THE ROLE OF CROP PRODUCTION CLUBS IN THE TECHNOLOGY TRANSFER PROCESS

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ABSTRACT

This study was undertaken to determine if crop production club members represent an adopter category of the adoption diffusion theory as outlined by the literature, to obtain a more detailed description of the characteristics of the crop production club members and how they relate to the adopter categories and to determine the role crop production clubs play in the technology transfer process. A telephone survey was conducted using two groups, one selected from crop production clubs that had been organized for more than five years and the other a stratified random sample of non-club farmers in the surrounding area to the clubs. The questionnaire was designed to obtain information about innovative cropping practices, as well as demographic data, personal characteristics and communication behavior. A total of 38 crop production club members and 28 non-club farmers were contacted between April 22 and May 10, 1991.

The results of the study found that the characteristics exhibited by crop production club members were similar to those outlined in the adoption-diffusion theory for early adopters. Therefore crop production club members fit into the adoption-diffusion process as early adopters. Crop clubs use demonstrations as a way of introducing new innovations to their club members. Both groups indicated that they used neighbors often as a source of information and therefore, crop production club members likely transfer information to others through this and other channels. They transfer

technology through the adoption-diffusion process as early adopters. From this study it can be concluded that crop production clubs do play a role in the technology transfer process.

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Chapter 1

Introduction

1.1 Problem

The introduction of innovative practices and the technology transfer process have been an integral part of the agriculture sector. Technology transfer continues to play an important role in agriculture. Traditionally, technology transfer was carried out by government departments, universities and research stations. Over the past number of years, these sources have been joined by a number of new sources. Crop production clubs are one of the newer sources emerging in the field. There is information available relating to technology transfer and sources of technology transfer. Generally, however, there is very little information available about crop production clubs because they are so new. There have been a few recent studies conducted to determine how clubs operate. Because crop production clubs are emerging as a source of technology, it is important to find out what role they play in the technology transfer process.

Crop production clubs consist of a group of agriculture producers from a local area who form a group to share information and to use the opportunity to innovate and compare results. The producers use the information from their projects for their own benefit. However, their use of new approaches is easily observable by other producers in the area and they are willing to

share their results and this may well be important in the adoption-diffusion and technology transfer process. A review of the literature outlines the adoption-diffusion process, including the adopter categories and adopter category characteristics. The literature also provides a background of technology transfer and where adoption-diffusion fits into the process.

An increase in the interest of crop production clubs has been accompanied by an increase in the number of clubs, the number of projects and the amount of funding. The 1990 Saskatchewan Producer Club Directory lists 28 organized crop clubs. With the increased focus on crop production clubs and the limited amount of information available, this study was conducted to determine the role crop production clubs play in the technology transfer process. It was designed to determine how crop production clubs fit into the adoption-diffusion process by identifying which adopter categories they represent and the corresponding characteristics they exhibit.

1.2 Significance

With the increasing emphasis on technology transfer and the increasing number of sources involved in the process, it is important to determine what role these various sources play. The information provided by this study will add to the limited body of knowledge about crop production clubs in relation to their role in the technology transfer process.

A study conducted in 1989 on crop production clubs established a foundation on which to do a follow-up study and recommended further

studies be conducted on the impact of crop production clubs on the whole technology transfer process. (Hass, 1989). Determining the role of crop production clubs in the technology process will provide useful information for further development decisions and may result in more funding allocated to club activities.

1.3 Objectives of the Study

This study was conducted in an attempt to relate crop production clubs to the adoption-diffusion process and the technology transfer process. The three objectives were:

1) to determine if crop production club members represent an adopter category of the adoption-diffusion theory, as outlined by the literature
2) to obtain a more detailed description of the characteristics of the crop production club members and how they relate to the adopter categories
3) to determine the role crop production clubs play in the technology transfer process.

1.4 Operational Definitions

Technology Transfer
The process that involves all stages of communicating a technology from the initial or development stage of a technology to the final user or adoption stage.

Adoption-Diffusion
The process of introducing a new technology to the final user and transferring it from the idea stage to the acceptance or adoption stage.

Adopter Categories
A system of classifying adopters of a new technology based on their innovativeness or when they first began using a new idea.

Crop Production Club
A group of farmers in a local area researching and demonstrating innovative crop-related practices and activities.

1.5 Limitations, Delimitations and Assumptions

The basic limitations of this study were the available sample size and the length of time crop production clubs have been organized. The 1990 Saskatchewan Producer Club Directory lists 28 crop production clubs currently operating, with 6 clubs organized for more than five years. This study only included those clubs that have been organized for five years or longer, which significantly restricts the number of clubs available for the study. This time frame may also pose some limits on how much time the adoption-diffusion process has had to take place. Another limitation is the restricted area from which the clubs were selected.

The focus of the study was only on crop production clubs and crop-related activities. In the literature on the adoption-diffusion process, five adopter categories (innovators, early adopters, early majority, late majority and laggards) and corresponding characteristics were outlined. (Rogers, 1983). Lionberger (1960) states however, that the division of adopters into three categories rather than five is sufficient to describe most known characteristic differences in relation to the adoption process. It was extremely difficult to

distinguish between innovators and early adopters in this study. Therefore, for the purposes of this study, Lionberger's three adopter categories (early adopters, majority and late adopters) were used in the analysis and discussion.

The study made the assumption that there had been enough time for the adoption-diffusion process to take place with those clubs that have been organized for five years or longer. Also, based on other studies and the adoption-diffusion theory, it can be assumed that the presence of a crop production club would likely attract the more progressive farmer in the area to join the club.

1.6 Literature Review

The literature review provided information about the technology transfer process and the adoption-diffusion process, which established the theoretical framework on which the study was based. The limited amount of literature available for crop production clubs, outlined what they are and how they function. A discussion of these processes established the basis of determining how crop production clubs relate to the adoption-diffusion process. A search for related information was conducted through the ERIC (Educational Research Information Centers) system database as well as the general University of Saskatchewan library catalogue. Some related papers and presentations were acquired from the staff of the University's Extension Division.

Technology transfer has played an important role in agriculture. There has been some research conducted and an effort made to define and describe technology transfer as well as to outline the major sources. Fuller (1982), Baker (1987), Whale (1989), and a recent report called Growing Together (1990), have all contributed to the discussion.

The adoption-diffusion theory, which fits into the final phase of the technology transfer process, has also been the subject of research and discussion. The main contributors to adoption-diffusion research are Lionberger (1960), Rogers (1971, 1983), Fliegel (1984) and Roling (1988). As a result of these studies, adopter categories and characteristics have been established. Rogers has reviewed and analyzed the major studies of adoption-diffusion and established a refined and accepted version of five adopter categories and corresponding characteristics. However, as mentioned previously, Lionberger's generalization of five adopter categories into three adopter categories was used in the analysis and discussion. The crop production club members selected for this study likely represent the early adopter category of the adoption-diffusion process.

A study conducted by Hass (1989) has provided the majority of the background for crop production clubs, including their structure and function. Bjorge (1988) and Tanner (1987) have made presentations about crop clubs, which also provided some useful information. There have also been a number of studies conducted, including those by Blackburn, et. al. (1983), Whale, et. al. (1984) and Alberta Agriculture (1983), to determine how farmers value various information sources, including information on rating neighbors as a useful source of information.

1.7 Research Hypotheses

This study compared crop production club members and non-club farmers with respect to innovative cropping practices to determine adopter categories and corresponding characteristics. The study also tried to determine the role crop production clubs play in the technology transfer process.

The adoption-diffusion theory outlines socio-economic characteristics that indicate innovativeness and suggests that earlier adopters have received more formal education, have accumulated more wealth and have larger farming units. The following hypotheses were tested to determine the socio-economic characteristics of the crop production club members and the non-club farmers.

Hypothesis 1

The average age of crop production club members is lower than the average age for non-club farmers.

Hypothesis 2

Crop production club members have a higher education level than non-club farmers.

Hypothesis 3

Crop production club members have higher annual gross sales than non-club farmers.

Hypothesis 4

Crop production club members have larger operations than non-club farmers.

The adoption-diffusion theory also outlines personality variables that differ between earlier adopters and later adopters in a system. The following hypotheses were tested to determine the personality variables of the crop production club members and the non-club farmers.

Hypothesis 5

Crop production club members have a more favorable attitude toward change than non-club farmers.

Hypothesis 6

Crop production club members are more able to cope with uncertainty and risk than non-club farmers.

Hypothesis 7

Crop production club members have a more favorable attitude toward research than non-club farmers.

The adoption-diffusion theory states that adopter categories exhibit different communication behavior. The following hypotheses were tested to determine the communication behavior of the crop production club members and the non-club farmers.

Hypothesis 8

Crop production club members use mass media communication channels for information more often than non-club farmers.

Hypothesis 9

Crop production club members use the services of change agents more often than non-club farmers.

Hypothesis 10

Crop production club members use interpersonal communication channels to a greater extent than non-club farmers.

Hypothesis 11

Crop production club members on average participate in more organizations, particularly agriculture related, than non-club farmers.

Adoption-diffusion is the final stage of the technology transfer process. The following hypothesis was tested to determine the number of innovative practices that farmers have adopted in the past five years.

Hypothesis 12

Crop production club members have adopted a greater number of innovative cropping practices in the past five years than non-club farmers.

1.8 Methodology

This study was conducted through telephone interviews with the individuals in the selected sample. Telephone interviews were chosen in order to obtain the best possible response under the circumstances. On-farm interviews were rejected due to the time of the year, as well as the time and travel distances that would be required to obtain face-to-face on-farm interview information.

The study sample was comprised of two groups, one selected from crop production club members involved in clubs which have been organized for five years or more and the second group selected from a stratified random sample of non-club farmers from the same area as the corresponding crop club members. The narrower operational time frame provided an opportunity to trace the member's involvement and limited the number of variables that affected their involvement. The questionnaires were similar for the two groups except for the introductory questions that related to either the crop club membership or the non-club farmers operation. A pretest was conducted to eliminate any unclear or ambiguous questions.

In this study, two groups of farmers were selected to represent all crop production club farmers and non-club farmers in the chosen study area. The research hypotheses predicted that there were differences in the samples based on specific factors. A statistical analysis was applied to the data in order to test the research hypotheses outlined in the study. The results of the analysis provided information on whether or not the differences between the samples were significant.

Both descriptive and inferential or sampling statistics were used in the analysis of the study. Descriptive analysis, including mean, mode, standard deviation and frequency distribution, provided information about each sample. Inferential analysis or sampling statistics provided a basis for estimating population characteristics based on the information gathered from the sample characteristics.

Sampling or inferential analysis use two types of data: parametric data and nonparametric data. (Best and Kahn, 1989). Parametric data is measured using measured intervals or ratios. An example of a parametric test is the t-test. Nonpararmetric data is measured using ordinal (ranking order) or nominal (counted) scales. An example of a nonparametric test is the chi-square. Williams (1968) states that "generally speaking, nonparametric tests are considered less powerful than their parametric counterparts."[1] (pg 123)

Inferential analysis of the study included the unpaired t-test and the chi-square. The t-test used the means and distributions of the two samples to test the significance of difference between the means of the two groups. The chi-square was used to determine the relationship and differences between the variables which required a ranking score or distribution into categories and to determine the significance of the difference of the variables. Given the sample size of this study, the significance level of $p<.001$ was accepted as the appropriate level and was used throughout the analysis.

Williams (1968) also outlines two factors of measurement that need to be considered. One of the factors is validity which he defines as "the degree to which the researcher measures what he claims to measure."[2] (pg 22) The second factor is reliability which he defines as "the external and internal consistency of measurement."[3] (pg 22) In order to ensure validity, the questionnaire design was based on the theoretical framework provided in the literature review. The theory outlined the factors which indicate innovativeness and the related adopter categories. A theoretical basis was outlined for technology transfer and the adoption diffusion process. The theoretical framework discussed in the literature review was used as the

basis for establishing the hypotheses to be tested and the corresponding questions which provided the results. The questionnaire was pre-tested to ensure that the questionnaire and results demonstrated reliability.

Chapter 2

Literature Review

2.1 Introduction

The British North America Act of 1867 influenced the way extension and technology transfer developed by defining research as a federal responsibility, and education, including extension, a provincial responsibility. This resulted in the development of extension programs with their own variations in each province. (Fleury, 1991)

The Homestead Act of 1870 encouraged settlement of Western Canada with the offer of free land. However, the numbers were relatively low until the railway crossed the prairies in 1883-1887. Many of the settlers lacked experience in farming and for those with experience, the methods they were familiar with did not apply to the semi-arid plains. Settlers quickly realized that without government advisory services, experimental farms or other research agencies to provide information, they would have to find a way of exchanging information and expanding community effort. In 1884 the first Agriculture Societies were formed with objectives of providing educational information to settlers with respect to agriculture production. Paul (1979) states that "the emphasis was on improved seed and livestock, and the

invention and improvement of agricultural implements or machines".[4] (pg 64)

In 1887, the federal government established the Experimental Farm Service, with one of the five farms located at Indian Head, Saskatchewan. Farmers were encouraged to cooperate in field tests and experiments since the Farm could not conduct tests in all of the settled area. The federal and territorial governments began cooperating in extension activities and strongly supported the activities of the Agriculture Societies. Provincial extension programs were established in western Canada in the early 1900's, after the formation of the provinces had been completed.

The extension function in all Canadian provinces, except Saskatchewan, was established as part of the provincial departments of agriculture. However, the extension program in Saskatchewan evolved in a very unique way. In 1910, five years after Saskatchewan became a province, Motherwell, the Saskatchewan Minister of Agriculture transferred the educational work of the government to the newly formed University of Saskatchewan's Extension Department in the College of Agriculture. This transfer supported the concept that the College would be the centre of all educational work in Agriculture. The transfer also placed Saskatchewan in the unique situation of being the first University to have a full-time Director of Extension and the first to have the College of Agriculture responsible for agricultural and women's extension programs throughout the province.

The federal government was mandated the role of research by the British North America Act, but extension was a provincial responsibility. Therefore,

the involvement of the federal government was conducted through "technology transfer" and included participation in meetings, development of technical and other publications and other forms of public information. In the mid-1970's, the sources of technology transfer expanded to include a number of private organizations, including producer organizations, commodity groups, fertilizer, chemical and machinery dealers and other non-government organizations. These organizations were becoming aware of the need to provide more information to their members particularly with respect to specific organizational needs and products. They therefore entered the technology transfer process by providing educational events.

The situation has developed where new innovations and technologies are introduced and transferred into the agriculture sector through a number of channels or sources. Crop production clubs are one of these and are increasing in numbers. The 1990 Saskatchewan Producer Club Directory lists 28 crop production clubs, 6 of which have been organized longer than 5 years. A review of the literature relating to technology transfer and adoption-diffusion theory provided information about what the technology transfer process is and how the adoption-diffusion process works. The literature review assisted in determining what role crop production clubs play in the whole technology process.

Although there is substantial research and literature relating to technology transfer and the adoption diffusion process, literature relating to crop production clubs is limited. This study was designed to add to the limited body of knowledge relating to crop production clubs.

2.2 Technology Transfer Process

Growing Together (1990) states that "in general terms, technology transfer means transmitting knowledge from one person to another for a practical application in a particular field."[5] (pg 7) Baker (1987) defines technology transfer as "involving the research, development, transfer and diffusion of new knowledge, including both "hard" (products) and "soft" (information) technologies."[6] (pg 3) Whale (1989) defines technology transfer as "helping to convey information in such a way that *a.* it fulfills a particular need of the client, and *b.* it can be effectively applied by the client to his or her own situation."[7] (pg 108)

Fuller (1982) states that by definition the process of technology transfer is linear and implies the 'passing on' of existing information. He outlines several interconnecting steps in the linear process of the technology transfer chain. Stage 1 is the knowledge generation or research stage. Stage 2 is the knowledge application or development stage. Stage 3 is the point where technology is made available or the transfer stage and Stage 4 is the on farm adoption or diffusion stage.

Whale (1989) also outlines the phases of the transfer process and uses Beal's breakdown of these phases into six different sets of activities. Knowledge production, knowledge management and knowledge translation are stages 1, 2 and 3, with stages 4 to 6 being comparable to those used by Fuller. Beal refers to stages 4 through 6 as product development, product

dissemination and product adoption/use. The transfer process is discussed incorporating Fuller's four stages and Beal's six stages.

Stage 1, the knowledge production stage is the point where the problem is outlined. Stage 2 is the knowledge management stage, where the focus is on who needs this particular information. Once the range of users are determined, the research-based information is screened, indexed, catalogued, packaged and stored in a form that makes it readily retrievable. Stage 3 is the knowledge translation stage and is the step where research findings are synthesized and converted to useful packages of information that can be used to solve practical problems. Beal (1982) characterizes this phase "as one of the 'meeting points' of abstract, scientific knowledge with the practical knowledge and problem definitions of clients"[8]. (pg 6)

Stage 4, the product development stage occurs when the research findings, which have been synthesized and converted, are combined with knowledge about user needs to develop solutions or "products" that can potentially meet these needs. Fuller refers to this as the stage of trial and error in which the utility, scale and marketability of the technology is determined. Stage 5 is the product dissemination or transfer stage. At this stage the technology is actually introduced to the bulk of the target population, usually as a product. This is a critical stage where marketing is important as well as support systems which promote awareness and acceptance of its utility and benefit. It is also necessary to monitor the results of the activities of this stage. Fuller calls this the stage of Extension. Stage 6 is the product adoption/use stage or diffusion stage. This is the period of time when farmers decide whether or not to adopt the new technology, assuming they are aware of it. Crop

production clubs enter the technology transfer process in Beal's stage 5, where the technology is actually introduced to them. They are involved in the process through stage 6 or the adoption-diffusion stage. This study was designed to determine what role they play in stage 6.

Growing Together (1990) states that "the purpose of technology transfer is to ensure that knowledge and its application flow from the R&D laboratory or field experiment (the technology source) to the user (the technology receiver). This represents a continuum from knowledge development (research) through knowledge transfer (transfer agents) to knowledge use (farmer or client)."[9] (pg 10) Federal or provincial research facilities, a university or other educational institution, a private sector research establishment or even another country can be the technology sources. Technology receivers range from producers to processors and marketers, from individual farmers to major corporations. There are a number of transfer agents between the research facility and the ultimate user, including governments, university and to a growing extent, the private sector.

Fuller outlines some of the limitations of successful transfer that can be observed, even with this simplistic outline of the Technology Transfer Chain. He suggests that the primary limitation is the great distance between Stage 1 (research) and Stage 4 (diffusion) or between the researcher (scientist) and the ultimate user (producer). This distance is evident whether measured in physical, temporal or psychological terms. Fuller states that before an innovation arrives at the farm level it must pass through several 'hands'. These intervening stages represent filters and adapters in the transfer process refining the product for adoption. However, these stages

also add cost and time to the entire process. Other constraints may be introduced at these intervening stages by political factors, fiscal limitations, conflicting programs and licensing problems.

Fuller states the second problem is the number of agencies, both public and private, that may be involved in the process. There are a wide variety of participants at each stage who have responsibility for the development, transfer and adoption of agricultural innovations. Fuller suggests the following[10] (pg 5) in his discussion to outline the participants involved in the process:

Research	**Development**	**Transfer**	**Adoption**
Government	Ag. Stations	Extension Services	Local Advisors
Industry	Labs and Demonstrations	Marketing Services	Local Agents
Universities	Demonstrations	Extension Education	Farmer Organisations and Advisory Groups

With the presence of multiple groups at each stage, conflict and confusion can arise especially between different levels of government and between the public and private sector. He points out that although the table was designed for diagramatic simplicity portraying the lines as direct and liner, the various agencies and institutions have high levels of interaction and are often interdependent. He goes on to say that the number of joint committees, both advisory and decision-making, required to service this complex structure can lead to the confusion and dilution of objectives.

Growing Together (1990) points out that traditionally technology was transferred from researchers to specialists and extension services to farm operations. The main focus was to help increase farm productivity and competitiveness. However, another group of clients emerging in the technology transfer process are producers, producer groups, processors and agri-businesses. Direct access to technology provides a way for this group to increase the competitiveness and marketability of their products. The report acknowledges the increasing number of available sources of information and the increasing challenges of selecting from among these sources. The report points out that other information sources, such as fertilizer and machinery dealers, community colleges, grain companies, commodity groups, farm organizations, soil conservation associations, chemical and pharmaceutical suppliers have joined traditional information sources such as government and university services.

Baker (1987) states that in response to today's diverse and specialized agriculture industry, several organizations have become involved in the transfer of new agricultural technologies besides the public sector. He identifies a range of groups including farm organizations, commodity groups, regional and community colleges, institutes of technology, the media and even non-agricultural government departments that are involved in agriculture extension activities or technology transfer. He suggests that national and provincial extension systems have become more complicated. The various organizations offer similar programs, creating confusion for the clients and other organizations in the agriculture industry.

Baker briefly outlines the involvement of some of the organizations in the technology transfer process or extension process as it is sometimes referred. All public sector extension systems have developed various mixes of subject matter specialists including central and regional personnel from the extension system, personnel from other departments and from federal research stations and colleges of agriculture. Agriculture Canada's role has been referred to as "technology transfer" and includes such activities as participation in farm meetings, development of technical and other non-scientific publications, preparation of materials for the media and other forms of public information on new technologies as well as funding of non-governmental technology transfer efforts through such mechanisms as federal-provincial agreements.

Agri-business technology transfer activity is largely carried out through information and marketing services. Their role is very specialized and is limited to the marketing interests of individual agri-businesses and focussed on selected groups of specialized agricultural producers. The agricultural media rely on mass communication and repetition of information to create awareness of new technologies among their listeners, watchers and readers. Farm organizations largely provide general information to their local constituents. They tend to stress agricultural policy formation rather than dissemination of technical agricultural techniques. However, in recent years they have employed researchers and agricultural specialists which has made it easier for them to evaluate and disseminate information. Farming for the Future (1983) states that after only one year the Alberta's On-Farm Demonstration Program has proven to be an effective and efficient means of accelerating the transfer of technology from the research lab to the

farm. The report also suggests that this system should be continued and expanded in the future.

The Growing Together (1990) report outlines suggestions and recommendations that resulted from discussions. It was suggested that one of the elements of the technology transfer structure that should be included is incentives and demonstrations to interest and assist users and potential users in developing and adopting new technology from research findings. A number of technology transfer mechanisms that could be part of a new structure were suggested including: direct contact between scientists and users, including individuals; joint action of scientists and extension staff with individuals; joint research producer/processor groups/; technical advice to groups; demonstrations and field days; articles/inserts in press and media. Involving users and potential users in planning and evaluating research programs and projects could be one way of speeding up the technology transfer process.

The report also stated that farmers and producer groups should participate in the technology transfer process through various ways such as providing advice and supporting activities such as on-farm demonstrations. They would also keep informed on technological advances and could use their entrepreneurial skills to identify opportunities to apply new ideas. Both this report and Alberta's Farming for the Future (1983) report stress the importance of demonstrations at the producer level. Crop production clubs basically operate through demonstrations of innovative practices and are therefore moving in the direction encouraged by these reports. Therefore,

as outlined by these reports, crop production clubs may well play a role in transferring technology to other producers largely through demonstrations.

2.3 Diffusion Process

Research relating to the adoption-diffusion process has been studied for several years. Rogers, (1971, 1983) a prominent researcher in the diffusion field, has summarized the research results from major studies conducted in the field. Lamble (1984) summarizes the extent of Rogers work with a statement about his 1971 book (co-authored by Shoemaker), "their book is based on an extensive review of the research on diffusion and adoption of innovations from a broad range of fields. It is a very comprehensive and much referenced source."[11] (pg 33) Rogers has since published another book in 1983 which expands on much of the information in the 1971 publication. Roling (1988) similarly states that "Everett Rogers systematised and disseminated the generalisations of the hundreds of empirical diffusion studies with enthusiasm, clarity and care (1962, 1971 and 1983)"[12]. (pg 65)

The North Central Regional Publication No. 13 (1962) states that the system of bringing new ideas from their initial development to acceptance by farmers is accomplished through two interrelated processes called diffusion and adoption. They describe the diffusion process as "the spread of new ideas from originating sources to the ultimate users. The adoption process is a mental process through which an individual passes from first hearing about a new idea to its final adoption."[13] (pg 3)

Rogers (1983) identifies four main elements of diffusion of innovations in his definition, "diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system." (pg 10)[14] "An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption"[15]. (pg 11) He suggests that individuals perceive a number of characteristics of innovations which explains the different rate of adoption. Generally, receivers adopt some innovations more rapidly than other innovations. Innovations adopted more quickly are considered by receivers as having greater relative advantage, compatibility, trialability, observability and less complexity.

Rogers defines communication channels, the second element, as the way in which messages are transferred from one individual to another. He suggests that the results of various diffusion investigations show that most individuals depend on a subjective evaluation of an innovation that is communicated to them through another individual like themselves who had previously adopted the innovation. The process, in its most elementary form, involves four elements: an innovation; an individual or other unit of adoption that has knowledge of, or experience with using, the innovation; another individual or other unit that does not yet have knowledge of the innovation; and a communication channel connecting the two units.

The third element in the diffusion process is time. Rogers suggests that including time as a variable in the diffusion process is a strength, but the measurement of time can also be criticized. There are three ways time is involved in the innovation process, namely in the innovation-decision process, the innovativeness of an individual and the innovation's rate of

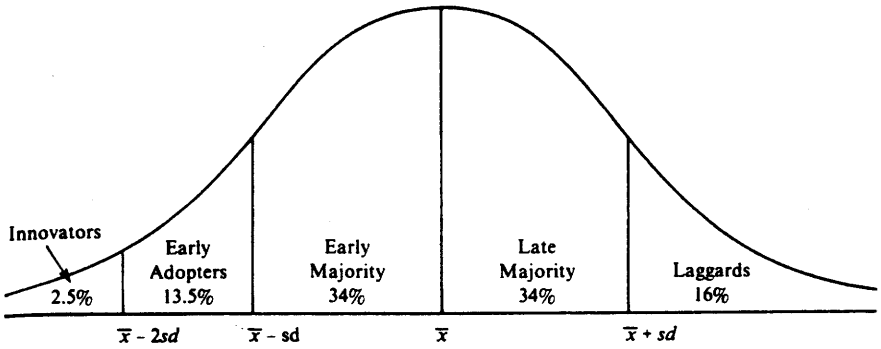
adoption in a system. He outlines the five main steps in the innovation-decision process: knowledge, persuasion, decision, implementation and confirmation. "Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system."[16] (pg 22) Five adopter categories have been developed to classify members of a social system on the basis on innovativeness. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system. The final element in Roger's definition of diffusion is the social system, which he defines a set of interrelated units (individuals, informal groups, organizations and or subsystems) that are engaged in joint problem solving to accomplish a common goal. Crop production clubs are a group of local producers who form a group for a specific purpose. They use demonstrations to try innovations that may provide useful information for members of the club. Although most of the activities are designed for club members only, other farmers in the area may benefit from the information by viewing the demonstrations and talking to neighbors who are members of the club.

2.4 Adopter Categories

Rogers (1983) points out that although there have been numerous titles of adopter categories developed, eventually one method of adopter categorization that he proposed in 1962 to be the standard, took over the dominant position. This provided for a standardization of both the nomenclature and the classification system. Lionberger (1960), North Central Regional Extension Publication No. 13 (1961), Fliegel (1984),

Lamble (1984) use Roger's categories in their discussions and Roling (1988) refers to his work. Rogers states that there is more known about innovativeness than about any other concept in diffusion research. The short-term goal of many change agencies is increased innovativeness of their clients and therefore, any diffusion research sponsored by these change agencies focuses on this main dependent variable of innovativeness. Innovativeness is one of the best single indicators of the success of development programs. This is another reason, particularly for developing countries, that the prime focus of diffusion research is innovativeness. The ultimate goal of most diffusion programs is behavioral change, indicated by innovativeness, rather than cognitive or attitudinal change. Innovativeness was the foundation of the design of this study and was used to determine how crop production clubs fit into the adoption-diffusion process. This information was also used to determine the role crop production clubs play in the technology transfer process.

Individuals in a social system adopt an innovation at different times. Rogers (1983), explains that five adopter categories were developed to classify adopters based on their innovativeness or when they first began using a new idea. The five categories describe "ideal" types which are based on generalizations of real cases and designed to allow for comparisons among groups of similar types. The five adopter categories are: innovators, early adopters, early majority, late majority and laggards. Innovators are the first 2.5 percent of the individuals to adopt an innovation. Early adopters are the next 13.5 percent to adopt a new idea. The early majority are the next 34 percent of adopters and the late majority form the next 34 percent of adopters. The last 16 percent are the laggards.



Adopter categorization on the basis of innovativeness.

The innovativeness dimension, as measured by the time at which an individual adopts an innovation or innovations, is continuous. This variable, however, may be partitioned into five adopter categories by laying off standard deviations from the average time of adoption.

Figure 1.1 — Adopter categorization on the basis of innovativeness. (Rogers, 1983, pg. 247)

2.4.1 Innovators

Innovators represent the two or three percent of a normal distribution, are noted as being "venturesome" and are eager to try new ideas. These interests tend to lead innovators out of their local circle of peer networks into a more cosmopolite social relationship. Their communication patterns and friendships tend to be among a group of innovators and may be spread over great geographical distances. Because innovators are the first to try new innovations, they tend to have the financial ability and psychological ability to cope with the high degree of uncertainty and risks associated with an

innovation. The innovator plays the important role in the diffusion process of launching new ideas into a social system, although they may not be respected by other members of the social system.

2.4.2 Early adopters

Early adopters are the next 10 to 15 percent to adopt new ideas and are a more integrated part of the local social system than are innovators. They are "respected", have high social status and have the greatest degree of opinion leadership in most social systems. Early adopters serve as a role model for many other members of a social system and are considered to be "the individual to check with" before using a new idea. Peers of early adopters respect them as representing successful and discrete use of new ideas. Therefore, the role of early adopters is to decrease uncertainty about a new idea by adopting it and through interpersonal networks conveying a subjective evaluation of the innovation to near-peers.

2.4.3 Early majority

Early majority represents the approximate third of the population who adopt new ideas just before the average member of a social system. They seldom hold leadership positions, but interact frequently with their peers. Early majority are considered to be deliberate because of their relatively long innovation-decision period. They provide interconnectedness in the

system's networks and provide an important link in the diffusion process between the early adopters and the late majority.

2.4.4 Late majority

The late majority normally represent the third of the population who adopt new ideas just after the average member of a social system. They are described as skeptical and approach new innovations cautiously. They may adopt new practices because of economic necessity and increasing social pressures. Even though they can be persuaded of the utility of new ideas, peer pressure is sill necessary to motivate adoption. Scarce resources means almost all of the uncertainty must be removed from the innovation before the late majority feel it is safe to adopt.

2.4.5 Laggards

Laggards are the last 15 percent to adopt and are considered to be "traditional". The past is the point of reference for the laggard, with decisions made in terms of what has been done in previous generations. They are the most localite of all adopter categories and are often isolates in social networks. Laggards are often suspicious of innovations and change agents. Limited resources mean that laggards want to be relatively certain that a new idea will not fail before they can afford to adopt. When they do adopt an innovation, it may already have been superseded by another more recent idea that is already being used by innovators.

Although five adopter categories have been outlined by Rogers, Lionberger (1960) points out that a general division of adopters can be made into early, late and the intervening or majority. These three divisions are sufficient to describe most known characteristic differences in relation to position on the adoption continuum.

2.5 Characteristics of Adopter Categories

There has been a large amount of research literature accumulated about variables related to innovativeness. Rogers (1983) summarizes the diffusion research into a series of generalizations under the following headings: socioeconomic status, personality variables and communication behavior.

2.5.1 Socioeconomic characteristics

Fliegel (1984) and Lionberger (1960) state that early adopters tend to be younger. However, Rogers states that there is inconsistent evidence about the relationship of age and innovativeness. Earlier adopters have more years of education, have higher social status, upward social mobility and have larger-sized units than later adopters. They are more likely to have a commercial (rather than subsistence) economic orientation than later adopters.

2.5.2 Personality variables

Earlier adopters have a more favorable attitude toward change than later adopters. They are also more able to cope with uncertainty and risk. Thomas, 1987 found evidence in his study that farmers have some ability to assess their own risk attitudes. Earlier adopters also have a more favorable attitude to science and education. They have higher levels of achievement motivation and higher aspirations than later adopters.

2.5.3 Communication Behavior

Earlier adopters have more social participation than later adopters. They have a greater knowledge of innovations and seek information about innovations more actively than later adopters. They have a higher degree of opinion leadership and are more likely to belong to highly interconnected systems than are later adopters. Earlier adopters have more change agent contact, have greater exposure to mass media communication channels and interpersonal communication channels than later adopters.

Rogers (1983) outlines each of the three communication channels that adopters are likely to use for information. Mass media communication channels use mass medium, such as radio, television, newspapers and publications, to transmit messages from one source to a large audience. Mass media is used to create awareness-knowledge. Interpersonal communication channels involve face-to-face exchange between two or more individuals. This channel is an effective way of persuading an

individual to adopt a new idea, particularly when the channel links individuals who are near-peers. Finally, Rogers outlines change agents as individuals, often professionals with university degrees in technical fields, who influence farmers innovation decisions in a direction deemed desirable by a change agency.

2.6 Summary of Characteristics of Adopter Categories

The generalizations indicate that an independent variable is positively related to innovativeness, which means that innovators will score higher on these variables than laggards. Therefore, from the diffusion research, a set of general characteristics of each adopter category have emerged. Rogers states that the important differences among these categories suggest that change agents should use somewhat different approaches with each adopter category. This means that one approach might appeal to innovators who adopted an innovation because it was soundly tested and developed by credible scientists. However, this approach would not likely be effective with the late majority and laggards who tend to have a less favorable attitude toward science. These later adopters will not adopt a new idea until most of the uncertainty about an innovation has been removed. They also place the greatest credibility in the subjective experience of their peers with the innovation conveyed to them through interpersonal channels.

The information provided by the literature review about the adoption-diffusion process has provided the background for this study and led to the design of the study. The study used innovativeness, as discussed by Rogers

and others, as a basis to determine the adopter category crop production club members represent. It is likely the crop production club members represent the early adopter category of the adoption-diffusion process.

2.7 Contributions and Criticisms of Diffusion Research

Rogers (1983) reviews the main contributions and criticisms of diffusion research and uses them to point out directions for future improvements of current weaknesses of diffusion studies. The results of diffusion research were incorporated during the 1960's and 1970's into his basic textbooks in social psychology, communication, public relations, marketing, consumer behavior, rural sociology and other fields. He states that both practitioners and theoreticians now regard the diffusion of innovations as a useful field of social science knowledge.

Rogers outlines four main contributions of diffusion research. The diffusion model is a conceptual paradigm which has a multidisciplinary nature and cuts across various scientific fields. The diffusion approach provides a common conceptual ground that links the divergent disciplines and methodologies. Secondly, the apparent pragmatic appeal of diffusion research in solving problems of research utilization is high. Research-based innovations and the potential users of such innovations can be connected with the diffusion approach. Third, the diffusion paradigm allows scholars to repackage their empirical findings in the form of higher-level generalizations of a more theoretical nature. Diffusion research has been allowed to progress in the direction of a gradual accumulation of empirical evidence

because of this orderly procedure. The fourth main contribution is that the research methodology implied by the classical diffusion model is clear-cut and relatively easy.

Rogers outlines the four major criticisms of diffusion research and states that until the 1970's almost nothing of a critical nature was written about this field. He suggests that this absence of critical viewpoints may have been the greatest weakness of all of diffusion research. Rogers outlines four main criticisms of diffusion research. His first main criticism is the pro-innovation bias of diffusion research. Most diffusion research implies that an innovation should be diffused and adopted by all members of a social system. It also implies that it should be diffused more rapidly and that the innovation should be neither re-invented nor rejected. Secondly, there is an individual-blame bias. There is a tendency to hold an individual responsible for his or her problems, rather than the system of which the individual is a part. The recall problem in diffusion research is the third criticism. A recall problem may occur owing to inaccuracies when respondents are asked to remember the time at which they adopted a new idea. The fourth criticism is the issue of equality in the diffusion of innovations. Socioeconomic gaps among the members of a social system are often widened as a result of the spread of new ideas.

Roling (1988) outlines what he sees as imperfections of the diffusion theory. He states that the populations or farmers are not homogeneous as implied by the theory. Farmers differ in psychological characteristics, group norms, access to resources and access to information. Therefore, these differences mean that when introducing a new innovation, the innovation does not mean

the same for every farmer. Roling states that there are differential rewards with diffusion between earlier as compared to later adopters and therefore diffusion processes are key mechanisms in reinforcing inequity and social differentiation. He also sees distortion of information as another imperfection. The basis of the theory is that the 'extension message' is assumed to be passed from one farmer to the next. He suggests that in actual practice, as studies of rumors have shown, considerable selectivity and distortion of messages take place. The result being that the information gets worse farther down the line, reinforcing the fact that later adopters have access to fewer sources of information. He also refers to progressive farmer bias in technology development or the fact that innovations are usually developed to suit the conditions of progressive farmers to begin with. He concludes with the suggestion these imperfections tend to be self-reinforcing. "Where differential rewards for innovation lead to higher incomes for earlier adopters, that tends to lead to their having access to even more resources so that they again increase their capacity to take risks, invest and innovate."[17] (pg 75)

Rogers and Roling both outline some criticisms of the adoption-diffusion theory. It was necessary to find out if crop production club members were early adopters. If the study proved that they were early adopters, then these criticisms outlined by Rogers and Roling have implications for the study and needed to be considered.

2.8 Crop Production Clubs

Hass (1989) outlines what crop production clubs are and what things are important for the clubs to succeed. Crop production clubs are made up of a small group of local producers who form a formalized organization with a clearly defined purpose. Examples of some of the specific goals and objectives include such things as: improve yields, learn about new crops, improve economics of crop production, test recommendations for local area, improve soil quality, implement conservation practices, determine best fertilizer/chemical programs, test various machinery and obtain outside resources to learn more about marketing. There is usually a professional, from government or industry, involved in the club who play an advisory and often leadership role. The club itself is producer-controlled. A large number of the clubs receive funding from outside sources, including government and industry.

Hass points out that the producers in this study tended to be innovative, motivated and fairly secure type of farmer. The results of the study also showed that producers felt they gained information from club activities that could be used to improve their own farming enterprise. They suggested that resources, both human and financial were easier to obtain as a group and that group support allowed them to try projects that as an individual they would unlikely try. The group support provided motivation among the members. These views tended to be supported by the professionals involved with the clubs.

Hass also looked at the impact on non-club farmers and found that although it was difficult to determine the impact because the clubs were only one or two years old, it appears that interest was being shown in club projects by non-club farmers. Some non-club farmers were trying practices that had been done previously by club members. He also states that the professionals agreed that an increase in interest was being shown by non-club farmers and they indicated that given time, crop clubs would prove to be useful in the technology transfer process.

Bjorge (1988) refers to crop production clubs as producer directed extension groups and states that their primary function is education. He suggests that these groups have the potential to be very effective in the technology transfer process. Bjorge outlines the main factors that must exist for a successful club, which include: producer directed, address an important need or problem, access to adequate human and financial resources, a solid structure and some success that motivates.

Vasey (1989) discusses Maximum Economic Yield (MEY) clubs in North Dakota and suggests that technology transfer has been greatly enhanced by the establishment of these clubs. The club members are eager for new information and are receptive to new research ideas. He states that the clubs have greatly reduced the time for knowledge to be put into practical use in the technology transfer process. He also suggests that a knowledgeable farmer has more credibility among his peers than people employed to disseminate information. Nowak (1982) states farm operators often generate the practical answers that other operators are seeking, whether through a process of invention or re-invention. In his reference to

conservation innovations, he states that most of the creative research is not coming from the universities or government conservation agencies, but rather from farmers themselves. Tanner (1987) points out that in some cases companies producing advanced technology seek out farmers in crop production clubs and organizations that are receptive to change, to participate in test sites and test groups, rather than farmers approaching companies. Therefore, these groups tend to get new technology first and assist in its development. Dillman (1986), in his study of adoption of no-till agriculture, states that changes are occurring with the sources of technology, and in the case of no-till, farmers played a very significant role in the innovation process. The government and university researchers and extension staff looked to the innovative farmers and then began contributing to the development process.

Roling (1988), in his discussion about agricultural information in industrial countries, briefly refers to development in the last 20 years of 'study clubs'. These are often set up by the extension worker, but have grown into 'mutual interest networks'. They consist of a small group of farmers who come together on a regular basis to study each other's financial management. He states that these study clubs play an important role in information exchange and in social pressure to innovate.

Several studies have looked at the value farmers place on various sources of information about farming operations and practices. One of these sources is neighbors and most of the studies indicate a high value placed on the information available from this source. In a study conducted by Blackburn (1983), 76% of farmers surveyed found neighbors to be very or moderately

important as a source of farm information. Alberta Agriculture (1983) found similar results, with 75% of farmers surveyed felt neighbors were a very or moderately important source of farm information. Whale, Hass and Hobin (1984) found that 85% of farmers surveyed felt that neighbors or family members were important sources of information about new farming practices. This study states that neighbors were consulted about a new idea that they had tried or were using to see how it had worked out under practical conditions similar to the farmer's own, and to consider implementation and management questions. The study draws the general conclusion "that decision making regarding change in farm practice is a complex process dominated by personal contacts. It requires information about the economic benefits of the change, and information that allows the farmer to translate the change in relation to his or her own abilities and resources."[18] (pg 18)

2.9 Implications for the Study

The literature review has provided the theoretical framework on which the study is based. The literature outlines the characteristics of farmers as they relate to innovativeness and the corresponding adopter categories. This information was used to help identify the characteristics of the sample used in this study and to determine the adopter categories the sample represents. The development of the technology transfer process, with a focus on the adoption-diffusion process, as well as the establishment of crop production clubs were outlined in the literature review. This information helped to

determine the role crop production clubs play in technology transfer and how the adoption-diffusion process relates to this role.

In summary, technology transfer takes place in several stages, with one of the final stages being the adoption-diffusion stage. At this stage, various sources including producer groups get involved in the technology transfer process. The literature suggests that one important method of transferring technology is through the use of demonstrations of new and innovative practices. This is accomplished through the transfer of information from the early adopters in a social system through the late adopters. Therefore, if crop production club members are early adopters and since they operate through the use of demonstrations, then this study should be able to conclude that crop production club members play an important role in the technology transfer process.

Chapter 3

Research Design

3.1 Sources of Data

This study consisted of two groups of farmers from Saskatchewan and Manitoba, one group made up of crop production club members and the other made up of farmers who were not club members, but who farm in the same areas. The crop production club sample was derived from the *Saskatchewan Producer Club Directory 1990* and the Manitoba Department of Agriculture, Dauphin region. Only clubs that had been organized for five years or longer were included in the selection process because it was felt that clubs operating for less than five years would not have had enough time to have much effect in the technology transfer process. Six clubs in Saskatchewan and one club in Manitoba, met the requirement of being organized for five years or longer. A letter was sent to the contact person for each club outlining the study and requesting a copy of the club membership mailing list. (Appendix A) Once the club membership list was received, letters outlining the study and the procedure were mailed to each individual member of the selected clubs. (Appendix B)

The non-club farmer sample was a stratified random sample which was selected from areas within reasonable proximity to a crop production club and had likely had the opportunity to observe practices club members were

trying. The stratified random sample was derived by using telephone directories for the selected areas. This sampling procedure was used for all areas except for one club area which included two telephone exchanges. In this case, a copy of the Rural Municipality Map was obtained and a stratified random sample was selected from the farmers listed on the map. A letter outlining the study and the procedure were mailed to each selected farmer. (Appendix C)

Three of the six clubs contacted in Saskatchewan and the one club in Manitoba agreed to participate in the study. The selected clubs included: the Dauphin Crop Management Club, the R.M. #259 Crop Club, the Birch Hills Crop Club and the Cargill-Elanco Canola Club. A total of 57 members were sent letters, 38 were contacted and 19 could not be reached. The non-club members were randomly selected from the Dauphin, Eston and Birch Hills phone lists, as well as the Rural Municipality of Connaught No. 457 Map. A total of 66 letters were sent out, 28 were surveyed, 26 could not be reached, 6 were not farming, 2 were livestock operators and 2 refused. Therefore the final samples used in the study were 38 Crop production club members and 28 non-club farmers.

3.2 Instrumentation

A telephone interview was conducted with the selected sample between April 22 and May 10, 1991. Telephone interviews were selected over on-farm interviews for various reasons, including the time of year (spring), the required amount of time and the required travel distances to complete the

study. It was chosen over other methods, such as a mailed questionnaire, because of the greater certainty of successfully obtaining results. Best and Kahn (1989) state that the interview is often superior to other data-gathering devices. They suggest this is because those contacted are less likely to refuse than if surveyed by mail. Once a rapport is established, they are more likely to provide sensitive information such as financial status, age and education levels. The questionnaire was pre-tested by five School of Agriculture Instructors who are also farmers.

A variety of questions and measurement scales were used in the design of the questionnaire including: open-ended, nominal scale, ordinal scale, ranking order and forced choice. Williams (1968) defines a scale as a "specific scheme for assigning numbers or symbols to designate characteristics of a variable."[19] (pg 14) Open-ended questions require participants to provide their own information such as total acres and were used for questions 5, 6, and 15 to 20. Nominal scale questions assign a number to categories representing certain characteristics, such as age or education, and allow participants to choose the appropriate category. This type was used for questions 21 to 23. Ordinal scale questions use an attitude or opinion scale for responses and were used for questions 7 to 10, 12 and 14. This was accomplished through the use of the Likert-type or summated rating scale which provides a set of responses, all considered to be approximately equal in attitude or value. (Issac and Michael, 1971) The scale allows participants to respond with a varying degree of intensity on a scale such as agree to disagree or very important to not important. Question 13 was a ranking order question, which required participants to rank four

choices in order of importance. Question 11 was a forced choice question requiring participants to make a choice between two options.

The questionnaire (Appendix D) began with an introduction and explanation of the background and design of the study. The design of the questionnaire was similar for both groups, except for the first four introductory questions. The introductory questions on the member questionnaire related to the crop production club membership. The introductory questions on the non-member questionnaire related to their farming operation. Non-members were also asked if they had ever belonged to a crop production club and if they were aware a club existed in their area. If they were not aware of the crop production club in their area, then questions 6, 7 and 8 which related to crop production club information were not asked. These three questions were directly related to knowledge about crop clubs, and without that knowledge any answers were irrelevant.

The second section of the questionnaire, questions 5 to 8, were designed to determine the number of new and innovative practices participants had used in their farming operation in the past five years and if the crop club activities had any effect on the use of these practices. The responses provided information about their innovativeness, which was required to determine which adopter category they represent. The adoption-diffusion process, which established the theoretical framework on which the study is based, used innovativeness of individuals as a basis for determining the adopter categories.

Each adopter category has corresponding characteristics. The next two sections of the questionnaire were designed to determine the characteristics of those being studied, which assisted in the analysis of the adopter category they represent. Questions 9 to 13 related to the general agriculture industry. The questions in this section were designed to establish how the participants related to changes in the agriculture industry, to risk and to research. Question 14, which asked a series of questions relating to sources of information farmers access for cropping information, was subdivided into three sections in order to organize the information into manageable sections. The three sections included mass media, change agent contacts and interpersonal contacts. This information helped to identify participant characteristics and corresponding adopter categories. Questions 15 to 18 related to their participation in crop-related organizations and non-farm organizations.

Questions 19 to 23 in the final section were designed to obtain demographic information from the participants, which also helped to establish the adopter categories the participants represent. The questions were designed to obtain information on farm size, annual gross sales, age and level of education. The final part of the questionnaire provided the participants with an opportunity for comments. Wrap-up details also included asking if the participant would like a copy of the final report and if necessary, could the participant be contacted again.

3.3 Data Analysis

The questionnaire design included precoded spaces for each question in order to code the responses for easier data analysis. Each questionnaire was assigned a sample number and the appropriate responses entered in the precoded area. The data was entered into the StatView 512+ Macintosh Computer Program which was used to analyze all of the data. The analysis provided information from the two samples that could be generalized and applied to the whole population.

Descriptive analysis results were used to provide information on mean, mode, standard deviation and frequency distribution of each variable. This analysis provided information about the two samples, the crop production club members and the non-member farmers. The mean, which is probably the most important measure, is the average of the scores of each sample and the mode is the score that occurs most frequently in a sample. Frequency distribution provided the frequency with which responses are assigned to each category on a measurement scale and are usually reported in terms of percentages, which allows for making generalizations about the observed results. (Williams, 1968) A descriptive analysis was done for each individual variable. Only descriptive statistics were used in the analysis of the demographic data, including total acres, cultivated acres, sales, age and education and the analysis of the question ranking research, extension, training and subsidies.

Inferential analysis or sampling statistics, which provided a basis for estimating population characteristics based on the information gathered

from the sample characteristics, were used for several variables in this study. The unpaired two-tailed t-test and the chi-square were the two inferential statistical analyses used. A significance level of $p<.001$ was considered appropriate for this study because of the sample size and was used throughout the analysis. The t-test used the means and distributions of the two samples to test the significance of difference between the means of the two populations and was used for questions 5, 6, 11 and 15 to 18. The t-test was therefore used to determine if there were significant differences between the two groups for the following variables: number of new innovations adopted, number of new innovations adopted because of the crop production club, market preference, number of crop-related organizations, number of non-agriculture organizations and the number of executive positions in the organizations.

The chi-square was used to determine the relationship and differences between the variables which required a ranking score or distribution into categories and to determine the significance of the difference of the variables. Questions 7 to 10, 12 and 14 required choosing responses based on a ranking score and were tested using the chi-square. The variables included: effect of crop production club on the individual, effect of crop production club on the area, changes in the agriculture sector, changes in farm size, level of risk and the information sources used for accessing cropping information.

Chapter 4

Results

4.1 Results of Study

The study was designed to obtain information about the characteristics of crop production club members, which would help to determine which adopter category they represent in the adoption-diffusion process. In the discussion of the analysis of the sample, CPC is used to denote crop production club members and NON is used to denote non-club farmers. Various measurements, such as the Likert-type scale, with response scales such as very important to not important, strongly agree to strongly disagree, often to not at all, have been used in the questionnaire. Therefore, the mean rating and mode rating represented in the analysis is a number which corresponds to the scale used for the particular question. For example, with a five-point scale rating from strongly agree to strongly disagree, a mean rating of 2 would correspond to the response 'agree', where strongly agree is 1 on the scale and strongly disagree is 5 on the scale. See Appendix D. A significance level of $p<.001$ was used as the accepted level and used throughout the analysis.

The literature indicated that those who fall into the early adopter category are usually younger, more highly educated, have larger sized farms and have higher annual gross sales than those in other adopter categories. The

following tables 1 to 5 provide demographic data relating to the participants in the study. This information was collected to provide some background information in order to establish a profile of the sample being studied and to determine if crop production club members fit into the early adopter category. This included variables such as age, education, annual gross sales and farm size.

Table 1

Age Distribution of Participants

	CPC		NON	
Age (Years)	Number	%	Number	%
<20	0	0	0	0
20-29	0	0	0	0
30-39	14	37	7	25
40-49	13	34	12	43
50-59	9	24	3	11
60+	2	5	6	21
Total	38	100	28	100

Table 1 outlines the distribution of the ages of the sample based on six age categories. The largest percentage or 37% of crop production club members fell into the 30-39 age category. The majority of non-club farmers or 43% fell into the 40-49 age category. Thirty-seven percent of crop production club members were under 40, while the non-club farmers group indicated only 25% were under 40. Statistics Canada (1986) indicated that 34% of Saskatchewan farmers were under 40, while 66% were over 40. The sample of non-club farmers in the study and the Statistics Canada census data of farmers are very similar. Therefore, although the study

sample was fairly small, the results are very comparable to the larger sample used by Statistics Canada. These results support the hypothesis that crop production club farmers tend to be younger than the non-club farmers group.

Participants were asked to indicate the highest level of education they had achieved. There were five categories provided, ranging from less than grade 12 to University degree. The results were used to help determine if crop production club members were early adopters.

Table 2

Education Levels of Participants

	CPC		NON	
Education (Years)	Number	%	Number	%
<Grade 12	4	11	13	46
Grade 12	5	13	8	29
Partial university or tech.	7	18	1	4
Technical Diploma	8	21	2	7
University Degree	14	37	4	14
Total	38	100	28	100

Table 2 outlines the distribution of the level of education participants had achieved. Of the crop production club group, 11% had less than grade 12, 13% had completed grade 12 and 76% achieved higher education levels than grade 12. The non-club farmers group indicated 46% had less than grade 12, 29% had completed grade 12 and 25% had achieved higher education levels than grade 12. A 1983 Alberta study found that 46% of the farmers had less than grade 12, 29% had completed grade 12 and 25% had achieved higher education levels than grade 12. A Saskatchewan Wheat

Pool study done in 1985, found that 36% of farmers had less than grade 12, 27% had completed grade 12 and 37% had higher levels than grade 12. The results obtained from the non-club farmers were very similar to the results of other studies conducted. Overall, crop production club members had obtained higher levels of education than the non-club farmers, as was hypothesized.

The participants were asked to indicate the annual gross sales of their farming operations. There were five categories of annual gross sales provided ranging from less than $40,000 to greater than $200,000. Annual gross sales is another indicator used to determine adopter categories participants fit into.

Table 3

Annual Gross Sales of Farming Operations of Participants

	CPC		NON	
Gross Sales ($)	Number	%	Number	%
< 40000	0	0	5	18
40000-75000	3	8	3	11
75001-100000	7	18	9	32
100001-200000	14	37	8	28
> 200000	14	37	3	11
Total	38	100	28	100

Table 3 outlines the annual gross sales of the farming operations of the crop production club members and the non-club farmers. The crop production club members indicated 26% averaged less than $100,000 in annual gross

sales, while 74% grossed more than $100,000 in annual sales. In comparison, the non-club farmers indicated 61% averaged less than $100,000 in annual gross sales, while 39% grossed more than $100,000 in annual sales. Statistics Canada (1986) indicated that 84% of farmers grossed less than $100,000 and 16% grossed more than $100,000 annually. The 1983 Alberta study found that 66% averaged less than $100,000, 24% grossed more than $100,000 annually while 10% refused to answer the question. The 1985 Saskatchewan Wheat Pool study found that 75% averaged less than $100,000, 22% averaged more than $100,000 with 2% providing no response. The crop production club members averaged much higher annual gross sales than non-club farmers and farmers in other studies. The results obtained from the non-club farmers were very similar to the results of other studies conducted. As hypothesized, crop production club members have higher annual gross sales than non-club farmers.

Participants were asked to indicate the total number of acres and the total number of cultivated acres included in their farm operation. The results were used to establish the farm size of participants. Farm size is another indicator of adopter categories as outlined by the adoption-diffusion theory.

Table 4

Total Acres of Farming Operation

	CPC		NON	
Total (Acres)	Number	%	Number	%
<1000	4	10	13	47
1000-2000	19	50	11	39
>2000	15	40	4	14
Total	38	100	28	100

Table 5

Total Cultivated Acres of Farming Operation

	CPC		NON	
Cultivated (Acres)	Number	%	Number	%
<1000	5	13	13	47
1000-2000	18	47	12	42
>2000	15	40	3	11
Total	38	100	28	100

Tables 4 and 5 outline the farm size of participants, with the crop production club members averaging 2125 cultivated acres and the non-club farmers averaging 1231 acres. The total number of cultivated acres and total acres for each operation were relatively similar. Forty percent of crop production club members operate more than 2000 acres as compared to 11% of non-club farmers. Statistics Canada (1986) results showed that 11% of farmers operate more than 2240 acres, with the average falling into the 760 to 1119 acre range. The 1985 Saskatchewan Wheat Pool study found that 10% farmed more than 2000 acres. The farm size of non-club farmers is very

similar to the farm size indicated by other studies. This supports the hypothesis that crop production club members have larger-sized operations than non-club farmers.

The participants were also asked questions that would provide information about what is referred to as personality variables. The questions were designed to find out information about their attitude to change, attitude to research and their perception of the amount of risk they are willing to take in their farming operation. The questions referred directly to changes in the agriculture sector, changes in farm size, market systems and risk.

Participants were asked to respond to a question regarding changes in the agriculture sector including increasing farm size, a trend towards more centralized grain handling systems and a decrease in the number of outlets for machinery service and repairs. They were asked for their opinion of how much these changes had affected their farming enterprise.

Table 6
Participants Attitudes to Changes in the Agriculture Industry

	CPC		NON	
Changes	Number	%	Number	%
significantly	5	13	7	25
moderately	18	47	10	36
slightly	14	37	10	36
not at all	1	3	1	3
Total	38	100	28	100

CPC Mean	2.23	NON Mean	2.18
CPC Mode	2	NON Mode	3

$\chi^2 = 1.812$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 6 summarizes their responses and indicates that 13% of the crop production club members felt the changes had affected their operation significantly, while the non-club farmers felt the changes had affected them more with 25% choosing significantly. The chi-square did not indicate a significant difference between the two groups, but both groups were positive about changes in the agriculture industry.

The participants were also asked if they felt the trend of increasing farm size would continue.

Table 7

Participants Attitudes to Changes in Farm Size

	CPC		NON	
Farm Size	Number	%	Number	%
strongly agree	7	18	8	29
agree	25	66	15	54
undecided	5	13	4	14
disagree	1	3	1	3
strongly disagree	0	0	0	0
Total	38	100	28	100

CPC Mean	2.00	NON Mean	1.93
CPC Mode	2	NON Mode	2

$\chi 2 = 1.19$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 7 outlines the responses of the crop production club members and the non-club farmers, which were basically the same, with 84% of the crop club members agreeing or strongly agreeing and 83% of the non-club farmers agreeing or strongly agreeing that the trend of increasing farm size would continue. The chi-square indicated that the difference between the two groups was not significant. Both groups agreed that the trend of increasing farm size would continue.

Participants were asked to indicate which market situation they would favor most, a move to a more open market system or a move to a more orderly market system. The corresponding assumption was that the open market system would have the potential for greater risk but would likely offer greater

returns. This study attempted to determine if there was a difference in the risk participants were willing to take in the marketing system.

Table 8

Participants Market Systems Preference

	CPC		NON	
Market systems	Number	%	Number	%
open markets	21	60	4	17
orderly markets	14	40	20	83
Total	35	100	24	100

CPC Mean	1.40	NON Mean	1.83
CPC Mode	1	NON Mode	2

t -value = -3.604
When d.f. = 57 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 8 summarizes their responses with 60% of crop production club members preferring the open market system and only 17% of non-club farmers preferring the open market system. The t-test shows there is a significant difference between the two groups. This information supports the hypothesis that crop production club members are more able to cope with uncertainty and risk.

The participants were asked to consider the decision-making in their farming operation and to rate themselves with respect to taking risks. They were given a rating scale of four choices from high risk to no risk. Thomas (1987)

concluded in his study that farmers have the ability to asses their own level of risk-taking.

Table 9

Participants Perception of Risk Level in Decision Making

	CPC		NON	
Risk	Number	%	Number	%
high	7	19	1	4
medium	25	67	21	75
low	5	14	6	21
no	0	0	0	0
Total	37	100	28	100

CPC Mean	1.95	NON Mean	2.18
CPC Mode	2	NON Mode	2

$\chi 2 = 3.765$
Using the chi-square test with 2 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 13.816 would be significant.

The results in Table 9 show that 19% of crop production club members consider themselves to be high risk-takers, but only 4% of non-club farmers rate themselves high risk-takers. Eighty-six percent of crop production club members and 79% of non-club farmers consider themselves to be medium or high risk-takers. The chi-square does not support a significant difference in their perception of the level of risk they take in making decisions. However, crop production club members do rate themselves as taking a higher level of risk in decision making than non-club farmers.

Participants were asked to consider the funding shortage that presently faces the agriculture sector and the corresponding cutbacks in research, extension, training and subsidies. With the funding shortage in mind, the participants were asked to rank the four areas in order of importance and the rankings were compared.

Table 10

A Ranking of Research, Extension, Training and Subsidies

Ranking	CPC	NON
1	research	subsidies
2	subsidies	research
3	extension	training
4	training	extension

Table 10 summarizes the ranking order of the two groups, with crop production club members ranking them in order of research, subsidies, extension and training and non-club farmers ranking them in order of subsidies, research, training and extension. Many of the participants added the qualification that although they did not like subsidies, under the current agriculture conditions, they had to rank it as fairly important. Crop production club members ranked research as more important than did non-club farmers. Therefore, the results support the hypothesis that crop production club members have a more favorable attitude to research.

The participants were asked to respond to questions that would indicate their communication behavior. They were provided with a list of sources of cropping information and asked to rate how often they used the sources.

The sources were divided into three groups which correspond to the adoption-diffusion theory: mass media channels, change agent contacts and interpersonal or face-to-face communication channels. Each group was subdivided into individual sources in order to get a more accurate picture of which sources participants find most useful for cropping information. Participants were also asked to indicate their involvement with agriculture organizations and non-agriculture organizations.

Participants were asked to rate how frequently they would use various sources of information for cropping practices. Mass media channels included newspapers, magazines, government publications, radio and television. Newspapers and magazines were separated into two categories in order to determine if there is a difference in how often participants use them. Newspapers provide short up-to-date articles of general information while magazies tend to provide more detailed and specific agronomic information.

Table 11

Newspapers as a Source of Cropping Information

	CPC		NON	
Newspapers	Number	%	Number	%
often	24	65	23	82
occasionally	7	19	2	7
rarely	6	16	3	11
not at all	0	0	0	0
Total	37	100	28	100

CPC Mean	1.51	NON Mean	1.29
CPC Mode	1	NON Mode	1

$\chi 2 = 2.603$
Using the chi-square test with 2 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 13.816 would be significant.

Table 11 outlines the frequency with which participants use newspapers as a source of information. Eighty-four percent of crop production club members and 89% of non-club farmers use newspapers often or occasionally. A study by Blackburn, et. al. (1983) found that 81% of a random sample of farmers and 88% of agri-leaders rated newspapers and magazines as moderately or very important sources of information. A 1983 Alberta Agriculture study found that 73% rated newspapers and magazines as very useful or useful sources of information. The results of this study are very similar to the results of the Blackburn and Alberta studies, with a high percentage of participants rating newspapers and magazines as important sources of information. A chi-square indicated there is not a significant difference between the two groups. Both groups use newspapers often as a source of information.

Table 12

Magazines as a Source of Cropping Information

	CPC		NON	
Magazines	Number	%	Number	%
often	17	46	9	32
occasionally	12	32	9	32
rarely	8	22	10	36
not at all	0	0	0	0
Total	37	100	28	100

CPC Mean	1.76	NON Mean	2.04
CPC Mode	1	NON Mode	3

$\chi 2 = 1.903$
Using the chi-square test with 2 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 13.816 would be significant.

Table 12 outlines the frequency with which participants use magazines as a source of information. In this case, 78% of crop production club members use magazines often or occasionally, while only 64% of non-club farmers use the same ratings. The mode for crop production club members is "often", while the mode for non-club farmers is "rarely". A chi-square indicated no significant difference. Both groups use magazines as a source of information.

Table 13

Government Publications as a Source of Cropping Information

	CPC		NON	
Government	Number	%	Number	%
often	14	37	5	18
occasionally	15	39	10	36
rarely	9	24	11	39
not at all	0	0	2	7
Total	38	100	28	100

CPC Mean	1.87	NON Mean	2.36
CPC Mode	2	NON Mode	3

$\chi 2 = 6.088$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

The use of government publications as a source of information is outlined in Table 13. Crop production club members use them more frequently, with 75% choosing the often or occasionally rating, but only 54% of non-club farmers choosing the same ratings. A study by Blackburn, et. al. (1983) found that 79% of a random sample of farmers and 92% of agri-leaders rated government publications as moderately or very important sources of information. The mode for crop production club members is "occasionally" and the mode for non-club farmers is "rarely". Although, the chi-square does not support a significant difference at the $p<.001$ significance level, crop production clubs members indicated that they use government publications more often than non-club farmers.

Table 14

Radio as a Source of Cropping Information

Radio	CPC Number	CPC %	NON Number	NON %
often	5	13	5	18
occasionally	16	42	11	39
rarely	16	42	11	39
not at all	1	3	1	4
Total	38	100	28	100

CPC Mean	2.34	NON Mean	2.29
CPC Mode	*	NON Mode	*

$\chi 2 = .345$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 14 outlines the frequency with which participants use radio as a source of information. The non-club farmers use radio slightly more with 57% indicating often or occasionally and crop production club farmers indicating 55% often or occasionally. The 1983 study by Blackburn, et. al. found that 63% of the random sample of farmers and 54% of agri-leaders rated radio and television as moderately or very important. The 1983 Alberta study that 71% of farmers rated radio as useful or very useful. The chi-square does not indicate a significant difference between the two groups. However, both groups indicated that radio is an important source of information.

Table 15

Television as a Source of Cropping Information

Television	CPC Number	CPC %	NON Number	NON %
often	5	13	6	21
occasionally	16	42	8	29
rarely	14	37	12	43
not at all	3	8	2	7
Total	38	100	28	100

CPC Mean	2.40	NON Mean	2.36
CPC Mode	2	NON Mode	3

$\chi 2 = 1.634$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 15 outlines the frequency with which participants use television as a source of information. The crop production club farmers use television slightly more than non-club farmers, with 55% of crop production club members choosing often or occasionally as compared to 50% of non-club farmers choosing often or occasionally. The 1983 Alberta study found that 37% of farmers rated television as useful or very useful. The chi-square analysis did not indicate a significant difference between the two groups. Both groups rated television as an important source of information.

Overall, the analysis of the mass media channels does not support the hypothesis that crop production club members use mass media more often than non-club farmers for sources of cropping information. Both groups use mass media as a source of cropping information. The study by Blackburn

and Alberta Agriculture, which rated sources based on importance and usefulness, found similar results in the use of mass media by farmers.

Participants were asked to indicate how frequently they used the services of change agents for cropping information. The change agents included: extension programs, extension agrologists, other specialists, Agriculture Canada Research Stations and university faculty. Extension programs considered included conferences, field days and short courses sponsored by the university and government departments. Extension agrologists and other specialists refer to government agriculture department staff and affiliates such as Soil Conservation specialists. Extension agrologists, who provide general information about several subject matter areas, were distinguished from other extension specialists, who provide specialized information on specific subject matter areas. During the telephone interview, the interviewer made sure the difference between the two was made clear to the participants.

Table 16

Extension Programs as a Source of Cropping Information

	CPC		NON	
Extension Programs	Number	%	Number	%
often	14	37	1	4
occasionally	15	39	17	61
rarely	9	24	4	14
not at all	0	0	6	21
Total	38	100	28	100

CPC Mean	1.87	NON Mean	2.54
CPC Mode	2	NON Mode	2

$\chi 2 = 18.218$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 16 outlines the responses to the use of extension programs as a source of information. Crop production club members use extension programs more often with 37% indicating often and only 4% of non-club farmers choosing often. The mode for both groups is the same and is "occasionally". A total of 76% of crop production club members and 65% of non-club farmers use extension programs often or occasionally. The chi-square test does indicate a significant difference between the two groups, with crop production club members using extension programs more than non-club farmers.

Table 17

Extension Agrologists as a Source of Cropping Information

	CPC		NON	
Extension Agrologists	Number	%	Number	%
often	12	31	5	18
occasionally	17	45	14	50
rarely	9	24	5	18
not at all	0	0	4	14
Total	38	100	28	100

CPC Mean	2.08	NON Mean	2.29
CPC Mode	2	NON Mode	2

$\chi 2 = 6.96$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 17 outlines the frequency with which participants use extension agrologists for cropping information. Once again, the mode, which is "occasionally", is the same for both groups, and the chi-square did not indicate a significant difference. However, 31% of crop production club members indicate they use extension agrologists often, but only 18% of non-club farmers use them as often. A total of 76% of crop production club members and 68% of non-club farmers use extension agrologists often or occasionally. The 1983 Alberta Agriculture study results showed that 69% found the district agriculturist (comparable to the extension agrologists in Saskatchewan) to be useful or very useful. This result is the same as the non-club farmers response. The chi-square does not indicate a significant difference between the two groups. Both groups do use extension agrologists for information.

Participants were also asked to indicate how often they use other extension specialists, such as soils and crops specialists, farm management specialists and soil conservation specialists.

Table 18

Extension Specialists as a Source of Cropping Information

	CPC		NON	
Extension Specialists	Number	%	Number	%
often	11	29	6	21
occasionally	16	42	8	29
rarely	8	21	10	36
not at all	3	8	4	14
Total	38	100	28	100

CPC Mean	2.08	NON Mean	2.43
CPC Mode	2	NON Mode	3

$\chi 2 = 3.057$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 18 outlines the frequency with which participants use extension specialists for cropping information. The crop production club members use the specialists more often, with 71% using them often and occasionally, while only 50% of non-club farmers use them often or occasionally. However, the chi-square analysis does not indicate a significant difference between the two groups. Both groups use extension specialists as sources of information.

Table 19

Agriculture Canada Research Stations as a Source of Cropping Information

	CPC		NON	
Agriculture Canada	Number	%	Number	%
often	2	5	2	7
occasionally	12	32	6	21
rarely	14	37	10	36
not at all	10	26	10	36
Total	38	100	28	100

CPC Mean	2.84	NON Mean	3
CPC Mode	3	NON Mode	*

$\chi 2 = 1.179$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Agriculture Canada Research Stations are another source of change agent contact. Table 19 outlines the results of the responses of participants, with 37% of crop production club members using them often or occasionally and 28% of non-club farmers using them often or occasionally. The 1983 Alberta Agriculture study found that 31% of farmers rated Agriculture Canada as useful or very useful. The chi-square does not support a significant difference. Both groups indicated that they use Agriculture Canada Research Stations to a limited extent for cropping information.

Table 20

University Faculty as a Source of Cropping Information

University Faculty	CPC Number	CPC %	NON Number	NON %
often	1	3	0	0
occasionally	12	32	2	7
rarely	12	32	10	36
not at all	13	33	16	57
Total	38	100	28	100

CPC Mean	2.98	NON Mean	3.5
CPC Mode	4	NON Mode	4

$\chi 2 = 7.287$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

The participants were asked to indicate how often they would use university faculty as a source of information. The crop production club members use them more often although the mode, which is "not at all", is the same for both groups. Thirty-five percent of crop production club members and 7% of non-club farmers use university faculty often or occasionally. Blackburn, et. al. (1983) found that 69% of agri-leaders and 64% of the random sample of farmers found university faculty to be moderately or very important. The 1983 Alberta Agriculture study found that 29% rated university faculty to be useful or very useful. The chi-square does not indicate a significant difference. University faculty are not highly used by either group. These results are similar to other studies, although Ontario seemed to rank them higher than either Alberta or Saskatchewan.

There is not a significant difference between the two groups in the use of services of change agents for cropping information. The use of extension agrologists and extension specialists was moderate for both groups, while the use of Agriculture Canada Research Stations and university faculty was relatively low for both groups. There is a significant difference in the use of extension programs, with crop production club members using them more than non-club farmers. Results of other studies are comparable to the results of this study. The analysis does not support the hypothesis that crop production club members use the services of change agents more often than non-club farmers.

Participants were asked to indicate how frequently they used interpersonal communication channels or face-to face channels for cropping information. The interpersonal channels considered were farm service agents, bank and credit agencies, industry representatives, agriculture consultants, agriculture organizations and neighboring farmers. They were also asked to indicate other sources not listed, but very few had any sources to add. The additional sources indicated were grain companies, speciality crop companies and newsletters and information from independent agriculture groups.

Table 21

Farm Service Agents as a Source of Cropping Information

	CPC		NON	
Farm Service Agents	Number	%	Number	%
often	16	42	18	64
occasionally	12	32	6	20
rarely	8	21	2	8
not at all	2	5	2	8
Total	38	100	28	100

CPC Mean	1.90	NON Mean	1.57
CPC Mode	1	NON Mode	1

$\chi 2 = 4.301$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 21 provides information about how often participants use farm service agents as a source of information. Crop production club members indicated that 74% use farm service agents often or occasionally and non-club farmers 84%. The Alberta Agriculture study found that 62% rated farm service agents as useful or very useful. The chi-square analysis did not indicate a significant difference between the two groups. However, both groups indicated that they strongly rely on farm service agents for cropping information.

Table 22

Banks and Credit Agencies as a Source of Cropping Information

	CPC		NON	
Banks & Credit	Number	%	Number	%
often	2	5	1	4
occasionally	7	19	7	25
rarely	8	21	8	28
not at all	21	55	12	43
Total	38	100	28	100

CPC Mean	3.26	NON Mean	3.11
CPC Mode	4	NON Mode	4

$\chi 2 = 1.303$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 22 outlines how often participants use banks and credit agencies as a source of cropping information. Non-club farmers use banks and credit agencies slightly more often than crop production club members, however, the mode for both groups is "not at all". Twenty-nine percent of non-club farmers and 24% of crop production club farmers use banks and credit agencies often or occasionally. Blackburn, et. al. (1983) found that 60% of the random sample of farmers and 49% of agri-leaders rated banks and credit agencies as moderately or very important. The Alberta Agriculture study found that 53% rated banks and credit agencies as useful or very useful. The chi-square indicated the difference was not significant. Both groups indicated that they do not strongly rely on banks and credit agencies as sources of cropping information. They rely on other sources for cropping information.

Table 23

Industry Representatives as a Source of Cropping Information

	CPC		NON	
Industry	Number	%	Number	%
often	10	26	8	29
occasionally	17	45	14	50
rarely	9	24	4	14
not at all	2	5	2	7
Total	38	100	28	100

CPC Mean	2.08	NON Mean	2.0
CPC Mode	2	NON Mode	2

$\chi^2 = .942$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Participants were asked to indicate how often they would use industry representatives, such as chemical company representatives, as a source of information. Table 23 outlines this information with 79% of non-club farmers and 71% of crop production club farmers indicating they use them often or occasionally. The mode for both groups is "occasionally". The 1983 Blackburn, et. al. study found that 57% of the random sample of farmers and 51% of agri-leaders rated industry representative as moderately or very important. The Alberta Agriculture 1983 study found that 62% rated industry representative as useful or very useful. The chi-square analysis did not indicate any significant difference. Both groups use industry representatives as a source of information.

Table 24

Agriculture Consultants as a Source of Cropping Information

	CPC		NON	
Consultants	Number	%	Number	%
often	0	0	0	0
occasionally	5	13	5	18
rarely	9	24	7	25
not at all	24	63	16	57
Total	38	100	28	100

CPC Mean	3.5	NON Mean	3.39
CPC Mode	4	NON Mode	4

$\chi 2 = .343$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 24 provides information about how often agriculture consultants are used as a source of information. The mode for both groups is "not at all", with 63% of crop production club members and 57% of non-club farmers never using agriculture consultants. Non-club farmers indicated they used them slightly more often with 18% indicating often or occasionally and 13% of crop production club members indicating often or occasionally. The chi-square indicated that the difference is not significant. Both groups indicated that agriculture consultants are not an important source of cropping information.

Table 25

Agriculture Organizations as a Source of Cropping Information

	CPC		NON	
Ag. Organizations	Number	%	Number	%
often	5	13	1	4
occasionally	20	53	9	32
rarely	10	26	9	32
not at all	3	8	9	32
Total	38	100	28	100

CPC Mean	2.29	NON Mean	2.93
CPC Mode	2	NON Mode	*

$\chi 2 = 8.573$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Participants were asked to indicate how often they used agriculture organizations as a source of information. Crop production club members use agriculture organizations more than non-club farmers with 66% as compared to 36%. However, at the accepted level of significance of $p<.001$ used in this study, the chi-square does not indicate a significant difference.

Table 26

Neighbors as a Source of Cropping Information

	CPC		NON	
Neighbors	Number	%	Number	%
often	13	34	16	57
occasionally	21	55	9	32
rarely	4	11	2	7
not at all	0	0	1	4
Total	38	100	28	100

CPC Mean	1.76	NON Mean	1.57
CPC Mode	2	NON Mode	1

$\chi 2 = 5.385$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 26 outlines how often participants use neighbors as a source of information. The results are basically the same, with both groups using neighbors often or occasionally 89% of the time. The mode for non-club farmers was "often" and the mode for crop production club members was "occasionally". Fifty-seven percent of non-club farmers and 34% of crop production club members use neighbors often. The 1983 Blackburn, et. al. study found that 76% of the random sample of farmers and 64% of agri-leaders rated neighbors as moderately or very important. The 1983 Alberta Agriculture study found that 75% of farmers rated neighbors as useful or very useful. The study by Whale, et. al. (1984) found that 85% of farmers rated neighbors as an important source of information. The chi-square did not indicate a significant difference. However, both groups highly rated neighbors as a source of information, as did farmers in other studies

conducted. Therefore, the concept of demonstrations is very useful and important for this group and a good method of exchanging information among farmers. The literature states that demonstrations are important in technology transfer. Therefore, since crop production clubs operate through the use of demonstrations, we know they are important to the technology transfer process.

There was little significant difference found between crop production club members and non-club farmers in the use of interpersonal channels of communication as sources of information. Both groups use interpersonal communication channels as sources of information, with particular importance placed on neighbors, farm service agents and industry representatives. Although the analysis does not support the hypothesis that crop production club members use interpersonal channels more than non-club members, the analysis does support the fact that interpersonal channels of communication are important sources of cropping information for farmers.

Participants were asked to indicate the number of agriculture organizations and non-agriculture organizations they have memberships for and how many executive positions they hold. The literature suggests that those falling into the early adopter category tend to be more involved in a social system and have the greatest degree of leadership in a social system. Therefore, finding out the number of organizations participants belong to will provide some indication of leadership and the adopter category they represent.

Table 27

Participation in Crop-related Organizations

Crop-related org.	CPC Number	CPC %	NON Number	NON %
0	0	0	1	3
2 or less	16	42	22	79
more than 2	22	58	5	18
Total	38	100	28	100

CPC Mean	3.37	NON Mean	1.86
CPC Mode	2	NON Mode	1

t -value = 3.656
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 27 outlines the number of crop-related organizations in which participants are members. Crop production club members belong to many more organizations than non-club farmers, with 58% belonging to more than two while only 18% of non-club farmers belong to more than two. A study by Blackburn, et. al. (1983) found that agri-leaders belong to an average of 3 organizations, while a random sample of farmers belong to an average of 1 organization. Blackburn's study did not distinguish between agriculture and non-agriculture organizations. The results from Blackburn's study are similar to this study. The t-test indicated there is a significant difference between the two groups. This supports the hypothesis that crop production club members on average participate in more organizations than non-club farmers.

Because crop production club members belong to more organizations, they also are more likely to take on a leadership role. As was proven later in the study, (See Table 30), crop production club members tend to be leaders and hold leadership positions in the community. The theory (Rogers, 1983), states that early adopters have a higher degree of opinion leadership, which means that they take a leading role in informally influencing the opinions of others about innovations. Therefore, other farmers would depend on the crop production club members for leadership.

Table 28

Executive Positions Held in Crop-related Organizations

	CPC		NON	
Executive (Crop)	Number	%	Number	%
0	25	64	23	82
2 or less	11	30	5	18
more than 2	2	6	0	0
Total	38	100	28	100

CPC Mean	.5	NON Mean	.18
CPC Mode	0	NON Mode	0

t -value = 1.897
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 28 provides information about the number of executive positions participants hold in crop-related organizations. The majority of both groups do not hold any executive positions, as indicated by 64% of crop production club members and 82% of non-club farmers. However, 30% of crop

production club members hold two or less positions and 6% hold more than two executive positions, compared to the non-club farmers where 18% hold two or less positions and 0% hold more than two executive positions. The t-test at the accepted level of significance of p<.001 for this study did not indicate a significant difference. Although the majority of both groups did not hold any executive positions, crop production club members indicated a higher level of involvement in organizations and therefore, take a stronger leadership role than non-club farmers.

Table 29

Participation in Non-agriculture Organizations

	CPC		NON	
Non-agriculture org.	Number	%	Number	%
0	15	39	21	75
2 or less	16	42	7	25
more than 2	7	19	0	0
Total	38	100	28	100

CPC Mean	1.37	NON Mean	.321
CPC Mode	0	NON Mode	0

t -value = 3.283
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Participants were asked to indicate the number of non-agriculture organizations in which they hold membership. Crop production club members have higher levels of participation, with 81% belonging to two or less and 19% belonging to more than two organizations. Of the 81%

belonging to two or less organizations, 39% do not belong to any. Of the non-club farmers, 100% belong to two or less organizations, with the majority or 75% not belonging to any non-agriculture organizations. The t-test did not indicate a significant difference between the two groups. However, crop production club members are more involved in both agriculture and non-agriculture organizations than non-club farmers. Therefore, farmers will look to crop production club members to take on a stronger leadership role not only in agriculture but also in all community activities.

Table 30

Executive Positions Held in Non-agriculture Organizations

	CPC		NON	
Crop-related org.	Number	%	Number	%
0	19	50	25	89
2 or less	14	36	3	11
more than 2	5	14	0	0
Total	38	100	28	100

CPC Mean	1.03	NON Mean	.107
CPC Mode	0	NON Mode	0

t -value = 3.644
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 30 outlines the number of executive positions participants hold in non-agriculture organizations. Once again as was shown in Table 28, the crop production club members hold a greater number of executive positions than

non-club farmers. Crop production club members indicated that 86% belong to two or less and 14% belong to more than two organizations. Of the 86%, 50% hold executive positions in non-agriculture organizations. In the non-club farmers group, 100% hold executive positions in two or less organizations, with only 11% holding executive positions. The t-test did indicate a significant difference. Crop production club members exhibit significantly more leadership characteristics and community involvement than non-club farmers.

Overall, crop production club members indicated a higher participation in both crop-related and non-agriculture organizations, both as members and as executive officers, as outlined in Tables 27 to 30. The participation by crop production club members in crop-related organizations and executive positions in non-agriculture organizations was significant. There was not a significant difference between crop production club members and non-club farmers in the involvement in non-agriculture organizations or executive positions in crop-related organizations. Although the information does not conclusively support the hypothesis that crop production club members do participate in more organizations than do non-club farmers, the information does indicate that crop production club members provide leadership for both agriculture and non-agriculture organizations and community activities.

Participants were asked to indicate the number of innovative cropping practices they have adopted and are using in their farming operation over the past five years.

Table 31

Number of Innovative Cropping Practices Adopted in Past Five Years

# Innovations	CPC Number	CPC %	NON Number	NON %
<3	13	34	23	82
3-5	20	53	5	18
>5	5	13	0	0
Total	38	100	28	100

CPC Mean	3.42	NON Mean	1.54
CPC Mode	*	NON Mode	1

t -value = 4.845
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 31 summarizes the number of innovative cropping practices farmers have adopted in the past five years. The crop production club members have adopted more practices than the non-club farmers. Thirty-four percent of crop production club members have adopted less than three new innovations, while 82% of non-club farmers fall into the same category. Thirteen percent of crop production club members have adopted more than five new practices, while none of the non-club farmers have adopted more than five new practices. The mode for crop production club members is equal for two and three, while the mode for the non-club farmers is one. The t-test indicated there was a significant difference. This analysis supports the hypothesis that crop production club members will have adopted a greater number of innovative cropping practices in the past five years than non-club farmers.

Participants were also asked to indicate the number of innovations they adopted because of activities carried out by the crop production club members.

Table 32

Practices Adopted Because of Crop Production Club Influence

	CPC		NON	
# Practices	Number	%	Number	%
0	11	29	27	96
1-3	25	66	1	4
>3	2	5	0	0
Total	38	100	28	100

CPC Mean	1.5	NON Mean	.036
CPC Mode	0	NON Mode	0

t -value = 5.684
When d.f. = 64 and p<.001
Then "t" = 3.46 for a two-tailed test

Table 32 outlines the results and indicates that crop production club members were influenced more than non-club farmers. Only 4% of the non-club farmers indicated they had adopted new practices because of crop production club activities, while 71% of crop production club members had adopted new practices because of club activities. Five percent of crop production club members had adopted more than three new practices because of crop production club activities. The mode for both groups was zero. The t-test indicated a significant difference. Crop production club

members were definately influenced more by club activities than non-club members.

Participants were asked to indicate in their opinion how important the crop production club in their area was in influencing the cropping decisions they made in their own farming operation.

Table 33

Importance of Crop Production Club Activities For Farming Operation

	CPC		NON	
Importance	Number	%	Number	%
very	2	5	0	0
moderately	21	55	3	15
slightly	12	32	6	30
not at all	3	8	11	55
Total	38	100	20	100

CPC Mean	2.42	NON Mean	3.4
CPC Mode	2	NON Mode	4

$\chi^2 = 18.242$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 33 outlines how important the participants feel the crop production club was in influencing cropping decisions they made for their farming operation. In the opinion of the crop production club members, 60% indicated very important or moderately important, while in the opinion of non-club farmers 15% indicated very important or moderately important.

Eight percent of crop production club members and 55% of non-club farmers indicated the crop production club was not at all important. The mode for the crop production club members was "moderately" important and the mode for the non-club farmers was "not at all" important. The chi-square analysis indicated the difference was significant. The crop production club members rated club activities significantly higher than non-club farmers.

Participants were asked to indicate in their opinion how important the crop production club in their area was in influencing cropping practices used in the area.

Table 34

Importance of Crop Production Club Activities For Farming Area

	CPC		NON	
Importance	Number	%	Number	%
very	2	5	0	0
moderately	18	49	5	25
slightly	15	41	5	25
not at all	2	5	10	50
Total	37	100	20	100

CPC Mean	2.47	NON Mean	3.25
CPC Mode	2	NON Mode	4

$\chi 2 = 15.579$
Using the chi-square test with 3 degrees of freedom and an accepted level for $p<.001$ (by use of tabled values) any score above 16.266 would be significant.

Table 34 outlines how important participants feel the crop production club was in influencing cropping decisions made in their farming area. Fifty-four percent of crop production club members were of the opinion that clubs were very important or moderately important in influencing cropping decisions in the area, while 25% of non-club farmers were of the same opinion. Five percent of crop production club members and 50% of the non-club farmers felt that the crop production club was not important. The mode for the crop production club members was "moderately" important while the mode for the non-club farmers was "not at all" important. The chi-square test indicated there was not a significant difference. While the difference is not significant, crop production club activities are important because both groups rated the activities fairly high. In the opinion of the participants, crop production clubs have had some influence on the cropping practices of participants and of farmers in the club area. Crop production clubs have been transferring information to other producers. Therefore, the overall perception is that crop production clubs did play a role in technoloy transfer.

4.2 Summary of Hypotheses

After completing the data analysis, the following conclusions regarding the hypotheses were reached:

Hypothesis 1 — Accepted

The average age of crop production club members is lower than the average age for non-club farmers. The majority of crop production club members fall into the 30-39 category, while the majority of non-club farmers fall into the 40-49 age category. See Table 1.

Hypothesis 2 — Accepted

Crop production club members have a higher education level than non-club farmers. The majority of the crop production club members indicated they had obtained higher levels of education than Grade 12, as compared to non-club farmers where the majority indicated they had completed Grade 12 or less. See Table 2.

Hypothesis 3 — Accepted

Crop production club members do have higher annual gross sales than non-club farmers. The majority of crop production club members indicated they had annual gross sales in excess of $100,000, whereas the majority of non-club farmers indicated their annual gross sales were below $100,000. See Table 3.

Hypothesis 4 — Accepted

Crop production club members have larger-sized operations than non-club farmers. Crop production club members average 2100 cultivated acres and non-club farmers average 1200 cultivated acres. See Tables 4 and 5.

Hypothesis 5 — Rejected

Crop production club members and non-club farmers have a similar attitude toward change. Although the difference was not significant, non-club farmers indicated they were affected by changes to a greater extent than crop production club members. See Tables 6 and 7.

Hypothesis 6 — Rejected

Crop production club members are more able to cope with uncertainty and indicated that they are slightly higher risk takers than non-club farmers. The majority of crop production club members indicated they would prefer a more open market system which has potential for greater risk. The analysis supports a significant difference between the two groups with respect to market uncertainty. With respect to taking risks, both groups indicated they were risk takers. Although crop production club members indicated they were higher risk takers than non-club members, the difference between the two groups was not significant. The results of a study by Thomas (1987) indicated that farmers have some ability to assess their own risk attitudes, therefore supporting the indication by crop production club members that they are high risk takers. See Tables 8 and 9.

Hypothesis 7 — Accepted

Crop production club members have a more favorable attitude toward research than non-club farmers. Crop production club members ranked research as number 1 and subsidies as number 2, while non-club farmers ranked subsidies as number 1 and research as number 2. See Table 10.

Hypothesis 8 — Rejected

The analysis does not support the hypothesis that crop production club members use mass media communication channels for information more often than non-club farmers. Both groups rely on mass media communication channels for information. There was not a significant difference between the two groups with respect to their use of newspapers,

radio, magazines, government publications and television. See Tables 11 through 15.

Hypothesis 9 — Rejected

The analysis does not support the hypothesis that crop production club members use the services of change agents more often than non-club farmers. The use of extension programs for crop production club members was significant, but there was not a significant difference between the two groups for extension agrologists, extension specialists, Agriculture Canada Research Stations or university faculty. Crop production club members indicated they use Agriculture Canada Research Stations and university faculty more than non-club farmers, although the use is relatively low for both groups. See Tables 16 through 20.

Hypothesis 10 — Rejected

The analysis does not support the hypothesis that crop production club members use interpersonal communication channels more often than non-club farmers. Both groups rely on interpersonal communication channels as sources of information, with particular importance placed on neighbors as well as farm service agents and industry representatives. See Tables 21 through 26.

Hypothesis 11 — Rejected

Crop production club members on average participate in more organizations, particularly agriculture related, than non-club farmers. Crop production club members also hold more executive positions in organizations than non-club farmers. Crop production club member

participation in crop-related organizations and executive position in non-agriculture organizations were significant, but the participation in non-agriculture organizations and executive positions in agriculture organizations were not. Possibly the hypothesis was too general and the information should have been divided into more than one hypothesis. Although the hypothesis was not accepted, the analysis indicated strong leadership characteristics and community involvement by crop production club members. See Tables 27 through 30.

Hypothesis 12 — Accepted

Crop production club members have adopted a greater number of innovative cropping practices in the past five years than non-club farmers. Crop production club members averaged two or three, while non-club farmers averaged one new practice. See Table 31.

Chapter 5

Summary, Conclusions and Recommendations

5.1 Summary of Study

The technology transfer process and the diffusion of innovations have always been an important part of the agriculture sector. Over the past number of years there has been an increase in the number of sources of technology transfer. One of the newer sources emerging is crop production clubs. Since there is very little information available about crop production clubs, this study was conducted to provide more information about the role crop production clubs play in the technology transfer process. The study was also designed to provide a profile of the characteristics of crop production club members, which would indicate which adopter category they represent in the adoption-diffusion process. Establishing the adopter category they represent in the adoption-diffusion process helped determine the role crop production clubs play in the technology transfer process. The results of the study provided information that will be useful for further development decisions and may result in more funding allocated to club activities. The results also add to the limited amount of information available about crop production clubs.

The sample included two groups of farmers (from Saskatchewan and Manitoba), one made up of crop production club members and the other made up of surrounding non-club farmers. Only clubs that had been organized for five or more years (a total of six) were considered for the study because it was felt that clubs organized for less than five years would not have had time to have much effect in the technology transfer process. Four crop production clubs that had been organized for five years or longer were included in the crop production club member group. The non-club farmer group was a stratified random sample selected from telephone directories of corresponding crop production club areas, except for one group which was a stratified random sample selected from the Rural Municipality map because the area included two telephone exchanges.

A letter was sent to each selected participant of the study and provided with information about the study and procedures. A telephone survey was selected in an effort to obtain the best information possible. Personal interviews were rejected because of the time of year of the study (spring) and the time and distances required to conduct face-to-face on-farm interviews. The participants were contacted by telephone between April 22 and May 10, 1991. A total of 38 crop production club members and 28 non-club farmers were interviewed.

The questionnaire was similar for both groups, except for the first four introductory questions, which related to club membership for crop production club members or related to the farming operation for non-club farmers. Non-club farmers were also asked if they were aware of the crop club in their area. If they were not, then questions 6, 7 and 8 were not asked since

without knowledge about the crop production club the questions were irrelevant. The questionnaire was designed to obtain information about innovative cropping practices, as well as demographic data, personal characteristics and communication behavior, which assisted in identifying adopter categories. The data collected was analyzed using the StatView 512+ Macintosh Computer Program. The data was entered into the program and analyzed as comparative statistics or descriptive statistics. In this study, a descriptive analysis was conducted for all variables and a comparative analysis, including the un-paired t-test and chi-square, was conducted on some of the variables as the data required.

5.2 Summary of Findings

A profile of the crop production club members was established based on the characteristics outlined in the questionnaire. The characteristics of crop production club members are representative of those outlined in the adoption-diffusion theory for early adopters. Crop production club members are younger, better educated, operate larger-sized units and average higher annual gross sales than the non-club farmers sample. Crop production club members have a more favorable attitude to change, are more able to cope with risk and uncertainty and have a more favorable attitude to research.

Crop production club members use change agent services, such as extension programs, agrologists, specialists, Agriculture Canada Research Stations and university faculty more than non-club farmers. Other sources of cropping information were generalized into two additional categories as

outlined by the theory, mass media and interpersonal channels. However, the categories seem to be too general to make any conclusive statements. Crop production club members use magazines, government publications and television more than non-club farmers, while non-club farmers use newspapers and radio more often as sources of cropping information. Crop production club members use agriculture organizations to a greater extent than non-club farmers, but non-club farmers use farm service agents, banks and credit agencies, industry representatives and agriculture consultants more than crop production club members. Both groups indicated they used neighbors often as sources of cropping information.

Crop production club members belong to a greater number of organizations, both agriculture and non-agriculture, than non-club farmers. Crop production club members also hold more executive positions in these organizations than non-club farmers. Crop production club members have adopted a greater number of innovative practices over the past five years than non-club farmers and indicated they have adopted a greater number because of activities of crop production clubs than non-club farmers.

Both crop production club members and non-club farmers were of the opinion that the crop production club had influenced cropping practices on their farm and in their area. However, crop production club members felt that the clubs had more influence than the non-club farmers, with over 90% of crop production club members as compared to only 50% of non-club farmers indicating they felt the club had influenced cropping practices.

This study was designed to determine the role crop production clubs play in the technology transfer process, but did not attempt in any way to test effectiveness. The results of the study indicated that crop production club members introduce a number of new and innovative practices to club members through the use of demonstrations. The demonstrations are easily observable by other farmers and some non-club farmers may try some of these innovations. However, this study did not try to determine the effectiveness of crop production clubs in relation to changes in behavior of non-club farmers. The study focused only on the role crop production clubs play as one of the sources in the technology transfer process. The study looked at what role crop production clubs play as compared to traditional government and university sources of information.

5.3 Conclusions

Crop production club members exhibit characteristics similar to those outlined in the adoption-diffusion theory for early adopters. Therefore crop production club members fit into the adoption-diffusion process as early adopters. The theory states that the role of early adopters is to decrease the uncertainty about a new idea by adopting it and through interpersonal networks convey a subjective evaluation of the innovation to near peers. Both groups indicated that they used neighbors often as a source of information and therefore, crop production club members likely transfer information to others through this and other channels. In this study, both groups indicated they use neighbors often or occasionally as a source of information 89% of the time. Other related studies reviewed in the literature

indicate 75% to 85% use neighbors often or occasionally as a source of information. Crop production club members indicated that they have a high level of interaction with extension and agriculture organizations. Therefore, they are a good group to target for extension programs and as early adopters, will transfer the information through the adoption-diffusion process.

The literature outlines several stages in the adoption-diffusion process. The final two stages are the transfer stage or the stage where innovations are introduced to the target population and the adoption-diffusion stage, where farmers decide whether or not to adopt a new innovation. The adoption of the new innovation usually spreads through the target population through the various categories outlined by the theory: early adopters, majority and laggards.

The literature suggests that it is important for farmers and producer groups to participate in the technology transfer process, particularly through various ways such as providing advice and supporting activities such as on-farm demonstrations. The literature also states that demonstrations are an effective and efficient means of accelerating technology transfer from the research lab to the farm. Crop clubs use demonstrations as a way of introducing new innovations to their club members. They transfer technology through the adoption-diffusion process as early adopters. They are key contacts with extension and agriculture organizations. Therefore, crop production clubs do play a role in the technology transfer process through the adoption-diffusion process.

Many of the club activities are closed to club members only, although some clubs are starting to hold field days and demonstration days to allow others in the area who are interested in the new innovations to observe the results. Clubs could expand their technology transfer role by making information more available to non-club farmers and other interested parties.

5.4 Recommendations

Crop production club members play a role in the technology transfer process through the adoption-diffusion process as early adopters. The following recommendations are being made as a result of this study:

1. Crop production clubs should make the results of their club activities more readily available to interested parties. This could easily be accomplished through public field days and tours. The results should be published and made available through extension services such as local farm service centers, government extension services and research stations.

2. Since crop production club members are early adopters and play a role in the adoption-diffusion process, extension activities should be targeted more directly at this group. The results of the study indicate that this group already uses change agent services and agriculture organizations to a great extent. Perhaps more of an effort could be made to include the clubs in extension program planning and needs assessment.

3. More funding should be made available to crop production clubs to carry out demonstrations and formalize their results. This could be accomplished by establishing a closer working relationship with research stations and organizations. The literature supports this format as an excellent method of accelerating technology transfer from the research lab to the farm.

5.5 Recommendations For Further Study

1. A review of the literature should be conducted to identify a means to test the effectiveness of sources of the technology transfer process.

2. This study proved there is a role for crop production clubs in the technology transfer process. A more in-depth review of the literature should be conducted to determine how effectiveness can be measured when studying technology transfer.

3. An in-depth study should be conducted in terms of the crop production clubs and the data obtained from this study to determine if the information from this study can be extended to all producer clubs such as marketing, forage, soil conservation and livestock producer clubs.

FOOTNOTES

FOOTNOTES

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APPENDIXES

APPENDIX A

Crop Production Club Contact Letter

Extension Division

UNIVERSITY OF SASKATCHEWAN
Saskatoon, Saskatchewan, S7N 0W0

«Data CPC Contact List»
March 22, 1991

«name»
«club»
«address»
«town», «prov» «code»

Dear «name»:

I am contacting you with regard to a research project that I am currently undertaking with Glen Hass at the Extension Division, University of Saskatchewan. We are interested in conducting an in-depth study of the kinds of agronomic practices Crop Production Club members are currently using and the role the clubs play in the technology transfer process in Saskatchewan and Manitoba. This is a follow-up to the study completed in 1989 which told us a lot about the structure and function of production clubs. This study will give us more information as to the role clubs play in providing information to other producers.

The study will be conducted by myself, through telephone interviews. Would you please send me a list of the members of your Crop Production Club. Each member of the club will be contacted individually to determine if they are interested in helping us out with this study. The information collected will be kept strictly confidential, with results presented as group responses and not individual responses. A copy of the report will be made available to those interested.

In order to complete the interviews before the spring rush begins, I would appreciate it if you could send the list by April 19, 1991. I have enclosed a self-addressed envelope for your convenience. I have also enclosed a form for you to complete that will provide us with some brief background information about your club, such as information on the length of time the club has been operating, types of activities of the club and future activities planned for the club. We also plan to interview some non-club farmers in your area to determine their farming practices. Would you be able to help us by identifying a few non-club members in your area? I would appreciate a list of names that can be included on the attached form.

We really appreciate your support and cooperation. If you have any questions, please contact me at 966-5592. I look forward to meeting the members of your club.

Sincerely yours,

Donna Fleury, P.Ag.
Extension Division

«Data CPC Contact List»**Crop Production Club Information**

This questionnaire is designed to provide us with some information about crop clubs in order to begin a more indepth study. The study will look at the kinds of agronomic practices Crop Production Clubs are currently using and the role the clubs play in the technology transfer process in Saskatchewan. Please return in the self-addressed envelope by **April 10**. Thank you for your help, it is greatly appreciated! If you have any questions, please contact Donna Fleury, Extension Division, Univ. of Sask., 966-5592.

«club» **«name»**

1. How many years has your club been in operation? _____

2. Please list current agronomic practices carried out by club members. (ex. fertilizer trials, chem-fallow, fall-spraying) _____

_____

_____

_____

_____

_____

_____

_____

3. What kinds of special events does your club hold and are they open to the community? (ex. field tours, demonstration plots, guest speakers)

_____

_____

_____

_____

4. Who is the professional person working with your club (extension agrologist, industry representative, etc.) _____
(name and organization)

5. Please provide the names of non-club farmers in your area. We are interested in determining their current farming practices. These farmers should have farming operations of similar size and basic agronomic practices usual to the area. _____

_____

_____

_____

_____

_____

Signature:_____

APPENDIX B

Letter to Individual Crop Production Club Member

Extension Division

UNIVERSITY OF SASKATCHEWAN
Saskatoon, Saskatchewan, S7N 0W0

«Data CPC List»
April 12, 1991

«name»
«address»
«town», «prov» «code»

Dear «name»:

I am contacting you with regard to a research project that I am currently undertaking with Glen Hass at the Extension Division, University of Saskatchewan. We are interested in conducting an in-depth study of the kinds of agronomic practices Crop Production Club members are currently using and the role the clubs play in the technology transfer process in Saskatchewan and Manitoba. This is a follow-up to the study completed in 1989 which told us a lot about the structure and function of production clubs. This study will give us more information as to the role clubs play in providing information to other producers. We will also be contacting non-club farmers in the area to look at the kinds of agronomic practices they are using.

The study will be conducted by myself through telephone interviews. I will be contacting you by phone shortly after you receive this letter to confirm your participation in the study. I will also set-up a time that is convenient for you to complete the interview. I hope to complete the interviews fairly soon. The interview will take approximately 10 to 15 minutes of your time. The information collected will be kept strictly confidential, with the results presented as group responses and not individual responses. A copy of the report will be made available to those interested.

We really appreciate your support and cooperation of this study. Your participation in this study is important in helping us to determine an accurate picture of the role Crop Production Clubs play in the technology transfer process in Saskatchewan.

If you have any questions, please contact me at (306) 966-5592. I look forward to talking to you.

Sincerely yours,

Donna Fleury, P.Ag.
Extension Division

APPENDIX C

Letter to Individual Non-Club Farmer

Extension Division

UNIVERSITY OF SASKATCHEWAN
Saskatoon, Saskatchewan, S7N 0W0

«Data NON List »
April 12, 1991

«name»
«address»
«town», «prov» «code»

Dear «name»:

I am contacting you with regard to a research project that I am currently undertaking with Glen Hass at the Extension Division, University of Saskatchewan. We are interested in conducting an in-depth study of the kinds of agronomic practices Saskatchewan and Manitoba producers are currently using. This information will be used to help us develop extension programs for the agriculture sector. We will also be contacting Crop Production Club farmers in your area to find out the type of projects they are undertaking in their club.

The study will be conducted by myself through telephone interviews. I will be contacting you by phone shortly after you receive this letter to confirm your participation in the study. I will also set-up a time that is convenient for you to complete the interview. I hope to complete the interviews fairly soon. The interview will take approximately 10 to 15 minutes of your time. The information collected will be kept strictly confidential, with the results presented as group responses and not individual responses. A copy of the report will be made available to those interested.

We really appreciate your support and cooperation of this study. Your participation in this study is important in helping us to determine the main agronomic practices being used in Saskatchewan and what type of extension programs are needed.

If you have any questions, please contact me at (306) 966-5592. I look forward to talking to you.

Sincerely yours,

Donna Fleury, P.Ag.
Extension Division

APPENDIX D

Crop Production Club Questionnaire
and
Non-Club Farmer Questionnaire

Crop Production Club Questionnaire (Member) **#_____**

Name: _____

Address: _____

Phone: _____

Hello. My name is Donna Fleury. This call is a follow-up to a letter I sent to you regarding a research project that I am currently undertaking with Glen Hass at the Extension Division, University of Saskatchewan. We will be collecting the information for the research project through a telephone interview which will take approximately 10 or 15 minutes of your time. **Would it be convenient to complete the interview now?**

If not, could we set a time when I could phone you back to complete the interview? **When would be a convenient time for you?**
Date:_____ Time:_____(a.m.) or (p.m.)

Background Information

We are interested in finding out about crop production practices Crop Production Club members are currently using. This is a follow-up to the study completed in 1989 which told us a lot about the structure and function of production clubs. The information will help us determine the role clubs play in providing information to other producers. We will also be contacting non-club farmers in the area to determine crop production practices they are using.

The information collected will be kept strictly confidential, with the results presented as group responses and not individual responses. Let me emphasize that no one will have access to individual records, only a summary of the group results will be made available. A copy of the report will be made available to those interested.

Do you have any questions before we start?

Introduction

There has been a rapid increase in the number of crop production clubs, as well as an increase in time and money spent on club activities. There also seems to be a lot of interest by non-members in the types of activities the clubs are carrying out. We are trying to determine the role crop clubs play and how important they are in transferring information to other producers. The first few questions are related to Crop Production Club membership.

1. **Are you a member of a Crop Production Club?** yes no

2. **How long have you been a member?**_____

3. **How long has your club been active?**_____

4. **How did your club get started?** _____

_____

What was your reason for joining the Crop Production Club?

_____

_____

Crop Production Information

Thinking back over the past five years, how many new and innovative cropping practices have you introduced into your operation that would not be considered to be a general practice for the farmers in your area. These practices should be ones that you have used more than once or intend to use again in your operation. Your area refers to the area that includes farmers who haul to the same elevator point as you (or in the same rural municipality).

5. **Please list the new and innovative practices you have introduced into your operation. (soil conservation techniques — green manuring, chem-fallow, new crops, machinery innovations, etc.)**

_____

_____

_____

_____

Are there any others you can think of?
Let's leave it and if you happen to think of others later, we can add them to the list.

6. **Which of these cropping practices are a direct result of your membership in the Crop Production Club?**

_____

_____

7. **How important is the Crop Production Club in influencing your cropping decisions on your farm?** Importance is rated on a scale of 1 to 4 with 1 very important, 2 moderately important, 3 slightly important and 4 not important. *So with this rating scale in mind, let me repeat the question to you.*

very important	moderately important	slightly important	not important
1	2	3	4

8. **In your opinion, how important has the Crop Production Club been in influencing cropping practices in your area?** The same scale as used in the previous question is used for this question. Importance is rated on a scale of 1 to 4 with 1 very important, 2 moderately important, 3 slightly important and 4 not important.

very important	moderately important	slightly important	not important
1	2	3	4

General Agriculture Industry

In the last decade, a number of changes have taken place in rural areas, particularly in relation to agriculture. These changes include an increasing farm size, a trend towards more centralized grain handling systems and a decrease in the number of outlets for machinery service and repairs.

9. **In your opinion, how much have these changes affected your farming enterprise?** The changes are rated on a scale from 1 to 4 with 1 significantly, 2 moderately, 3 slightly and 4 not at all.

significantly	moderately	slightly	not at all
1	2	3	4

10. **Do you feel this trend of increasing farm size will continue?** The scale ranges from 1 to 5, with 1 strongly agree, 2 agree, 3 neutral, 4 disagree and 5 strongly disagree.

strongly agree	agree	undecided	disagree	strongly disagree
1	2	3	4	5

11. *Presently the market place for crops produced in Western Canada has a lot of variables.* **Which of the following market situations would you favor most?**_____

1) a move to a more open market system, which offers higher returns, but has the potential for greater risk.
2) a move to a more orderly market system, which offers lower returns, but would likely have less risk.

12. *Thinking about decisions you make in your farming operation, how would you rate yourself with respect to taking risks.* **Please use the following rating scale to rate the level of risk you would normally take in making decisions.** The scale ranges from 1 to 4 with 1 being high, 2 medium, 3 low and 4 no risk.

high	medium	low	no risk
1	2	3	4

13. *The agriculture sector is presently facing a shortage of funding. This is creating cutbacks in research, extension, training and subsidy programs. Considering this funding shortage I'm going to ask you to rank these areas in order of importance, with 1 being most important, to 4 being least important.* **Which do you think is most important — research, extension, training or subsidy programs?** 1-most important, 4-least important

____ Research
____ Extension
____ Training
____ Subsidies

Information Sources:

14. *Farmers today tend to be faced with a lot of information and information sources. A number of these sources relate to cropping information.* **Which of the following would you most likely use to access cropping information and how often would you use the sources for information?** Please rate the frequency you use the information sources by using a scale from 1 to 4 with 1 being often, 2 occasionally, 3 rarely and 4 not at all. *Let me emphasize that this question refers to cropping information sources.*

Mass Media Information	**1**	**2**	**3**	**4**
newspapers	often	occasionally	rarely	not at all
magazines	often	occasionally	rarely	not at all
Government publications	often	occasionally	rarely	not at all
Radio	often	occasionally	rarely	not at all
Television	often	occasionally	rarely	not at all

Specialist Information	**1**	**2**	**3**	**4**
Extension programs (conferences, field days, short courses)	often	occasionally	rarely	not at all
Extension Agrologist (formerly Ag. Reps.)	often	occasionally	rarely	not at all
Other Specialists (Crops, Farm Management, Soil Conservation)	often	occasionally	rarely	not at all
Agriculture Canada Research Stations	often	occasionally	rarely	not at all
University Faculty	often	occasionally	rarely	not at all

Other Contacts	**1**	**2**	**3**	**4**
Farm Service Agents (elevator manager, retail suppliers)	often	occasionally	rarely	not at all
Bank and Credit Agencies	often	occasionally	rarely	not at all
Industry Representatives (chem. reps)	often	occasionally	rarely	not at all
Agriculture Consultants	often	occasionally	rarely	not at all
Agriculture Organizations	often	occasionally	rarely	not at all
Neighboring Farmers	often	occasionally	rarely	not at all
Other (*specify*)_____	often	occasionally	rarely	not at all

15. *There are a number of provincial, national and international farm organizations in existence at the present time. The Sask. Soil Conservation Association is an example of a provincial organization and Soil Conservation Canada is a national organization. (other examples: SWP, UGG, Canola Growers, etc.)* **How many crop-related agriculture organizations do you belong to?_____**

16. **In how many of these organizations have you held executive positions in the past 5 years?_____**
(president, secretary, treasurer, board of directors)

17. **There are also a number of non-farm organizations in existence. (example: Lions, Kinsmen, etc.) How many non-farm organizations do you belong to?_____**

18. **In how many of these organizations have you held executive positions in the past 5 years?_____**
(examples: president, secretary, treasurer, board of directors)

Demographic Information
The questions in this last section are a little more personal in nature. However, I would like to remind you that all of this information will be kept strictly confidential. I would now like to ask you a few questions about yourself and your farm.

19. **How many acres of farmland do you operate?_____**

20. **What is the total acreage cultivated?_____**

21. **Using the following value ranges, what is the approximate annual gross sales of your farming enterprise?**
1) <40,000
2) 40,000-75,000
3) 75,001-100,000
4) 100,001-199,999
5) >200,000

22. **Which one of the following age groups apply to you?**
1) under 20
2) 20-29
3) 30-39
4) 40-49
5) 50-59
6) 60 and over

23. **What is the highest level of formal education you have received?**
1) < grade 12
2) grade 12
3) some university or technical courses
4) Technical Diploma
5) University Degree or higher

This brings us to the end of the questionnaire. **Are there any comments you would like to add?**

_____

_____

_____

_____

_____

Thank you for participating in the study. We really appreciate your time and support. I think we have all of the information we need. However, if as we go through the study and find we need additional information, would it be all right to call you back? yes no

The results of the study will be compiled and published in a report later in the year. **Would you like to receive a copy of the report?** yes no

If yes, what is your mailing address?

_____

_____

Thank you for your assistance.

Crop Production Club Questionnaire (Nonmember) #_____

Name: _____

Address: _____

Phone:_____

Hello. My name is Donna Fleury. This call is a follow-up to a letter I sent to you regarding a research project that I am currently undertaking with Glen Hass at the Extension Division, University of Saskatchewan. We will be collecting the information for the research project through a telephone interview which will take approximately 10 or 15 minutes of your time. **Would it be convenient to complete the interview now?**

If not, could we set a time when I could phone you back to complete the interview? **When would be a convenient time for you?**
Date:_____ Time:_____(a.m.) or (p.m.)

Background Information

We are interested in finding out about the crop production practices producers are currently using. This information will be used to help us develop extension programs for the agriculture sector. We will also be contacting Crop Production Club farmers in your area to find out the type of projects they are undertaking in their club.

The information collected will be kept strictly confidential, with the results presented as group responses and not individual responses. Let me emphasize that no one will have access to individual records, only a summary of the group results will be made available. A copy of the report will be made available to those interested.

Do you have any questions before we start?

Introduction

With the changes that are continually happening in agriculture, it is important that the types of extension activities we offer reflect these changes. In order to help us develop future extension programs for the agriculture sector, it is important for us to determine what kinds of cropping practices producers are currently using. The first few questions I would like to ask you are general questions. Because we are also interviewing Crop Production Club members, I would like to ask you a couple of questions about Crop Production Clubs.

1. **My understanding is that you do not belong to a Crop Production Club. Is that correct?** yes no

2. **Have you ever been a member of a Crop Production Club?**
   1 yes 2 no

3. **Are you aware that there is a Crop Production Club in your area?** yes no (Note: if no, omit 6, 7, and 8 because irrelevant)

4. **How long have you been farming?**_____

Crop Production Information

Thinking back over the past five years, how many new and innovative cropping practices have you introduced into your operation that would not be considered to be a general practice for the farmers in your area. These practices should be ones that you have used more than once or intend to use again in your operation. Your area refers to the area that includes farmers who haul to the same elevator as you (or in the same rural municipality).

5. **Please list the new and innovative practices you have introduced into your operation. (soil conservation techniques — green manuring, chem-fallow, new crops, machinery innovations, etc.)**

_____

_____

_____

_____

Are there any others you can think of?
Let's leave it and if you happen to think of others later, we can add them to the list.

6. **Which of these cropping practices are a direct result of your interaction with Crop Production Club members?**

_____

_____

7. **How important is the Crop Production Club in influencing your cropping decisions on your farm?** Importance is rated on a scale of 1 to 4 with 1 very important, 2 moderately important, 3 slightly important and 4 not important. *So with this rating scale in mind, let me repeat the question to you.*

very important	moderately important	slightly important	not important
1	2	3	4

8. **In your opinion, how important has the Crop Production Club been in influencing cropping practices in your area?** The same scale as used in the previous question is used for this question. Importance is rated on a scale of 1 to 4 with 1 very important, 2 moderately important, 3 slightly important and 4 not important.

very important	moderately important	slightly important	not important
1	2	3	4

General Agriculture Industry

In the last decade, a number of changes have taken place in rural areas, particularly in relation to agriculture. These changes include an increasing farm size, a trend towards more centralized grain handling systems and a decrease in the number of outlets for machinery service and repairs.

9. **In your opinion, how much have these changes affected your farming enterprise?** The changes are rated on a scale from 1 to 4 with 1 significantly, 2 moderately, 3 slightly and 4 not at all.

significantly	moderately	slightly	not at all
1	2	3	4

10. **Do you feel this trend of increasing farm size will continue?** The scale ranges from 1 to 5, with 1 strongly agree, 2 agree, 3 neutral, 4 disagree and 5 strongly disagree.

strongly agree	agree	undecided	disagree	strongly disagree
1	2	3	4	5

11. *Presently the market place for crops produced in Western Canada has a lot of variables.* **Which of the following market situations would you favor most?**_____

a) a move to a more open market system, which offers higher returns, but has the potential for greater risk.

b) a move to a more orderly market system, which offers lower returns, but would likely have less risk.

12. *Thinking about decisions you make in your farming operation, how would you rate yourself with respect to taking risks.* **Please use the following rating scale to rate the level of risk you would normally take in making decisions.** The scale ranges from 1 to 4 with 1 being high, 2 medium, 3 low and 4 no risk.

high	medium	low	no risk
1	2	3	4

13. *The agriculture sector is presently facing a shortage of funding. This is creating cutbacks in research, extension, training and subsidy programs. Considering this funding shortage I'm going to ask you to rank these areas in order of importance, with 1 being most important, to 4 being least important.* **Which do you think is most important — research, extension, training or subsidy programs?** 1-most important, 4-least important

____ Research
____ Extension
____ Training
____ Subsidies

Information Sources:

14. *Farmers today tend to be faced with a lot of information and information sources. A number of these sources relate to cropping information.* **Which of the following would you most likely use to access cropping information and how often would you use the sources for information?** Please rate the frequency you use the information sources by using a scale from 1 to 4 with 1 being often, 2 occasionally, 3 rarely and 4 not at all. *Let me emphasize that this question refers to cropping information sources.*

Mass Media Information	**1**	**2**	**3**	**4**
newspapers	often	occasionally	rarely	not at all
magazines	often	occasionally	rarely	not at all
Government publications	often	occasionally	rarely	not at all
Radio	often	occasionally	rarely	not at all
Television	often	occasionally	rarely	not at all

Specialist Information	**1**	**2**	**3**	**4**
Extension programs (conferences, field days, short courses)	often	occasionally	rarely	not at all
Extension Agrologist (formerly Ag. Reps.)	often	occasionally	rarely	not at all
Other Specialists (Crops, Farm Management, Soil Conservation)	often	occasionally	rarely	not at all
Agriculture Canada Research Stations	often	occasionally	rarely	not at all
University Faculty	often	occasionally	rarely	not at all

Other Contacts	**1**	**2**	**3**	**4**
Farm Service Agents (elevator manager, retail suppliers)	often	occasionally	rarely	not at all
Bank and Credit Agencies	often	occasionally	rarely	not at all
Industry Representatives (chem. reps)	often	occasionally	rarely	not at all
Agriculture Consultants	often	occasionally	rarely	not at all
Agriculture Organizations	often	occasionally	rarely	not at all
Neighboring Farmers	often	occasionally	rarely	not at all
Other (*specify*)_____	often	occasionally	rarely	not at all

15. *There are a number of provincial, national and international farm organizations in existence at the present time. The Sask. Soil Conservation Association is an example of a provincial organization and Soil Conservation Canada is a national organization. (other examples: SWP, UGG, Canola Growers, etc.)* **How many crop-related agriculture organizations do you belong to?_____**

16. **In how many of these organizations have you held executive positions in the past 5 years?_____**
(president, secretary, treasurer, board of directors)

17. **There are also a number of non-farm organizations in existence. (example: Lions, Kinsmen, etc.) How many non-farm organizations do you belong to?_____**

18. **In how many of these organizations have you held executive positions in the past 5 years?_____**
(examples: president, secretary, treasurer, board of directors)

Demographic Information
The questions in this last section are a little more personal in nature. However, I would like to remind you that all of this information will be kept strictly confidential. I would now like to ask you a few questions about yourself and your farm.

19. **How many acres of farmland do you operate?_____**

20. **What is the total acreage cultivated?_____**

21. **Using the following value ranges, what is the approximate annual gross sales of your farming enterprise?**
1) <40,000
2) 40,000-75,000
3) 75,001-100,000
4) 100,001-199,999
5) >200,000

22. **Which one of the following age groups apply to you?**
1) under 20
2) 20-29
3) 30-39
4) 40-49
5) 50-59
6) 60 and over

23. **What is the highest level of formal education you have received?**
1) < grade 12
2) grade 12
3) some university or technical courses
4) Technical Diploma
5) University Degree or higher

This brings us to the end of the questionnaire. **Are there any comments you would like to add?**

_____

_____

_____

_____

_____

Thank you for participating in the study. We really appreciate your time and support. I think we have all of the information we need. However, if as we go through the study and find we need additional information, would it be all right to call you back? yes no

The results of the study will be compiled and published in a report later in the year. **Would you like to receive a copy of the report?** yes no

If yes, what is your mailing address?

_____

_____

If you are interested in more information about the Crop Production Club in your area, I would be pleased to provide you with a contact person. yes no

Thank you for your assistance.