	36	37.5
IPM Area Specialist	34	--	34	35.4
Hay Grower Meetings	8	3	11	11.5
Extension Fact Sheets	3	6	9	9.4
Other Farmers	8	--	8	8.3
Other (Applicator)	1	--	1	1.0
Independent Private Consultant	--	--	--	--
Vocational Agriculture Teacher	--	--	--	--
Total	154	22	176	100.0

*N = 96 Total number of respondents to this question

TABLE V

A DESCRIPTIVE ANALYSIS OF HOW ALFALFA PRODUCERS PERCEIVED THE COST EFFECTIVENESS OF IPM TO HAVE BEEN*

	Categories											
	Very Effective		Effective		Somewhat Effective		Not Effective		Unknown		Total N=24	%	Mean	S.D.
	n	%	n	%	n	%	n	%	n	%				
Cost Effectiveness	5	20.8	13	54.2	4	16.7	--		2	8.3	24	100	2.82	1.00

*This data was analyzed using a Likert-type scale. Numerical values were assigned as follows: Very Effective (4), Effective (3), Somewhat Effective (2), and Not Effective (1). Unknown was assigned a value of (0) but was not computed into the overall total. Real limits were established at 3.5 and above for Very Effective, 2.5 to 3.49 were Effective, 1.5 to 2.49 for Somewhat Effective, and .50 to 1.49 for Not Effective, and 0 to .49 for Unknown. Because the overall mean was 2.82, the descriptor for this question was Effective.

Effective", and two (8.3%) listed "Unknown" as the level of effectiveness.

The data reported in Table VI showed the perceived advantages concerning IPM practices. Allows A Quick Response to Problems was the most popular reason, with 21 individuals ranking it first or second and one other mentioning it, for a total of 22 (91.7%), while Increased Profitability followed with 12 respondents ranking it one or two, and two mentioned, for a total of 14 (58.3%). Other received eight number first or second rankings and three mentioned, for a total of 11 (48.5%), and Increased Yield followed with two rankings of one or two and seven mentioned, making its total nine, giving it 37.5%. Increased Stand Longevity had four respondents ranking it one or two and three lower rankings, for a total of seven, or 29.2%. None of the respondents chose Environmentally Friendly or Opportunity to Use Alternative Pest Controls.

Presented in Table VII were data depicting perceived disadvantages concerning IPM programs and practices. Regarding the disadvantages ranked, No Disadvantages received 14 responses, all ranked as one or two, giving it first place with 58.3% of the total. This was followed by Cost, receiving 11 first or second place ratings, for 45.8%, while Other garnered only three (12.5%) rankings, and Ability of Scouts to Recognize Problems and Reliability of Information each received two rankings of first or second. However, Lack of Consultants, Time Constraints, Lack of

TABLE VI

A DISTRIBUTION OF RESPONDENTS' RANKINGS OF PERCEIVED ADVANTAGES CONCERNING IPM PRACTICES BY SELECTED ADVANTAGE

Selected Advantages	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Allows Quick Response to Problems	21	1	22	91.7
Increased Profitability	12	2	14	58.3
Other**	8	3	11	45.8
Increased Yield	2	7	9	37.5
Increased Stand Longevity	4	3	7	29.2
Environmentally Friendly	--	--	--	--
Opportunity to use alternative pest control	--	--	--	--

*N = 24 Total number of respondents to this question
** Other included Better Quality Alfalfa; IPM Specialist's Expertise; Saves Producer Time; Recognizes New Problems Quickly; Provides Good Information.

TABLE VII

A DISTRIBUTION OF RESPONDENTS' RANKING OF PERCEIVED DISADVANTAGES CONCERNING IPM PRACTICES BY SELECTED DISADVANTAGE

Selected Disadvantages	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N
No Disadvantages	14	--	14	58.3
Cost	11	--	11	45.8
Other**	3	--	3	12.5
Ability of Scouts to Recognize Problems	2	--	2	8.3
Reliability of Information	2	--	2	8.3
Lack of Consultants	--	--	--	--
Time Constraints	--	--	--	--
Lack of Understanding Concerning IPM	--	--	--	--
Appropriateness of Recommendations	--	--	--	--

*N = 24 Total number of respondents to this question.
**Other included Need Closer Scouting Intervals; Poor Communication with Scouts; and Time Lag of Scouting Reports

Understanding Concerning IPM, and Appropriateness of Recommendations received no responses.

The data shown in Table VIII depicted the Distribution of Respondents by Whether or Not Their Alfalfa was Regularly Checked for Insect, Weed, or Disease Problems. An overwhelming majority (111, or 92.5%) of the producers indicated "Yes" they did check their alfalfa regularly for problems related to insects, weeds, or diseases. Only two (1.7%) of the respondents indicated that "No" they did not check their fields regularly, while seven (5.8%) stated they check their alfalfa "Sometimes". The data illustrated in Table VIII resulted from information acquired through telephone survey item ten which emphasized checking the crop on a regular basis.

TABLE VIII

A DISTRIBUTION OF RESPONDENTS BY WHETHER OR NOT THEIR ALFALFA WAS REGULARLY CHECKED OR SCOUTED FOR INSECT, WEED, OR DISEASE PROBLEMS BY ANYONE

Alfalfa Checked or Scouted by Anyone	Frequency Distribution N=120	Percent(%)
Yes	111	92.5
No	2	1.7
Sometimes	7	5.8
Total	120	100.0

The data shown in Table IX reported the Distribution of Respondents By Who Checks The Alfalfa for Insect, Weed, or Disease Problems. Most of the respondents (89, or 75.4%) do the checking themselves. Twenty-one (17.8%) indicated that they use Consultants/Scouts, while eight (6.8%) have the checks done by Applicators.

TABLE IX

A DISTRIBUTION OF RESPONDENTS BY WHO CHECKS THEIR ALFALFA FOR INSECT, WEED, OR DISEASE PROBLEMS

Personalities Conducting Field Checks	Frequency Distribution N=118	Percent(%)
Yourself	89	75.4
Consultants/Scouts	21	17.8
Applicator	8	6.8
Son/Daughter	-	--
Spouse	-	--
Hired Hand	-	--
Other	-	--
Total	118	100.0

Shown in Table X was the Distribution of Respondents by the Frequency With Which Their Fields are Checked for Pests During the Haying Season. Sixty-nine (58.5% of the 118 producers responding reported that they check their fields "once per week" during the haying season, while seventeen (14.4%) indicated that they check their alfalfa fields

TABLE X

A DISTRIBUTION OF PRODUCER RESPONSES CONCERNING FIELD INSPECTIONS FOR PESTS DURING THE HAYING SEASON BY FREQUENCY CATEGORY

Frequency Categories	Frequency Distribution N=118	Percent(%)
Once per week	69	58.5
Twice per week	17	14.4
Once between cuttings	27	22.9
Other*	5	4.2
Total	118	100.0

*Other included every day (3) and twice between cuttings (2).

"twice per week". However, 27 (22.9%) said they only checked "once between cuttings", and five (4.2%) reported Other.

Table XI revealed the Distribution of Respondents by the Frequency Their Fields were Checked During the Dormant Season. Seventeen (14.4%) of the 118 respondents stated they checked their fields "Once a Month" during the dormant season. However, 19 (16.1%) respondents checked only "Once Every Three Months", and 81 (68.7%) did "not check" their fields during the dormant season. One respondent (0.8%) indicated Other.

Illustrated in Table XII was the Distribution of Responses Concerning the Frequency of Insect-Related Problems. Only two (1.7%) of the respondents indicated that they have problems "Every Month", while 28 (23.3%) reported

TABLE XI

A DISTRIBUTION OF PRODUCER RESPONSES CONCERNING FIELD INSPECTIONS FOR PESTS DURING THE DORMANT SEASON BY FREQUENCY CATEGORY

Frequency Categories	Frequency Distribution N=118	Percent(%)
Once a month	17	14.4
Once every 3 months	19	16.1
Not checked	81	68.7
Other (Only with new hay)	1	0.8
Total	118	100.0

insect-related problems "Just During Haying Season". Most of the respondents (89, or 74.2%) had problems in the "Spring"; however, one producer (0.8%) reported "No Insect Problems".

TABLE XII

A DISTRIBUTION OF PRODUCER RESPONSES CONCERNING THE OCCURRENCES OF INSECT-RELATED PROBLEMS BY FREQUENCY CATEGORY

Frequency Categories	Frequency Distribution N=120	Percent(%)
Every month	2	1.7
Just during haying season	28	23.3
Spring	89	74.2
No insect problems	1	0.8
Just during the dormant season	-	--
Other	-	--
Total	120	100.0

The data illustrated in Table XIII showed the Major Pest Problems Affecting Alfalfa Production on Respondents' Farms as Ranked by the Respondents. Insects and Weeds each received 117 rankings as the top two major pest problems. Insects were also mentioned by two respondents, for a total of 119 (99.2%), while Weeds were mentioned by one individual, for a total of 118 (98.3%). Only nine producers ranked diseases as one of the top two major pest problems, though ten others mentioned it, giving it a total of 19 ratings and 15.8% of the total.

Major Insect Problems as Ranked by Respondents were shown in Table XIV. The two most frequent insect problems were Alfalfa Weevils (*Hypera postica*), with 101 producers ranking it first or second and one mentioning it for a total of 102 (85.0%), and Aphids (*Aphididae*), which received 96 rankings of one or two and ten mentions, for a total of 106 (88.3%). Minor problems identified by the respondents were Armyworms (*Spodoptera spp.*), listed by ten producers as one or two and thirteen as a lower ranking, for a total of 23 (19.2%); Blister Beetles (*Epicauta spp.*) with five ratings of one or two and 12 lower rankings, for a total of 17 (14.2%); "Cutworms" (*Peridroma spp.*) with four ratings of one or two and twelve lower rankings, for a total of 16 (13.3%); Webworms (*Loxostege spp.*) were ranked as first or second by six respondents and mentioned by nine, for a total of 15 (12.5%); Other problems were mentioned by two others, for a total of two responses at (1.7%); while Grasshoppers

TABLE XIII

A SUMMARY OF RESPONDENTS' RANKINGS OF PERCEIVED PROBLEMS AFFECTING ALFALFA PRODUCTION ON RESPONDENTS' FARMS BY SELECTED PEST

Selected Pests	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Insects	117	2	119	99.2
Weeds	117	1	118	98.3
Diseases	9	10	19	15.8
Other	--	--	--	--

*N = 120 Total number of respondents to this question

TABLE XIV

A SUMMARY OF RESPONDENTS' RANKINGS CONCERNING PERCEIVED PROBLEMS BY SELECTED INSECTS

Selected Insect Pests	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Alfalfa Weevil	101	1	102	85.0
Aphids	96	10	106	88.3
Armyworms	10	13	23	19.2
Blister Beetle	5	12	17	14.2
Cutworms	4	12	16	13.3
Webworms	6	9	15	12.5
Other**	5	4	9	1.7
Grasshoppers	1	5	6	5.0
Potato Leafhoppers	1	1	2	1.7
No Insect Problem	--	--	-	--

*N = 120 Total number of respondents to this question.
**Other included one respondent who did not know if he had any insect problems, and Alfalfa Looper.

(*Melanoplus spp.*) were ranked by one respondent as one or two, but were mentioned by five respondents, for a total of six (5.0%); and Potato Leafhoppers (*Empoasca fabae*) received one ranking of first or second and one lower ranking, for a total of two (1.7%).

The data in Table XV illustrated the Major Weed Problems During the Growing Season as Ranked by Respondents. Crabgrass (*Digitaria sanquinalis*) received the highest number of rankings with 76 rating it first or second as a major problem and two mentioned, for a total of 78 (65.0%). Foxtail (*Setaria italica*) had 42 ratings of first or second and 11 lower ratings for a total of 53 (44.2%) and was followed by Pigweed (*Amaranthus spp.*) which had 40 first or second rankings and 11 mentions, for a total of 51 (42.5%). Other received 20 responses of first or second ratings and 11 lower rankings, for a total of 31 (25.8%). Curly Dock (*Rumex crispus*) was identified by 16 producers as one of their two biggest weed problems and mentioned by seven others, for a total of 23 (19.2%). Johnsongrass (*Sorghum Halepense*) received ten rankings of one or two and six mentions, for a total of 16 (13.3%). Pepper grass (*Lepidium spp.*) received six rankings of first or second and was mentioned by two others, for a total of eight (6.7%). Horsetail (*Conyza canadensis*) or Marestail or Mulestail received five (4.2%) rankings, all first or second. Three producers (1.0%) reported that they had no weed problem during the summer, and no one indicated a problem with

TABLE XV

A SUMMARY OF RESPONDENTS' RANKINGS CONCERNING SUMMER AND WINTER PLANT PESTS BY SELECTED WEED SPECIES

SUMMER Selected Weed Species	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N
Crabgrass	76	2	78	65.0
Foxtail	42	11	53	44.2
Pigweed	40	11	51	42.5
Other**	20	11	31	25.8
Curly Dock	16	7	23	19.2
Johnsongrass	10	6	16	13.3
Pepper grass	6	2	8	6.7
Horsetail	5	--	5	4.2
Jointed Goat Grass	-	--	--	--
Field Bindweed	-	--	--	--
Morning Glory	-	--	--	--

TABLE XV (continued)

WINTER Selected Weed Species	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Cheat (Downy Brome)	42	--	42	35.0
Mustard	37	--	37	30.8
Other (Ryegrass)	7	--	7	5.8
No Weed Problem (Summer)	50	--	50	36.8
No Weed Problem (Winter)	3	--	3	41.7

*N = 120 Total number of respondents to this question.
**Other included Watergrass (12), Henbit (10), Shepherdspurse (2), Sandbur (3), Bermudagrass (3), and Bullnettle.

Jointed Goat Grass (*Aegilops cylindrica*), Field Bindweed (*Convolvulus arvensis*), or Morning Glory (*Ipomoea spp.*).

Table XV also depicted the major cool season weed problems as ranked by respondents. No Weed Problem was ranked first or second by 50 respondents (41.7%) and had the highest overall response rate. Forty-two producers (35.0%) identified Cheat (Downy Brome) (*Bromus spp.*) as a problem, while 37 (30.8%) listed Mustard (*Brassica spp.*) and seven respondents (5.8%) chose Other to characterize their major winter weed problems.

The data in Table XVI showed the major disease problems in alfalfa as ranked by the respondents. The most common response elicited for this question was No Disease Problem, as indicated by 71 respondents (59.2%). Root Rot ranked number two, with 41 rankings (34.2%) as being ranked either first or second as a disease problem, and was followed by Leaf and Stem Spots with seven responses (5.8%), Other with five (4.2%), and Crown Rot with four (3.3%).

Major Problems Relative to Soil Fertility as Ranked by the Respondents were shown in Table XVII. A deficiency in Phosphorous was the most common response with 88 ratings of first or second and three lower rankings, for a total of 91 (75.8%). Following closely were Potassium Deficiencies with 81 first or second rankings and one mentioned, for a total of 82 (68.3%). Low PH was listed by 63 respondents as one of their two top problems, and mentioned by two others, for a total of 65 (54.2%), while 12 individuals (10.0%) surveyed

TABLE XVI

A SUMMARY OF RESPONDENTS' RANKINGS CONCERNING THEIR PERCEPTIONS OF PROBLEMS IN ALFALFA BY SELECTED DISEASE PROBLEM

Selected Disease Problem	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Root Rot	41	--	41	34.2
Leaf and Stem Spots	7	--	7	5.8
Other**	5	--	5	4.2
Crown Rot	4	--	4	3.3
No Disease Problem	71	--	71	59.2

*N = 120 Total number of respondents to this question.
**Other included Wilt (4) and Nematode.

TABLE XVII

A SUMMARY OF RESPONDENTS' RANKINGS CONCERNING THEIR PERCEPTIONS RELATIVE TO SOIL FERTILITY BY SELECTED NUTRIENT DEFICIENCY PROBLEM

Selected Nutrient Deficiency Problems	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Phosphorous	88	3	91	75.8
Potassium	81	1	82	68.3
Low pH	63	2	65	54.2
No Deficiencies	12	--	12	10.0
Nitrogen	5	1	6	5.0
Other**	2	--	2	1.7
Boron	-	--	--	--
Manganese	-	--	--	--

*N = 120 Total number of respondents to this question.
**Other included Sulphur and Zinc.

reported having No Deficiencies. Nitrogen deficiency was ranked one or two by five respondents and mentioned by one, for a total of six (5.0%), and Other by two (1.7%). Neither Boron nor Manganese deficiencies were reported by any respondent.

The data reported in Table XVIII indicated that pesticides was the obvious choice of the respondents, being listed by 117 respondents (97.5%) as one of their two top pest control methods. Grazing followed with 56 respondents ranking it first or second and nine mentions, for a total of 65 (54.2%), and Harvest Time captured 27 first or second place rankings with 16 mentions, for a total of 43 (35.8%). Both Host Plant Resistance and Other were ranked by one individual as one or two and by five others as lower rankings, for a total of six (5.0%). Natural Predators received one response for a first or second ranking and two mentions, for a total of three (2.5%). No one mentioned Biological as a pest control method.

The data shown in Table XIX revealed the Distribution of Respondents by How They Determined When to Spray. Visible Damage was the most frequently used factor in determining when to spray, with 78 (65.0)% of the responses, while Scouting Reports were identified by 24 (20%) of the respondents, and two producers (1.7%) indicated the Calendar to a large extent determined their decision to initiate pest controls. Applicator Recommendations influenced the decisions of 19 (15.8%) respondents, while Insect Numbers

TABLE XVIII

A SUMMARY OF RESPONDENTS' RANKINGS CONCERNING THEIR FIRST AND SECOND CHOICES OF PEST CONTROLS BY METHOD UTILIZED

Methods Utilized	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
Pesticides	117	--	117	97.5
Grazing	56	9	65	54.2
Harvest Time	27	16	43	35.8
Host Plant Resistance	1	5	6	5.0
Other**	1	5	6	5.0
Natural Predators	1	2	3	2.5
Biological	-	--	--	--

*N = 120 Total number of respondents to this question.
**Other included Cultipacker during winter (5) and Mowing.

TABLE XIX

A SUMMARY OF PRODUCER RESPONSES CONCERNING THEIR DECISIONS WHEN TO SPRAY BY DETERMINING FACTOR

Determining Factor	Total Mentioned N=120	Percent of Total N Percent(%)
Visible Damage	78	65.0
Insect Numbers	59	49.2
Scout Report	24	20.0
Applicator Recommendation	19	15.8
Other (Watch Neighbors)	3	2.5
Calendar	2	1.7

*N = 120, the total number of respondents to this question

were deemed the most important indicator of when to initiate pest controls by 59 (49.2%) respondents and three respondents (2.5%) marked Other.

The data illustrated in Table XX revealed the frequency during the year which producers discovered unfamiliar pest problems. Only three (2.5%) producers reported having unfamiliar pest problems Every Haying Season, followed closely by four (3.3%) who had problems More Than Once Per Year. However, 45 (37.5%) reported they had unfamiliar pest problems Less Than Once Per Year, while a clear majority (68 or 56.7%) reported No Problems.

TABLE XX

A DISTRIBUTION OF PRODUCER RESPONSES CONCERNING THE DISCOVERY OF UNFAMILIAR PESTS BY FREQUENCY DURING THE YEAR

Frequency During the Year	Frequency Distribution N=120	Percent(%)
Every Haying Season	3	2.5
More Than Once Per Year	4	3.3
Less Than Once Per Year	45	37.5
No Problem	68	56.7
Total	120	100.0

The data in Table XXI described the personalities most often consulted about unfamiliar pest problems by the respondents. The most frequently consulted individuals were County Extension Agents, identified by 75 respondents in their two top choices and two others as a third or lower choice, for a total of 77 (64.2%). This was followed by Applicator/Chemical Sales Representatives, with 53 first or second rankings and three mentions, for 56 (46.7%) of the responses. IPM Area Specialists were third with 23 first and second responses (19.2%), while Other Farmers received 17 first or second responses and two mentions, for a total of 19 (15.8%). Under Other, the Noble Foundation was named by six respondents as their first or second choices to consult about unfamiliar pest problems and mentioned by another, for a total of seven (5.8%), and Seed Dealers were consulted by four (3.3%) respondents about unfamiliar pests.

TABLE XXI

A SUMMARY OF THE RESPONDENTS' FIRST OR SECOND CHOICES OF INDIVIDUALS MOST OFTEN CONSULTED ABOUT UNFAMILIAR PESTS BY CONSULTANT GROUP

Consultant Groups	Ranked 1 or 2 N	Mentioned N	Total Mentioned N	Percent of Total % of N*
County Extension Agent	75	2	77	64.2
Applicator/Chemical Sales Rep.	53	3	56	46.7
IPM Area Specialist	23	--	23	19.2
Other Farmers	17	2	19	15.8
Other (Noble Foundation)	6	1	7	5.8
Seed Dealer	4	--	4	3.3
Vocational Agriculture Teacher	--	1	1	0.8
Independent Private Consultant	--	--	--	--
Coop Manager	--	--	--	--

*N = 120 Total number of respondents to this question.

A Vocational Agriculture Teacher was mentioned by one person (0.8%), but no one mentioned Independent Private Consultants or Coop Managers.

TABLE XXII

A DISTRIBUTION OF RESPONDENTS BY THE NUMBER OF YEARS THEY HAVE BEEN PRODUCING ALFALFA

Number of Years	Frequency Distribution N=120	Percent(%)
1 to 10	22	18.3
11 to 20	37	30.8
21 to 30	22	18.3
31 to 40	23	19.2
41 to 50	14	11.7
51 and over	2	1.7
Total	120	100.0

Mean = 25.2 years, SD = 14.1, Range = 2 to 65 years

The data reported in Table XXII the Distribution of Respondents by the Number of Years They Have Been Producing Alfalfa. Twenty-two respondents (18.3%) had been producing between one to ten years, while 37 (30.8%) indicated they had been in the business 11 to 20 years and 22 (18.3%) had been raising alfalfa 21 to 30 years. Twenty-three (19.2%) stated they had been alfalfa producers 31 to 40 years, 14 (11.7%) 41 to 50 years, and two (1.7%) reported 51 years or

more experience as an alfalfa producer. The data described in Table XII indicates this group (120) of respondents had been producing alfalfa for an average of 25.2 years. The standard deviation of 14.1 years was reflected in the range of two to 65 years experience in producing alfalfa.

TABLE XXIII

A DISTRIBUTION OF RESPONDENTS BY FARMING STATUS

Farming Status	Frequency Distribution N=120	Percent(%)
Full-Time	95	79.2
Part-Time	25	20.8
Total	120	100.0

The data reported in Table XXIII showed the Distribution of Respondents by Farming Status. Ninety-five (79.2%) of the respondents were full-time farmers, while 25 (20.8%) were part-time farmers.

The data in Table XXIV revealed the distribution of alfalfa production operations among the respondents in the four-county area by number of acres in production. Thirty-five (29.2%) respondents reported having 50 acres or less, while 25 (20.8%) had 51 to 100 acres and 24 (20.0%) had 101

TABLE XXIV

A DISTRIBUTION OF RESPONDENTS BY THE NUMBER OF ACRES OF ALFALFA THEY HAVE IN PRODUCTION

Number of Acres In Production	Frequency Distribution N=120	Percent(%)
50 and under	35	29.2
51 to 100	25	20.8
101 to 200	24	20.0
201 to 300	18	15.0
301 to 400	3	2.5
401 to 500	7	5.8
501 and over	8	6.7
Total	120	100.0

Mean = 171.2 acres, SD = 169.2 acres and Range = 12 to 750 acres

to 200 acres of alfalfa in production. Eighteen producers (15.0%) had 201 to 300, three (2.5%) had 301 to 400, seven (5.8%) had 401 to 500, and eight (6.7%) had over 500 acres. The mean for this item was 171.18 acres and the standard deviation was 169.19. The minimum number of acres cultivated was 12 and the maximum 750.

The data reported in Table XXV showed a Distribution of Respondents by Gender. The 120 respondents represented in this study included 118 (98.3%) males and two (1.7%) females.

The data reported in Table XXVI indicated the Distribution of Respondents by Age. Only one respondent (0.8%) was under 30 years of age. The remainder of the

TABLE XXV

A DISTRIBUTION OF RESPONDENTS BY GENDER

Gender	Frequency Distribution N=120	Percent(%)
Male	118	98.3
Female	2	1.7
Total	120	100.0

group was fairly evenly distributed, with 33 (27.5%) respondents between the ages of 31 and 45; 27 (22.5%) between 46 and 55, while 31 (25.8%) were between 56 and 65 years of age, and 28 (23.4%) were in the 66 years of age and older group.

TABLE XXVI

A DISTRIBUTION OF RESPONDENTS BY AGE

Age	Frequency Distribution N=120	Percent(%)
30 and Under	1	0.8
31 to 45	33	27.5
46 to 55	27	22.5
56 to 65	31	25.8
66 and Over	28	23.4
Total	120	100.0

Mean Age = 54.8 years, SD = 13.4 years, and Range = 25 to 85

TABLE XXVII

A DISTRIBUTION OF RESPONDENTS BY HIGHEST LEVEL OF FORMAL EDUCATION

Level of Education	Frequency Distribution N=119	Percent(%)
High School	55	46.2
Attended College	32	26.9
B.S. Degree	28	23.5
Master's Degree	3	2.5
Doctorate	1	0.9
Total	119	100.0

The data in Table XXVII showed the Distribution of Respondents by Highest Level of Formal Education among the 119 respondents as 55 (46.2%) with a High School education, while 32 (26.9%) indicated they had Attended College, and 28 others (23.5%) held the B.S. degree. However, three (2.5%) of the respondents had Master's Degrees, and one (0.9%) had an earned Doctorate.

The demographic information reported in Table XXVIII illustrated the Distribution of Respondents by the Percentage of Total Family Income Derived from Alfalfa Production. However, 43 respondents reported that they fed all the alfalfa produced to their own livestock, while three chose not to respond. Twenty-four (32.4%) respondents reported that one-fourth or less of their total income was derived from alfalfa production, while 35 (47.3%) indicated between 26 and 50 percent of their family income resulted

TABLE XXVIII

A DISTRIBUTION OF RESPONDENTS BY PERCENTAGE OF TOTAL FAMILY INCOME DERIVED FROM ALFALFA PRODUCTION

Percentage of Income	Frequency Distribution N=74	Percent(%)
1 to 25	24	32.4
26 to 50	35	47.3
51 to 75	13	17.6
76 to 100	2	2.7
Total	74*	100.0

Mean = 36.4% income derived from alfalfa, SD = 22.5% Income and Range = 2 to 90% of the total income derived from alfalfa.
*N = less than sample size because 43 respondents fed all their hay to their livestock and three chose not to answer

from alfalfa production. Thirteen (17.6%) producers reported between 51 and 75 percent of their total income came from alfalfa, while only two (2.7%) derived more than 76 percent of their income from alfalfa production.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

Modern agriculture and the infrastructure on which it depends is faced with many problems including profitability and survival. However, most of the difficulties have arisen as a result of a lack of awareness and understanding regarding the complexity or potential of a particular practice or issue. An example of a relatively new innovation being recognized and employed by many alfalfa grower-respondents in the four-county area is Integrated Pest Management (IPM). Minimizing costs and creating a positive image for production agriculture as a public perception are important considerations for producers and Extension educators. Integrated Pest Management (IPM) provides an opportunity for extension to develop educational programming that provides both information and technical assistance. Taking advantage of the "teachable moment" with farmers goes a long way in helping them through the various stages of the diffusion process. That "window of

opportunity" and working with a person they respect provides the encouragement many need to try something new.

It was the intent of the researcher in this study to assess the awareness and perceptions among alfalfa producers concerning Integrated Pest Management (IPM) practices in Caddo, Grady, Garvin, and McClain Counities in South-Central Oklahoma. The purpose of this chapter was to present the major findings, conclusions, and recommendations of the study as well as the purpose, objectives, and procedures.

Purpose of the Study

The purpose of this study was to describe the awareness, perceptions and practices implemented with regard to IPM practices among selected alfalfa producers in a four-county area of South-Central Oklahoma.

Objectives of the Study

The specific objectives outlined in this study were designed:

1. To determine the awareness level among selected alfalfa producers of Integrated Pest Management practices in the four-county area.

2. To determine the perceptions of IPM practices among selected alfalfa producers in the four-county area with regard to:

a) major pest problems confronting producers,

b) sources of information concerning IPM practices,

c) and perceived advantages and disadvantages of IPM.

3. To determine IPM practices implemented by selected alfalfa producers in the four-county area.

4. To determine and compare the personal and production characteristics of selected alfalfa producers with IPM practices currently conducted in the four-county area of South-Central Oklahoma.

Procedures

The population of this study included alfalfa producers in the contiguous four-county area of Caddo, Grady, Garvin, and McClain Counties. These four counties represented 20 percent of Oklahoma's 430,000 harvested acres in 1991, according to the Oklahoma Agricultural Statistics (1992). The selected producers were identified from Extension producer lists and membership in alfalfa Hay Growers' Associations in their respective counties. One hundred thirty-seven producers were identified as active producers. Seventeen growers from this group (137) chose not to

participate, while 120 (87.6%) producers provided useable information.

The instrument designed by the researcher was deemed to have face-validity by a panel of Extension experts and pilot tested among ten growers in a county not part of the study. Both qualitative and quantitative data were determined from the 28-item telephone questionnaire. The forced response items followed the objectives of the study emphasizing 1) producer and alfalfa hay operation demographics, 2) producer awareness and application of IPM practices, 3) alfalfa pests and production problems, and 4) a comparison of producer operation characteristics and perceptions of IPM practices. Descriptive statistics were utilized to describe the producer responses, while crosstabs were employed to compare the producers' characteristics with with awareness, perceptions, and application of IPM practices.

Summary of the Major Findings

Objective One: Producer Awareness

Over 68% of the study participants responding to the question dealing with their awareness of IPM indicated "yes", they were aware of Integrated Pest Management as a practice, program, or concept, while 20% stated they were only "somewhat" aware of IPM. Almost 12% revealed they had "no" awareness of Integrated Pest Management as a cultural

practice. With regard to producer involvement, only 20% stated they were currently "enrolled" in an IPM program as a practice in their alfalfa production operations, whereas 80% were not incorporating offered IPM programs in their production units.

Objective Two: Producer Perceptions

Major Pest Problems: More than 74% of the alfalfa grower-respondents stated that major insect problems occurred in the spring and consisted primarily of the alfalfa weevil, while the aphid was a major warm-season insect pest. Even though crabgrass, foxtail, and cheat best illustrate the primary weed problems identified by producers, weeds as a whole ranked second behind insects as major pest problems. In the aggregate, diseases were negligible with 59% of the respondents indicating few if any problems. Only root rot was mentioned as a problem.

Sources of IPM Information: The respondents overwhelmingly ranked County Extension Agents their first and best source of information about Integrated Pest Management; IPM Area Specialists ranked second and newsletters and publications ranked a distant third.

IPM Advantages and Disadvantages: The primary advantages perceived by the grower-respondents were: 1) IPM allows a quick response to problem situations and 2) the potential resulting from the implementation of IPM practices

offers the possibility for increased profitability. The disadvantage highlighted by producers was cost. It was disappointing that only 20% of the producers responded to the survey question concerning the perceived advantages of IPM, while just 20% addressed the perceived disadvantages of IPM. Regarding the perceived effectiveness only 24 of the 120 total rsponded; however, of this group over 75% lauded the effectiveness of IPM as a tool and cultural practice.

Objective Three: IPM Practices

Over 92% of the respondents indicated that their alfalfa fields were checked on a regular basis for insect, weed, or disease problems. The data also revealed that almost three-fourths (74.2%) of the producer-respondents checked their own fields, while 17.5% had their alfalfa stands checked by consultants or IPM scouts and slightly over eight percent of the field checks were conducted by chemical applicators. Nearly 58% of the respondents indicated they checked their fields once a week during the haying season, whereas over 14% stated they checked their fields twice per week. However, 24% revealed they only checked their fields between cuttings. Most producer-respondents (74.2%) indicated their primary concern regarding insect-related problems was in the spring, while slightly over 23% stated their major consideration was just during the haying season.

Objective Four: Producers' Characteristics, Awareness, Perceptions and Practices

Farming Status: Table XXIX showed that when comparing the respondents' demographics with variables concerning production, perceived awareness and application of IPM practices, over 55% of the full-time growers in the study had been producing alfalfa for more than 20 years with production operations of more than 100 acres of alfalfa. Almost 71% of the full-time grower-respondents indicated "yes", they had an awareness of IPM, while 60% of the part-time producers were aware of IPM as a practice. However, over 18% of the full-time farmers and 24% of the part-time group expressed that they had "no" awareness of Integrated Pest Management.

Regarding the perceived advantages of IPM, over 25% of the full-time farmers believed that increased profitability was the major advantage, while almost 44% of those responding indicated that their perception of IPM was the opportunity for a quick response to the problem. However, 44% of the full-time group which responded to the disadvantages of IPM stated either there were "no disadvantages" or perceived cost was prohibitive. Of the full-time producer-respondents, visible damage, scouting reports, and insect counts were the major considerations which 85% utilized in determining when to make chemical applications, while visible damage and insect counts were the factors most considered by 81% of the part-time growers.

TABLE XXIX

A DISTRIBUTION OF PRODUCER RESPONSES COMPARING FARMING STATUS BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLE

Producer/Production Variables	Farming Status: Full-time N	Farming Status: Part-Time N
Years As An Alfalfa Producer		
1 to 10	15	7
11 to 20	27	10
21 to 30	18	4
31 to 40	20	3
41 to 50	13	1
51 and Over	2	0
Acres of Alfalfa Under Cultivation		
50 or Less	22	13
51 to 100	20	5
101 to 200	20	4
201 to 300	18	0
301 to 400	3	0
401 to 500	7	0
501 and Over	8	0
Awareness of IPM		
Yes	67	15
No	18	6
Somewhat	10	4
Enrollment in IPM		
Yes	20	4
No	74	22
Major Source of Information Concerning IPM		
IPM Specialist	26	8
Ext. Agent	62	15
Other Farmers	5	3
Newsletters/Publications	17	6
Ext. Fact Sheets	2	1
Haygrower Meetings	7	1
Other (Applicator)	1	0
Private Consultant	0	0
Vo-Ag Teacher	0	0

TABLE XXIX (Continued)

Producer/Production Variables	Farming Status: Full-Time N	Farming Status: Part-Time N
Cost Effectiveness of IPM		
Very Effective	5	0
Effective	9	4
Somewhat Effective	4	0
Unknown	2	0
Not Effective	0	0
Perceived Advantages of IPM		
Increased Profitability	10	2
Quick Response to Problems	17	4
Increased Yield	2	0
Increased Stand Longevity	3	1
Other	7	1
Environmentally Friendly	0	0
Opportunity to Use Alternative Pest Control	0	0
Perceived Disadvantages of IPM		
No Disadvantages	11	3
Cost	11	0
Ability of Scouts	1	1
Reliability of Information	1	1
Other	1	2
Lack of Consultants	0	0
Time Constraints	0	0
Lack of Understanding	0	0
Appropriateness of Rec.	0	0
When to Spray for Pests		
Visible Damage	59	19
Scout Report	21	3
Calendar	2	0
Applicator Recommendation	16	3
Insect Numbers	42	17
Other	3	0

TABLE XXIX (Continued)

Producer/Production Variables	Farming Status: Full-Time N	Farming Status: Part-Time N
Those Most Often Consulted About Unfamiliar Problems		
IPM Specialist	18	5
County Extension Agent	59	16
Applicator/Chemical Reps.	45	8
Private Consultant	0	0
Vo-Ag Teacher	0	0
Coop Manager	0	0
Seed Dealer	3	1
Other Farmers	10	7
Other (Noble Center)	5	1
Age		
30 Years or Younger	1	0
31 to 45 Years	25	8
46 to 55 Years	18	9
56 to 65 Years	26	5
65 Years or Older	25	3
Highest Education Level		
High School	46	9
Attended College	25	7
B.S. Degree	20	8
Master's Degree	3	0
Doctorate	1	0
Other	0	0
Percentage of Total Family Income From Alfalfa		
1 to 25%	17	7
26 to 50%	29	6
51 to 75%	11	2
76 to 100%	2	0
Alfalfa Fed to Livestock	30	13

Twenty-one percent of the 95 full-time growers in the study indicated the B.S. degree was their highest level of formal education, while four held advanced degrees. Slightly over 65% of the full-time producers responding to "Percentage of Total Income Derived from Alfalfa" disclosed that more than 25% of their family income came from alfalfa, while only five part-time growers indicated more than 25% of their income was the result of their alfalfa operations.

Years of Experience: Table XXX showed the comparison of years of experience in producing alfalfa revealed that the largest number, 27 growers, were in the 11-20 year experience category, while 21 producers in this experience group had alfalfa operations ranging in size from 101 to over 501 acres. The 11-20 year experience group also had the largest group with 28 respondents declaring their awareness of IPM as a practice. In addition, the 11-20 year experience group was also the largest group, with ten producers, who were conducting IPM practices, while the Extension Agent was the primary contact for producers across all experience categories. However, when determining an appropriate time for chemical application, visible damage and insect counts were the two factors which influenced the producers most. This was true across all six experience categories, which ranged from one to 51 years experience and over. The Extension Agent was the most often consulted professional regarding IPM across all experience groups and especially the 11-20 year group. This group also had the

TABLE XXX

A DISTRIBUTION OF RESPONSES COMPARING NUMBER OF YEARS THE RESPONDENTS HAVE BEEN ALFALFA PRODUCERS BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLES

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Farming Status						
Full-Time	15	27	18	20	13	2
Part-Time	7	10	4	3	1	0
Acres Alfalfa Under Cultivation						
50 or less	11	9	6	2	6	1
51 to 100	3	7	4	10	0	1
101 to 200	1	10	3	6	4	0
201 to 300	3	5	4	3	3	0
301 to 400	0	1	1	1	0	0
401 to 500	1	2	2	0	2	0
501 and over	3	3	0	1	1	0
Awareness of IPM						
Yes	15	28	12	18	7	2
No	6	6	3	3	6	0
Somewhat	1	3	7	2	1	0

TABLE XXX (Continued)

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Presently Enrolled in IPM?						
Yes	3	10	3	5	2	1
No	19	27	18	18	13	1
Source of Information Concerning IPM						
IPM Specialist	5	13	6	6	3	1
Ext. Agent	10	26	16	16	7	2
Other Farmers	0	2	2	4	0	0
Newsletters/Pub.	6	5	2	8	1	1
Ext. Fact Sheets	0	1	1	0	1	0
Haygrower Meeting	2	2	2	0	2	0
Other(Applicator)	1	0	0	0	0	0
Private Consultant	0	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0	0

TABLE XXX (Continued)

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Cost Effectiveness of IPM						
Very Effective	1	1	1	1	1	0
Effective	4	3	2	2	2	0
Somewhat Effective	0	0	1	2	0	1
Unknown	0	0	0	1	1	0
Not Effective	0	0	0	0	0	0
Perceived Advantages of IPM (Ranked as 1 or 2)						
Increased Profitability	0	5	4	0	3	0
Quick Response to Problem	3	8	4	4	2	0
Increased Yield	0	0	0	1	1	0
Increased Stand Longevity	2	1	0	1	0	0
Other	2	2	0	2	1	1
Environmentally Friendly	0	0	0	0	0	0
Opportunity to use Alt. Pest Control	0	0	0	0	0	0

TABLE XXX (Continued)

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Perceived Disadvantages of IPM (Ranked As 1 or 2)						
No Disadvantages	0	4	4	4	1	1
Cost	2	4	0	4	1	0
Ability of Scouts	0	1	0	1	0	0
Reliability of Info	0	2	0	0	0	0
Other	1	1	1	0	0	0
Lack of Consultants	0	0	0	0	0	0
Time Constraints	0	0	0	0	0	0
Lack of Understanding	0	0	0	0	0	0
Appropriateness of Rec.	0	0	0	0	0	0
When to Spray for Pests						
Visible Damage	16	20	17	14	10	1
Scout Report	3	9	4	5	2	1
Calendar	0	0	2	0	0	0
Applicator Rec.	4	7	1	2	4	1
Insect Numbers	11	20	10	13	5	0
Other	2	0	0	1	0	0

TABLE XXX (Continued)

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Those Most Often Consulted About Unfamiliar Problems (Ranked as 1 or 2)						
IPM Specialist	5	8	4	4	2	0
County Extension Agent	13	24	12	16	8	2
Applicator/Chem. Reps	8	13	12	11	9	0
Private Consulant	0	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	1	0
Coop Manager	0	0	0	0	0	0
Seed Dealer	2	0	1	1	0	0
Other Farmers	3	7	4	1	1	1
Other (Noble Center)	1	2	1	0	2	0
Age						
30 Years or Younger	1	0	0	0	0	0
31 to 45 Years	13	12	5	2	1	0
46 to 55 Years	4	15	4	4	0	0
56 to 65 Years	1	6	9	11	4	0
66 Years and Older	1	4	4	6	11	2

TABLE XXX (Continued)

Producer/Production Variables	Years of Production 1 - 10 N	11 - 20 N	21 - 30 N	31 - 40 N	41 - 50 N	51 and over N
Highest Education Level						
High School	10	12	9	15	7	2
Attended College	4	12	5	6	5	0
B.S. Degree	8	10	6	2	2	0
Master's Degree	0	1	2	0	0	0
Doctorate	0	1	0	0	0	0
Other	0	0	0	0	0	0
Percent of Total Family Income from Alfalfa						
1 to 25%	2	11	4	3	4	0
26 to 50%	5	12	7	6	5	0
51 to 75%	1	3	3	3	3	0
76 to 100%	0	0	0	2	0	0
Alfalfa Fed to Livestock	13	9	10	5	4	2

most professional contacts with the IPM Agent as well as chemical applicators. The 11-20 year experience category revealed 25 producers who ranged in age from 31-55 years, while the 11 growers in the 41-50 year experience group were also in the 66 years of age and older category. Furthermore, the largest number of respondents with college degrees were the 11-20 year experience group of grower-respondents, while the same was true with 15 producers in this age group reporting more than 25% of their total family income being derived from alfalfa production.

Size of Operation: Table XXXI illustrated when comparing the size of producer operations by awareness regarding IPM, growers with 51-100 acre operations were the most prevalent (almost 17%), while there were 16 (13.3%) growers each in the 50 and under, 101 to 200, and 201 to 300 acre size operations. However, comparisons concerning size of operations by sources of information revealed that growers with 50 acres or less and up to 300 acres ranked the Extension Agent and IPM Specialist first and second respectively. Perceptions of the growers revealed "quick response to problems" and potential to "increase profitability" were the major advantages of IPM among the 50 acre and less group through operations up to 400 acres in size. "Quick response to problems" was perceived as an advantage across all acreage categories. Again, "visible damage" and "insect numbers" were the influential factors for determining timing, type of chemical application, etc.,

TABLE XXXI

A DISTRIBUTION OF PRODUCER RESPONSES COMPARING THE NUMBER OF ACRES OF ALFALFA THE RESPONDENTS CURRENTLY HAVE UNDER CULTIVATION BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLES

Producer/Production Variables	Acres of Alfalfa						
	50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Years As An Alfalfa Producer							
1 to 10	11	3	1	3	0	1	3
11 to 20	9	7	10	5	1	2	3
21 to 30	6	4	5	4	1	2	0
31 to 40	2	11	6	3	0	0	1
41 to 50	6	0	4	2	0	2	0
51 and over	1	1	0	0	0	0	0
Farming Status							
Full-Time	7	27	18	20	13	2	8
Part-Time	7	10	4	3	1	0	0
Awareness of IPM							
Yes	16	20	16	16	2	6	6
No	12	6	5	0	0	0	1
Somewhat	7	0	5	1	0	1	0

TABLE XXXI (Continued)

Producer/Production Variables	Acres of Alfalfa						
	50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Enrolled in IPM?							
Yes	3	5	6	6	1	1	2
No	32	21	19	10	3	6	5
Source of Information Concerning IPM (Ranked 1 or 2)							
IPM Specialist	8	8	6	6	2	3	1
Ext. Agent	20	20	17	9	2	6	3
Other Farmers	1	1	4	2	0	0	0
Newsletters/Pub.	7	7	2	2	0	0	5
Ext. Fact Sheets	1	0	0	1	0	0	1
Haygrower Meetings	5	0	2	1	0	0	0
Other(Applicator)	0	0	0	0	0	0	1
Private Consultant	0	0	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0	0	0

TABLE XXXI (Continued)

Producer/Production Variables	Acres of Alfalfa						
	50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Cost Effectiveness of IPM							
Very Effective	1	0	1	2	1	0	0
Effective	2	2	1	3	2	1	2
Somewhat Effective	0	0	2	2	0	0	0
Unknown	1	1	0	0	0	0	0
Not Effective	0	0	0	0	0	0	0
Perceived Advantages of IPM (Ranked As 1 or 2)							
Increased Profitability	1	3	3	3	1	1	0
Quick Response to Problems	3	4	5	6	1	1	1
Increased Yield	0	0	1	0	0	1	0
Increased Stand Longevity	1	1	0	0	0	1	1
Other*	0	2	2	3	0	0	1
Environmentally Friendly	0	0	0	0	0	0	0
Opportunity to use Alt. Pest Control	0	0	0	0	0	0	0

TABLE XXXI (Continued)

Producer/Production Variables	Acres of Alfalfa						
	50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Perceived Disadvantages of IPM (Ranked As 1 or 2)							
No Disadvantages	2	4	4	3	1	0	0
Cost	0	1	2	6	0	1	1
Ability of Scouts	0	1	0	1	0	0	0
Reliability of Info	0	1	0	0	1	0	0
Other	1	1	1	0	0	0	0
Lack of Consultants	0	0	0	0	0	0	0
Time Constraints	0	0	0	0	0	0	0
Lack of Understanding	0	0	0	0	0	0	0
Appropriateness of Rec.	0	0	0	0	0	0	0
When to Spray for Pests							
Visible Damage	31	16	13	7	1	5	5
Scout Report	2	5	5	7	1	2	2
Calendar	0	1	1	0	0	0	0
Applicator Rec	6	2	4	5	0	0	2
Insect Numbers	18	12	15	4	1	4	5
Other	1	2	0	0	0	0	0

TABLE XXXI (Continued)

Producer/Production Variables	Acres of Alfalfa 50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Those Most Often Consulted About Unfamiliar Problems (Ranked as 1 or 2)							
IPM Specialist	4	4	4	7	2	0	2
County Ext. Agent	21	16	17	10	2	5	4
Appl./Chem.Rep	13	13	11	8	0	4	4
Private Consulant	0	0	0	0	0	0	0
Vo-Ag Teacher	1	0	0	0	0	0	0
Coop Manager	0	0	0	0	0	0	0
Seed Dealer	2	0	0	1	0	1	0
Other Farmers	8	2	5	2	0	0	0
Other (Noble Center)	1	0	5	0	0	0	0
Age							
30 Years or Less	0	0	0	0	0	0	1
31 to 45 Years	9	5	3	5	0	5	4
46 to 55 Years	7	7	6	5	1	0	1
56 to 65 Years	9	7	7	5	1	1	1
66 Years and Older	10	6	8	3	1	1	1

TABLE XXXI (Continued)

Producer/Production Variables	Acres of Alfalfa 50 & Under N	51-100 N	101-200 N	201-300 N	301-400 N	401-500 N	501 & Over N
Highest Education Level							
High School	18	15	10	6	2	3	5
Attended College	7	5	10	5	1	1	3
B.S. Degree	8	6	6	5	0	3	0
Master's Degree	2	0	0	1	0	0	0
Doctorate	0	0	0	1	0	0	0
Other	0	0	0	0	0	0	0
Percent of Total Family Income from Alfalfa							
1 to 25%	13	8	4	1	0	1	0
26 to 50%	7	2	7	8	1	3	4
51 to 75%	0	2	4	1	1	3	2
76 to 100%	0	1	0	1	0	0	0
Alfalfa Fed to Livestock	15	12	9	5	1	0	1

when compared across all acreage categories. County Extension Agents and chemical applicators/representatives ranked first and second respectively across all acreage categories with 17.5% of all respondents ranking County Extension Agents first regarding sources of IPM informatin when compared to production units in the 50 acre and less category. The comparison between size of operation and by highest level of formal eduation revealed that having a "high school" education was predominant across all acreage categories. Size of operation also seemed somewhat influential when comparing the percentage of total income derived from alfalfa. Producer responents in the one to 25% and 26 to 50% income groups dominated across all acreage categories. Two producers in acreage categories 51 to 100 and 201 to 300 acres derived 76 to 100% of their total family income from alfalfa.

Age: The comparison of age with farming status, shown in Table XXXII, was enlightening, with only one producer 30 years of age or under who was a full-time farmer; however, 25 producers were revealed in the 31 to 45, 18 in the 46 to 55, 24 in the 56 to 65, and 27 in the 66 years of age and older categories. However, when one compares age to the number of years the respondents have been producing alfalfa, there is only one producer 30 or under and that individual is in the one to ten year experience category, while 13 producers between 31 and 45 and one grower in the 66 years of age and over class are also in the one to

TABLE XXXII

A DISTRIBUTION OF PRODUCER RESPONSES COMPARING AGE OF THE RESPONDENTS BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLES

Producer/Production Variables	Age of Respondent				
	30 & Under N	31 - 45 N	46 - 55 N	56 - 65 N	66 & over N
Years As An Alfalfa Producer					
1 to 10	1	13	4	3	1
11 to 20	0	12	15	6	4
21 to 30	0	5	4	9	4
31 to 40	0	2	4	11	6
41 to 50	0	1	0	2	11
51 and over	0	0	0	0	2
Farming Status					
Full-Time	1	25	18	24	27
Part-Time	0	8	9	7	1
Acres Alfalfa Under Cultivation					
50 or less	0	9	11	5	10
51 to 100	0	7	4	11	3
101 to 200	0	6	5	6	7
201 to 300	0	5	4	8	1
301 to 400	0	1	1	0	1
401 to 500	0	2	2	0	3
501 and over	1	3	0	1	3

TABLE XXXII (Continued)

Producer/Production Variables	Age of Respondent 30 & Under N	31 - 45 N	46 - 55 N	56 - 65 N	66 & over N
Awareness of IPM					
Yes	0	30	18	19	15
No	1	1	6	6	10
Somewhat	0	2	3	6	3
Presently Enrolled in IPM?					
Yes	0	7	3	9	5
No	1	26	24	22	23
Source of Information Concerning IPM (Ranked 1 or 2)					
IPM Specialist	0	9	7	11	7
Ext. Agent	0	21	20	21	15
Other Farmers	0	1	2	4	1
Newsletters/Pub.	0	10	4	6	3
Ext. Fact Sheets	0	1	0	1	1
Haygrower Meetings	0	3	3	0	2
Other(Applicator)	0	1	0	0	0
Private Consultant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0

TABLE XXXII (Continued)

Producer/Production Variables	Age of Respondent				
	30 & Under	31 - 45	46 - 55	56 - 65	66 & over
	N	N	N	N	N
Cost Effectiveness of IPM					
Very Effective	0	2	0	3	0
Effective	0	4	3	3	3
Somewhat Effective	0	1	0	2	1
Unknown	0	1	0	0	1
Not Effective	0	0	0	0	0
Perceived Advantages of IPM (Ranked As 1 or 2)					
Increased Profitability	0	4	3	4	1
Quick Response to Problem	0	6	5	9	1
Increased Yield	0	1	0	1	0
Increased Stand Longevity	0	2	1	1	0
Other*	0	2	0	1	5
Environmentally Friendly	0	0	0	0	0
Opportunity to use Alt. Pest Control	0	0	0	0	0

TABLE XXXII (Continued)

Producer/Production Variables	Age of Respondent 30 & Under N	31 - 45 N	46 - 55 N	56 - 65 N	66 & over N
Perceived Disadvantages of IPM (Ranked As 1 or 2)					
No Disadvantages	0	2	3	6	3
Cost	0	4	2	3	2
Ability of Scouts	0	1	0	1	0
Reliability of Info	0	1	1	0	0
Other	0	0	1	1	0
Lack of Consultants	0	0	0	0	0
Time Constraints	0	0	0	0	0
Lack of Understanding	0	0	0	0	0
Appropriateness of Reccommendations	0	0	0	0	0
When to Spray for Pests					
Visible Damage	1	20	17	18	22
Scout Report	0	8	3	9	4
Calendar	0	0	0	2	0
Applicator Rec.	0	5	4	2	8
Insect Numbers	1	17	15	14	12
Other	0	1	0	1	1

TABLE XXXII (Continued)

Producer/Production Variables	Age of Respondent				
	30 & Under N	31 - 45 N	46 - 55 N	56 - 65 N	66 & over N
Those Most Often Consulted About Unfamiliar Problems (Ranked as 1 or 2)					
IPM Specialist	0	8	4	9	2
County Ext. Agent	0	20	17	18	20
Appl./Chem. Reps	1	13	12	12	15
Private Consulant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0
Coop Manager	0	0	0	0	0
Seed Dealer	0	1	1	1	1
Other Farmers	0	3	5	5	4
Other (Noble Center)	0	1	2	0	3

TABLE XXXII (Continued)

Producer/Production Variables	Age of Respondent 30 & Under N	31 - 45 N	46 - 55 N	56 - 65 N	66 & over N
Highest Education Level					
High School	0	9	7	19	20
Attended College	1	11	11	5	4
B.S. Degree	0	13	7	4	4
Master's Degree	0	0	1	2	0
Doctorate	0	0	1	0	0
Other	0	0	0	0	0
Percent of Total Family Income from Alfalfa					
1 to 25%	0	8	4	5	7
26 to 50%	1	12	8	8	6
51 to 75%	0	5	2	2	3
76 to 100%	0	0	0	2	0
Alfalfa Fed to Livestock	0	8	10	13	12

ten year experience category. Twelve producers in the 31 to 45 age bracket have 11 to 20 years experience producing alfalfa as well as 15 growers in the 46 to 55 year old category. Eleven respondents between 56 and 65 years of age have 31 to 40 years production experience, while 11 in the 66 years of age and over group have from 41 to 50 years experience producing alfalfa. When comparing age to size of alfalfa production operations, one is enlightened immediately. The one respondent 30 years of age or younger is one of eight producers with 501 or more acres of alfalfa in production. With regard to alfalfa production acres of 50 or less, 35 producers are in this category with 10 of the 35 respondents being 66 years of age or older. Nine growers having 50 acres or less of alfalfa are in the 31 to 45 year age group, while 11 producers each fit the 46 to 55 and 56 to 65 age categories. The respondents in each of the two acreage categories, 51 to 100 and 101 to 200 acre operations respectively, represent producers in every age classification except 30 and under, with seven in 50 acres or less operations being 66 years of age or older. Seven respondents having alfalfa operations of 401 to 500 acres in size and four producers with 501 or more acres were in the 31 to 45 years of age category, while 18 growers with 201 to 300 acre operations were represented across the age groups of 31 to 45, 46 to 55, and 56 to 65 years, and one individual who was 66 years of age or older. Awareness of IPM was well represented among all age categories except the

30 year and under group. In the 31 to 45, 46 to 55, 56 to 65, and 66 and over age categories, there were 30, 18, 19, and 15 respondents respectively, that indicated "yes" they were aware of IPM. However, 96 of 120 study respondents representing all age categories by wide margins indicated that they were not in an IPM program. The major perceived advantages regarding IPM among all age groups except the 30 and under was,"IPM allows for a quick response to the problem", cost was viewed as the major constraint among the same age groups. However,the majority of respondents across the same age groups previously mentioned regarding this specific question item stated that there were "no disadvantages" in utilizing IPM as a cultural practice. "Visible damage" and "insect numbers" were the two factors identified across all age categories as being important indicators in making decisions concerning chemical application. The person most often consulted by the respondents regarding unfamiliar problems across all age categories except the 30 and under group was the County Extension Agent, while applicators/chemical representatives ranked second with responses across all age classifications. The 31 to 45 year age group had the largest number of respondents revealing completion of a Baccalaureate degree program with 13 growers, the 56 to 65 age category had two Masters degrees and the 46 to 55 age group revealed one with a Doctorate. Over 45 percent (55) of the producer-respondents indicated that a "high school" education was their highest

level of formal education. This was a commonality across all age categories except those 30 years of age and under. Almost one third (32.5%) of the respondents with a high school education were in the 56 to 55 (19) and 66 and over (20) age groups. One grower-respondent in the 30 years of age and under group revealed that 26 to 50% of the total family income was derived from alfalfa sales, while 12 producers in the 31 to 45 age category also derived 26 to 50% of their income from alfalfa. Two respondents each in the respective income ranges indicated 51 to 75% and 76 to 100% of their income was derived from alfalfa as well as being in the 56 to 65 age group. All age categories except the 30 and under group were represented in the one to 25% income range, while the 56 to 65 age group was represented among all income categories. However, over 35% representing age categories ranging from 31 to 45 years to 66 years of age and over did not sell their alfalfa, but chose to "market" it through livestock instead. Of the groups choosing not to sell alfalfa, almost 30% of the total respondents were in the age categories 46 to 55 (10), 56 to 65 (13) and 66 and over (12) respectively.

Formal Education: The information shown in Table XXXIII, were comparisons involving the producers' highest level of formal education, have shown those with education beyond "some college work/attended college" or the completion of a degree program had been rather dominant or at least a majority when equated with the variables of farming status,

TABLE XXXIII

A DISTRIBUTION OF PRODUCER RESPONSES COMPARING THE HIGHEST LEVEL OF FORMAL EDUCATION OF THE RESPONDENTS BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLES

Producer/Production Variables	Level of Education				
	High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
Years As An Alfalfa Producer					
1 to 10	10	4	8	0	0
11 to 20	12	12	10	1	1
21 to 30	9	5	6	2	0
31 to 40	15	6	2	0	0
41 to 50	7	5	2	0	0
51 and over	2	0	0	0	0
Farming Status					
Full-Time	46	25	20	3	1
Part-Time	9	7	8	0	0

TABLE XXXIII (Continued)

Producer/Production Variables	Level of Education				
	High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
Acres Alfalfa Under Cultivation					
50 or less	20	9	6	0	0
51 to 100	12	7	4	1	0
101 to 200	12	5	5	2	0
201 to 300	8	5	4	0	1
301 to 400	0	1	2	0	0
401 to 500	3	2	2	0	0
501 and over	0	3	5	0	0
Awareness of IPM					
Yes	30	24	25	2	1
No	17	5	1	0	0
Somewhat	8	3	2	1	0
Enrolled in IPM?					
Yes	11	6	6	1	0
No	44	26	22	2	1

TABLE XXXIII (Continued)

Producer/Production Variables	Level of Education: High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
Source of Information Concerning IPM (Ranked 1 or 2)					
IPM Specialist	14	9	9	2	0
Ext. Agent	30	22	22	3	0
Other Farmers	5	2	1	0	0
Newsletters/Pub.	13	3	7	0	0
Ext. Fact Sheets	0	2	1	0	0
Haygrower Meetings	1	3	4	0	0
Other(Applicator)	1	0	0	0	0
Private Consultant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0
Cost Effectiveness of IPM					
Very Effective	2	1	1	1	0
Effective	3	3	6	1	0
Somewhat Effective	2	2	0	0	0
Unknown	2	0	0	0	0
Not Effective	0	0	0	0	0

TABLE XXXIII (Continued)

Producer/Production Variables	Level of Education: High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
Perceived Advantages of IPM (Ranked As 1 or 2)					
Increased Profitability	3	5	3	1	0
Quick Response to Problem	8	5	7	1	0
Increased Yield	1	0	1	0	0
Increased Stand Longevity	1	1	2	0	0
Other*	3	2	3	0	0
Environmentally Friendly	0	0	0	0	0
Opportunity to use Alt. Pest Control	0	0	0	0	0
Perceived Disadvantages of IPM (Ranked As 1 or 2)					
No Disadvantages	6	4	4	0	0
Cost	3	4	3	1	0
Ability of Scouts	1	1	0	0	0
Reliability of Info	0	2	0	0	0
Other	0	1	1	1	0
Lack of Consultants	0	0	0	0	0
Time Constraints	0	0	0	0	0
Lack of Understanding	0	0	0	0	0
Appropriateness of Rec.	0	0	0	0	0

TABLE XXXIII (Continued)

Producer/Production Variables	Level of Education: High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
When to Spray for Pests					
Visible Damage	39	22	15	2	0
Scout Report	11	6	6	1	0
Calendar	0	1	1	0	0
Applicator Rec.	11	5	2	0	1
Insect Numbers	25	18	15	1	0
Other	2	1	0	0	0
Those Most Often Consulted About Unfamiliar Problems (Ranked as 1 or 2)					
IPM Specialist	7	9	6	1	0
County Ext. Agent	35	16	22	1	1
Appl./Chem. Reps	24	16	11	2	0
Private Consulant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0
Coop Manager	0	0	0	0	0
Seed Dealer	3	0	1	0	0
Other Farmers	8	4	4	0	0
Other (Noble Center)	2	3	1	0	0
Age					
30 Years or Less	0	1	0	0	0
31 to 45 Years	14	12	7	2	0
46 to 55 Years	7	13	5	1	1
56 to 65 Years	16	6	9	0	0
66 Years and Old	24	0	6	0	0

TABLE XXXIII (Continued)

Producer/Production Variables	Level of Education				
	High School N	Attended College N	B.S. Degree N	Master's Degree N	Doctorate N
Percent of Total Family Income from Alfalfa					
1 to 25%	14	3	7	0	0
26 to 50%	14	10	8	2	1
51 to 75%	3	6	3	0	0
76 to 100%	2	0	0	0	0
Alfalfa Fed to Livestock	21	11	10	1	0

experience, acres of alfalfa and age categories of the respondents. However, when the level of formal education was compared to awareness of IPM the number of respondents with a "high school" education and "attended college" exceed the "yes" responses to awareness for all other levels of formal education combined. In addition, over 96% more "high school graduates" and those had "attended college" indicated "yes", they were aware of IPM, than those with B.S. degrees and beyond. Nevertheless, when analyzed there were almost three times as many respondents with less than the B.S. degree; therefore, the results should be skewed. The major sources of information was the same as it had been with other comparisons; the Extension Agent was by far the number one source, while both IPM Specialists and publications were second and third, respectively. Visible damage, insect numbers, and applicator's recommendations again were the most prominent factors to consider in deciding to initiate chemical application across all formal education groups. Scouting reports were also important across all groups, particularly among high school graduates. With regard to those most often consulted for IPM assistance, Extension Agents and chemical representatives were the most consulted. Extension Agents ranked highest among all formal education groups except those with the Masters degree and tied with chemical representatives when comparisons were made among those who had "attended college". It appeared that the age group with the highest level of formal education among the

respondents was the 56 to 65 year age group, while the 31 to 45 year group had the least formal education of any age group. The 26 to 50% income from alfalfa category was as prevalent or more prevalent across all formal education groups except among those who had "attended college". Furthermore, a rather sizable number of respondents across all levels of formal education did not utilize alfalfa as a cash crop but marketed it through their beef or dairy operations.

Income from Alfalfa: Table XXXIV revealed that when comparisons were made between percentage of income derived from alfalfa production and years of production experience, it was obvious that a large group did not utilize alfalfa as a cash crop. Thirty-five percent of the respondents marketed their alfalfa through livestock operations. However, the largest number utilizing alfalfa as a cash crop were those who derived from one to 50% of their income from alfalfa and had been in the business from 11 to 20 years. Thirteen producer-respondents, the largest number, in the one to ten year experience group indicated they utilized their alfalfa production through other saleable commodities such as beef and milk. Over 76% of the producer-respondents across all groups deriving income from and/or utilizing alfalfa in their livestock operations were full-time farm operators. Income groups with the largest numbers were the one to 25% and 26 to 50% income groups and the group which marketed their alfalfa through other phases of the farming

TABLE XXXIV

A DISTRIBUTION OF PRODUCER RESPONSES COMPARING THE PERCENTAGE OF TOTAL FAMILY INCOME DERIVED FROM ALFALFA PRODUCTION BY SELECTED PRODUCER AND/OR PRODUCTION VARIABLES

Producer/Production Variables	Percentage of Income				
	1 - 25	26 - 50	51 - 75	76 - 100	Not Sold
	N	N	N	N	N
Years As An Alfalfa Producer					
1 to 10	0	7	1	0	13
11 to 20	9	13	4	0	10
21 to 30	4	7	2	0	9
31 to 40	8	6	3	2	4
41 to 50	4	2	3	0	5
51 and over	0	0	0	0	2
Farming Status					
Full-Time	22	29	10	2	30
Part-Time	5	3	3	0	13
Acres Alfalfa Under Cultivation					
50 or less	9	10	1	0	15
51 to 100	9	2	2	1	11
101 to 200	5	7	4	0	8
201 to 300	0	8	1	1	6
301 to 400	0	1	0	0	2
401 to 500	1	3	3	0	0
501 and over	1	4	2	0	1

TABLE XXXIV (Continued)

Producer/Production Variables	Percentage of Income 1 - 25 N	26 - 50 N	51 - 75 N	76 - 100 N	Not Sold N
Awareness of IPM?					
Yes	16	25	9	2	27
No	4	7	3	0	10
Somewhat	4	3	1	0	6
Enrolled in IPM?					
Yes	4	9	2	0	9
No	20	26	11	2	34
Source of Information Concerning IPM (Ranked 1 or 2)					
IPM Specialist	5	12	9	1	7
Ext. Agent	18	23	15	1	20
Other Farmers	1	3	1	1	2
Newsletters/Pub.	6	5	3	1	8
Ext. Fact Sheets	0	1	0	0	2
Haygrower Meetings	3	1	1	0	3
Other(Applicator)	0	0	0	0	1
Private Consultant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0

TABLE XXXIV (Continued)

Producer/Production Variables	Percentage of Income 1 - 25 N	26 - 50 N	51 - 75 N	76 - 100 N	Not Sold N
Cost Effectiveness of IPM					
Very Effective	0	3	1	0	1
Effective	2	3	1	1	6
Somewhat Effective	2	0	0	0	2
Unknown	0	1	0	0	1
Not Effective	0	0	0	0	0
Perceived Advantages of IPM (Ranked As 1 or 2)					
Increased Profitability	3	3	2	0	4
Quick Response to Problem	4	8	1	0	8
Increased Yield	1	0	1	0	0
Increased Stand Longevity	0	3	0	0	1
Other*	0	0	1	0	0
Environmentally Friendly	0	0	0	0	0
Opportunity to use Alt. Pest Control	0	0	0	0	0

TABLE XXXIV (Continued)

Producer/Production Variables	Percentage of Income 1 - 25 N	26 - 50 N	51 - 75 N	76 - 100 N	Not Sold N
Perceived Disadvantages of IPM (Ranked As 1 or 2)					
No Disadvantages	4	4	1	0	5
Cost	1	7	1	0	2
Ability of Scouts	0	1	0	0	1
Reliability of Info	0	0	0	0	2
Other	0	0	0	1	2
Lack of Consultants	0	0	0	0	0
Time Constraints	0	0	0	0	0
Lack of Understanding	0	0	0	0	0
Appropriateness of Rec.	0	0	0	0	0
When to Spray for Pests					
Visible Damage	20	18	10	2	28
Scout Report	3	11	2	0	8
Calendar	0	0	0	0	2
Applicator Rec.	5	5	2	0	7
Insect Numbers	15	13	11	0	20
Other	1	0	0	0	2

TABLE XXXIV (Continued)

Producer/Production Variables	Percentage of Income 1 - 25 N	26 - 50 N	51 - 75 N	76 - 100 N	Not Sold N
Those Most Often Consulted About Unfamiliar Problems (Ranked as 1 or 2)					
IPM Specialist	4	10	2	0	7
County Ext. Agent	18	21	7	0	29
Appl./Chem. Reps	11	13	9	2	18
Private Consulant	0	0	0	0	0
Vo-Ag Teacher	0	0	0	0	0
Coop Manager	0	0	0	0	0
Seed Dealer	0	0	1	1	2
Other Farmers	5	5	0	0	7
Other (Noble Center)	1	0	2	0	3
Age					
30 Years or Less	0	1	0	0	0
31 to 45 Years	8	11	5	0	9
46 to 55 Years	6	7	3	0	10
56 to 65 Years	3	10	2	2	12
66 Years and Older	8	5	3	0	12

TABLE XXXIV (Continued)

Producer/Production Variables	Percentage of Income 1 - 25 N	26 - 50 N	51 - 75 N	76 - 100 N	Not Sold N
Highest Education Level					
High School	9	17	3	2	21
Attended College	8	7	6	0	11
B.S. Degree	7	8	3	0	10
Master's Degree	0	2	0	0	1
Doctorate	0	1	0	0	0
Other	0	0	0	0	0

operation. These groups primarily had alfalfa operations which ranged in size from 50 acres or less to 300 acres. With regard to awareness of IPM, the groups who had one to 25% and 26 to 50% of their income derived from alfalfa and those marketing their crop in other ways were "yes" aware, while the group who "did not sell" alfalfa for a cash crop had "no" awareness of IPM as a practice and were also the largest group of respondents in the "no" category. Among all groups deriving or not deriving income from alfalfa, the Extension Agent was overwhelmingly ranked first as the most prominent source of information, while IPM Specialists and publications followed in second and third, respectively. Among all these groups, visible damage of the crop, insect counts, and scouting resports were the factors most often cited as reasons for applying chemical controls. County Extension Agents and chemical representatives were the consultants most often contacted with regard to problems to which producers were unfamiliar. Concerning the variable of producer age, the group which did not sell their alfalfa as a cash crop were primarily in the age groups of 46 to 55, 56 to 65 and 66 years of age and older, while the 26 to 50% income category had a rather large number (11) in the 31 to 45 year age group which utilized alfalfa as a cash crop.

Conclusions

An analysis of the data and subsequent major findings were the basis for the conclusions drawn in this study.

1. Even though the typical alfalfa grower-respondent had an awareness of IPM, the apparent level of their proclaimed awareness was not congruent with expected levels of enrollment/participation in sanctioned Integrated Pest Management programs.

2. Insect damage to alfalfa primarily occurs in the spring and seems to be the major type of pest concern among producers. From the apparent positive relationships among the growers and their County Extension Agents, it should come as no surprise that the growers' mainly sought the Agents as the principal source of information concerning IPM. It was further apparent from the findings that the grower-respondents perceived that IPM offered a quick response to problem situations and the potential for enhancing profitability.

3. Based on the evidence in the findings, it was apparent that checking alfalfa for pest problems during the growing season was an important practice among the grower-respondents in the contiguous four-county area. It was also discernible that checking their alfalfa on a regular basis during the growing season was considered a worthwhile effort among the producers. In addition, it was even further apparent that visible crop damage and insect counts were the

two factors which producers relied on to make decisions about pursuing some type of pest control measure.

4. Subsequent to analyzing the findings, it was concluded that the typical respondent in this study was male, a full-time farmer, educated beyond the high school level, older than his peers, an experienced alfalfa producer with a sizeable operation and derived a considerable portion of the family's income from alfalfa. After further observation it was apparent that the typical grower-respondent in the contiguous four-county area had an awareness of IPM as a cultural practice and had been involved in conducting rather extensive field inspections of their crop during the growing season, but were rather dependent on previous experience in making pest control decisions and utilizing information sources with which they were not familiar. Even though the typical respondents in this study were older than their peers, they had higher levels of formal education than most groups their age and conducted what could be defined as medium size operations. Furthermore, it was apparent that alfalfa was considered a cash crop even though a sizeable group marketed their alfalfa through livestock.

Recommendations

The recommendations herein are provided to assist users of this study in making educational program decisions

concerning the diffusion of information and practice of Integrated Pest Management.

1. The growers were comfortable and seem to have rather positive relationships with their County Extension Agents. Therefore, Extension programming in the four-county area which includes profitability in agriculture should also stress awareness and benefits of Integrated Pest Management (IPM) as a target program goal. Furthermore, as a part of Extension programming utilizing experiential learning, on-farm demonstration plots should be encouraged among producers to emphasize the beneficial impacts of IPM as a worthwhile practice versus "business as usual".

2. Extension workshops for the purposes of assisting specialists and county field staff in disseminating pertinent information to producers for updating should stress the need for conducting local meetings early enough for growers to take advantage of new ideas, technology, practices, etc. prior to the upcoming growing season. Furthermore, workshop leaders should emphasize the importance and benefits of reminding producers early and often that spring is a critical time for alfalfa insect infestations in the four-county area and quick responses in discerning problem situations may prevent extensive losses.

3. Extension Agents, IPM Specialists, and chemical representatives should continue emphasizing the importance to farmers of checking their fields on a regular systematic basis for alfalfa related pests throughout the growing

season and particularly during the early spring for the alfalfa weevil. Observations for visible damage and insect counts should be stressed among producers.

4. Since this group has rather strong positive ties to Extension, a variety of methods to communicate with and inform producers of new technology, changes in chemical regulations, etc. should be pursued. Extension agents should also be aware of the stages of adoption in which producers may be working through as they attempt to assist them with problems. Even though personal contact with producers is expensive and time consuming, it may further the existing positive relationships as well as assure the adoption of IPM as a management practice.

Implications

The findings of this study indicate that a majority of alfalfa producers have an awareness of Integrated Pest Management and believe it to be a worthwhile effort to conduct. However, it is important to remember that the findings also reveal that some producers do not understand the concept of Integrated Pest Management. Considered in its totality, this research effort implies that alfalfa producers need further updating and educational programs before they as a commodity group "buy" into the idea of IPM.

With the rural economy and the environment being perceived as important considerations by both farm and non-

farm publics, it appears to be up to Extension educators to design, develop and conduct educational programs which bring about a greater comprehension of existing pest problems, the alternatives available and strategies for effective solutions. However, for one reason or another Extension will not reach everyone; still the effort will hopefully result in a higher level of understanding concerning agriculture as a whole and the alfalfa industry specifically. Therefore, a definite need exists for producers and the public to understand that agriculture is both a business and a food supply. While this study has dealt specifically with alfalfa growers and their awareness and perceptions of IPM, its implications go beyond the 120 producers in South-Central Oklahoma.

A holistic approach to solving agricultural problems in cooperation of farmers with Cooperative Extension and other research and educational agencies will provide the infrastructure for reaching our goals of a competitive and profitable American agriculture and a cleaner environment.

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APPENDICES

APPENDIX A

IRB STATEMENT OF APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Proposal Title: ALFALFA PRODUCERS' AWARENESS, PERCEPTIONS, AND PRACTICES IMPLEMENTED WITH REGARD TO INTEGRATED PEST MANAGEMENT IN A FOUR COUNTY AREA IN SOUTH CENTRAL OK.

Principal Investigator: Dr. James D. White/Dean Odell Dickey

Date: July 6, 1992 IRB # AG-93-001

This application has been reviewed by the IRB and

Processed as: Exempt [X] Expedite [ ] Full Board Review [ ]

Renewal or Continuation [ ]

Approval Status Recommended by Reviewer(s):

Approved [X] Deferred for Revision [ ]

Approved with Provision [ ] Disapproved [ ]

Approval status subject to review by full Institutional Review Board at next meeting, 2nd and 4th Thursday of each month.

Comments, Modifications/Conditions for Approval or Reason for Deferral or Disapproval:

Exempt Survey

Signature: Marcia K. Tilley Date: July 6, 1992

Chair of Institutional Review Board

APPENDIX B

LETTER TO EXTENSION AGENTS AND IPM SPECIALISTS

2313 S. Walnut #80
Stillwater, OK 74074
July 17, 1992

NAME
ADDRESS

Dear NAME:

I am currently working on a Master's Degree in Agricultural Education at Oklahoma State University. The research for my thesis is centered around alfalfa producers' awareness, perceptions and practices implemented with regard to Integrated Pest Management. Dr. James White, Agricultural Education Department, is advising the study. Dr. Eddy Finley, Agricultural Education, Dr. John Caddel, Agronomy, and Dr. Gerrit Cuperus, Entomology, are also working with me on the study. This topic was chosen because of my interest in alfalfa and production practices regarding pest management. Also, I feel the information gained from this study will be beneficial to the alfalfa producers of this state.

I have selected a four-county area of South-Central Oklahoma, which includes Caddo, Garvin, Grady and McClain Counties, as the site of the study. The population of the study will include alfalfa growers who are members of their county Hay Growers Association and others who have been identified by County Extension Agents and IPM Specialists, including Dr. Gerrit Cuperus.

A telephone survey will be utilized to gather information. I plan to begin the calls sometime in late July and continue through August. The calls will be made between 8:00 and 10:00 p.m. so as to interfere as little as possible with the producers' work schedule. Also, the survey was designed to take only a few minutes to complete. A copy is being included in order that you might be made more aware of the types of questions being asked.

If you have any questions or concerns about the survey, please feel free to contact either myself (377-0717) or Dr. White (744-5130) for further information.

Sincerely,

Odell Dickey
Graduate Student

Enclosure

APPENDIX C

COMMON AND SCIENTIFIC NAMES OF ORGANISMS ADDRESSED IN THE STUDY

COMMON AND SCIENTIFIC NAMES OF ORGANISMS ADDRESSED IN THE STUDY

COMMON NAME	SCIENTIFIC NAME
Crops	
Alfalfa	*Medicago sativa*
Grain Sorghums	*Sorghum bicolor*
Peanuts	*Arachis hypogaea*
Soybeans	*Glycine max*
Wheat	*Triticum aestivaum*
Insects	
Alfalfa (Forage) Looper	*Caenurgina erechtea*
Alfalfa Weevil	*Hypera postica*
Aphid	*Aphidae*
Army Worm	*Spodoptera spp.*
Blister Beetle	*Epicauta spp.*
Citrus Scale	*Aonidiella spp.*
Cotton Boll Worm	*Heliothis zea*
Cutworm	*Peridroma spp.*
European Spruce Sawfly	*Diprion hercyniae*
Grasshopper	*Melanoplus spp.*
Ground Beetle	*Coleoptera carabidae*
Gypsy Moth	*Lymantria dispar*
Lacewing	*Neuroptera chrysopa*
Lady Beetle	*Coleoptera coccinellidae*
Mosquito	*Culicidae spp*
Parasitic Wasp	*Blathyplectes curculionis*
Potato Leafhopper	*Empoasca fabae*
Screw Worm	*Cochliomyia hominivorax*
Webworm	*Loxostege spp.*

COMMON AND SCIENTIFIC NAMES OF ORGANISMS
(Continued)

COMMON NAME	SCIENTIFIC NAME
Weeds and Grasses	
Bermudagrass	*Cynodon dactylon*
Bull Nettle	*Urtica spp.*
Cheat	*Bromus secalinus*
Crabgrass	*Digitaria sanquinalis*
Curly Dock	*Rumex crispus*
Downy Brome	*Bromus tectorum*
Field Bindweed	*Convolvulus arvensis*
Foxtail	*Setaria italica*
Henbit	*Lamium amplexicaule*
Horsetail	*Conyza canadensis*
Johnson Grass	*Sorghum halepense*
Jointed Goat Grass	*Aegilops cylindrica*
Morning Glory	*Ipomoea spp.*
Mustard	*Brassica spp.*
Pigweed	*Amaranthus spp.*
Ryegrass	*Lolium multiflorum*
Sandbur	*Cenchrus spp.*
Shepherdspurse	*Capsella bursa-pastoris*
Watergrass	*Echinochloa spp.*

APPENDIX D

QUESTIONNAIRE

Alfalfa Integrated Pest Management Survey

Hello, may I speak to Mr./Ms._____? Thank you. Hello, Mr. _____, my name is Odell Dickey and I am with Oklahoma State University at Stillwater. Would you mind helping us out by answering a few questions on alfalfa production and Integrated Pest Management? This should take approximately 20 minutes of your time. Thank you.

1. How long have you been an alfalfa producer? _____

2. What is your farming status?

   Full-time _____
   Part-time _____

3. Presently, how many acres of alfalfa do you have under cultivation? _____

Definition of IPM: Integrated Pest Management is an approach that employs a combination of techniques to control pests before their numbers or damage becomes economically important. These techniques may include regular crop checks, chemicals, crop rotations, resistant varieties, and natural controls such as predators or parasites of destructive insects.

4. Are you aware of Integrated Pest Management (IPM)?

   Yes _____
   No _____ (If no, go to Question 10)
   Somewhat _____

5. Are you presently enrolled in an Integrated Pest Management program?

   Yes _____
   No _____

6. Would you rank order your major source/sources of information concerning Integrated Pest Management programs and practices?

   IPM Area Specialist _____
   County Extension Agent _____
   Independent Private Consultant _____
   Vocational Agriculture Teacher _____
   Other Farmers _____
   Newsletters/Publications _____
   Extension Fact Sheets _____
   Hay Grower Meetings _____
   Other (Specify) _____

7. How cost effective has Integrated Pest Management been?

   Very Effective _____
   Effective _____
   Somewhat Effective _____
   Not Effective _____
   Unknown _____

8. What are your perceived advantages concerning IPM? Would you care to rank these advantages?

Increased profitability	_____
Allows for quick response to the problems	_____
Increased yield	_____
Increased stand longevity	_____
Environmentally friendly	_____
Opportunity to use alternative pest control	_____
Other(Specify)	_____

9. What are your perceived disadvantages concerning IPM? Would you care to rank these disadvantages?

Lack of consultants	_____
Cost	_____
Time constraints	_____
Ability of scouts to recognize problems	_____
Lack of understanding concerning IPM	_____
Appropriateness of recommendations	_____
Reliability of information	_____
No Disadvantages	_____
Other(Specify)	_____

10. Is your alfalfa regularly checked by anyone for insect, weed, or disease problems?

Yes	_____	
No	_____	(If no, go to Question 14)
Sometimes	_____	

11. Who does these checks?

Yourself	_____
Son/Daughter	_____
Spouse	_____
Hired Hand	_____
Consultants/Scouts	_____
Applicator	_____
Other (Specify)	_____

12. How often are fields checked during the haying season?

Twice a week	_____
Once a week	_____
Once between cuttings	_____
Other (Specify)	_____

13. How often are fields checked during the dormant season?

Once a month	_____
Once every 3 months	_____
Not Checked	_____
Other (Specify)	_____

14. How frequently do you have insect related problems?

Every month during the year _____
Spring _____
Just during the haying season _____
Just during the dormant season _____
No insect problem _____
Other (Specify) _____

15. Rank order the major pest problems affecting alfalfa production on your farm.

Insects _____
Weeds _____
Diseases _____
Other (Specify) _____

16. Would you rank order your major insect problems?

Alfalfa Weevil _____
Aphids _____
Potato Leafhoppers _____
Grasshoppers _____
Webworms _____
Cutworm _____
Armyworm _____
Blister Beetle _____
Other (Specify) _____
No Insect Problem _____

17. Would you rank order your major weed problems during the -

SUMMER		WINTER	
Curly Dock	_____	Cheat (Downy Brome)	_____
Pigweed	_____	Mustard	_____
Foxtail	_____	Other (Specify)	_____
Jointed Goat grass	_____	No Weed Problem	_____
Pepper grass	_____		
Field Bindweed	_____		
Morning Glory	_____		
Johnsongrass	_____		
Crabgrass	_____		
Horsetail (Marestail,Mulestail)	_____		
Other (Specify)	_____		
No Weed Problem	_____		

18. Would you rank order your major disease problems?

Root Rot _____
Crown Rot _____
Leaf and Stem Spots _____
Other (Specify) _____
No Disease Problem _____

19. Please rank order the problems you experience relative to soil fertility.

Boron Deficiencies _____
Manganese Deficiencies _____
Phosphorous Deficiencies _____
Low PH _____
Nitrogen _____
Potassium _____
Other (Specify) _____
No Deficiencies _____

20. Please rank order the pest control methods you utilize.

Pesticides _____
Biological _____
Natural Predators _____
Grazing _____
Host Plant Resistance _____
Harvest Time _____
Other (Specify) _____

21. How do you determine when to spray for pests?

Visible Damage _____
Insect Numbers _____
Scout Report _____
Calendar _____
Applicator Recommendation _____

22. How often do you find pest problems with which you are not familiar?

Every haying season _____
More than once a year (Specify) _____
Less than once a year (Specify) _____
No problem _____

23. Would you rank order those you consult most often about these pest problems with which you are not familiar?

IPM Area Specialist _____
County Extension Agent _____
Applicator/Chemical Sales Rep. _____
Independent Private Consultant _____
Vocational Agriculture Teacher _____
Coop Manager _____
Seed Dealer _____
Other Farmers _____
Other (Specify) _____

24. Gender: Male _____ Female _____

25. Age: _____

26. Highest level of formal education:

High School	_____
Attended College	_____
B.S. Degree	_____
Master's Degree	_____
Doctorate	_____
Other	_____

27. What percent of your total family income comes from alfalfa production?

_____

27A. Alfalfa not sold; fed to other livestock. _____

Thank you for your time, I really appreciate your willingness to be a part of this study.

VITA

Dean Odell Dickey

Candidate for the Degree of

Master of Science

Thesis: ALFALFA PRODUCERS' AWARENESS AND PERCEPTIONS OF INTEGRATED PEST MANAGEMENT PRACTICES IN A FOUR-COUNTY AREA IN SOUTH-CENTRAL OKLAHOMA

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Fort Smith, Arkansas, October 5, 1961, the son of Donald O. and Kathleen Dickey.

Education: Graduated from Fort Smith Southside High School, Fort Smith, Arkansas, May of 1979; received a Bachelor of Science Degree from Oklahoma State University, Stillwater, Oklahoma, May of 1989, with a major in Animal Science; completed requirements for the Master of Science Degree at Oklahoma State University in July of 1993.

Professional Experience: Weaning Pen Manager, Granada Land and Cattle Company, Wheelock, Texas; Herdsman, Inman Dairy, Scroggins, Texas; Dairy Technician, Oklahoma State University Dairy Cattle Center, Stillwater, Oklahoma; and member of Gamma Sigma Delta Honor Society, at Oklahoma State University.