

**THE FACTORS IN COMPLETION, NON-COMPLETION, AND NON-
PARTICIPATION IN FARMER FIELD SCHOOLS IN TRINIDAD AND
TOBAGO**

A Dissertation

by

SAMUEL NEAL GOFF

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2008

Major Subject: Agricultural Education

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May 2008

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ABSTRACT

The Factors in Completion, Non-Completion, and Non-Participation in Farmer Field

Schools in Trinidad and Tobago. (May 2008)

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The purpose of the study was to identify and analyze factors affecting completion, non-completion, and non-participation in five Farmer Field Schools (FFS) administered by the Ministry of Agriculture, Lands, and Marine Resources (MALMR) of Trinidad and Tobago.

The research objectives used to accomplish the purpose of this study focused on the relationship between participation status and 1) personal characteristics, 2) individuals' motivations for participation, 3) perceptions about selected farming practices, 4) individuals' priority rankings of their sources of information regarding farming practices, 5) the deterrents to participation, and 6) perceptions of the usefulness of competitions as a means for increasing the popularity of FFS.

This study employed an ex post facto, causal comparative research design. Three instruments were developed. The sample population ($N=109$) consisted of farmers classified as FFS completers ($n=56$), non-completers ($n=15$), and non-participants ($n=38$). Data were gathered from late May to late September 2007.

Individuals with a greater number of participating friends are more likely to complete the program FFS completers 1) were more driven by social reasons to

participate in FFS than were non-completers, 2) possessed a greater concern for the environment than did non-completers, 3) had higher expectations than did non-completers that participation in a FFS would improve their occupational performance and status, 4) more likely than non-completers to be willing to take on the financial risks involved in the adoption of IPM on their farms, 5) believed more strongly than did non-completers that IPM is compatible with agricultural practices and the market in Trinidad and Tobago. Completers most highly value the information received from MALMR whereas the non-completers and non-participants most highly value information received from the agro-shops. Completers vs. non-completers and non-participants held widely divergent views on the deterrents to participation in FFS.

The contribution of this study to the field of agricultural and extension education is that policymakers and practitioners may use the information herein to employ strategies that impair or eliminate the factors leading to attrition and non-participation, thus making programs more accessible, prevent attrition, and may decrease farmers' expenditures on pesticides, and increase income.

DEDICATION

This dissertation is dedicated to my family. I would first like to thank my wife, Kylah Clark-Goff, for her support, encouragement, and willingness to take on a blitzkrieg approach to higher education and raising a family. Four years, three degrees, two children! I am amazed at how well you have been able to multi-task your academic and familial responsibilities over the last four years while also leaving room for me to pursue my studies. You are, without a doubt, far more of a friend and wife than I could have ever hoped for. The words “thank you” somehow seem inadequate. I look forward to seeing how you and I will put our academic backgrounds into practice.

Mo and Madeleine: you bring immense joy to my life. Breaks from my work in the evenings to play with you kept me sane. You, like your mother, have made sacrifices. Your smiles, kind words, and desire to play stimulated me to complete my work so I could be home with you.

Thank you, Mom, Dad, and Gary, for believing in me all along the way. You have shown me what is truly important in life. Keith, Vicki, Cullen, and Kara, I could not have married into a better extended family!

A million thanks to all of you. To you, I dedicate this work.

ACKNOWLEDGEMENTS

To my advisor, Dr. Lindner, I would like to express my sincere gratitude for your support and guidance throughout my graduate studies at Texas A&M University. Your suggestions have always challenged me to give my best effort every day. Your contributions to my academic development have made the last four years productive and enjoyable.

I would also like to thank Dr. Christiansen, Dr. Hallmark, and Dr. Murphy for serving on my committee. Your valuable feedback and support encouraged me to persist to the end. I greatly value the depth and breadth of your insights and experience.

This research would not have been possible without the support of Dr. David Dolly of the University of the West Indies. I thank Dr. Dolly for his availability to establish my dissertation study and host Dr. Lindner and me on several occasions. Your commitment to provide agricultural and extension education to the small-scale farmers in Trinidad and Tobago is an inspiration.

I would also like to thank Ms. Phillippa Ford, the Permanent Secretary of Agriculture at MALMR, and Ms. Pauline Dowlath of MALMR for granting permission to conduct the study.

Finally, I express my appreciation to the farmers who kindly participated in this research and provided the information for this dissertation.

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CHAPTER I

INTRODUCTION

Trinidad and Tobago's economy is heavily dependent on oil and gas industries (Central Statistical Office, 2008). The energy sector contributes 40% of GDP and 80% of exports, yet only employs 5% of the population. In contrast, the contribution of agriculture to Trinidad and Tobago's GDP is 0.6% (Central Intelligence Agency, 2008), a decline from 5% of GDP in 1985 (Seepersad, 2003). The agriculture sector, however, employs 9.5% of the population (Central Intelligence Agency, 2008). Trinidad and Tobago is a net food importer; in 1999, the value of food imports exceeded the value of food exports by 181%. As a result, national and household food security is a source of concern. Gradually reversing the trend from three decades ago, the majority of agricultural production is for local sale and consumption rather than for export. The country's farmers produce "most of its requirements for vegetables" (Seepseerad, 2003, p.6).

Despite producing the majority of the vegetables needed for domestic consumption, it has been noted (Dolly, 2005) that farmers' indiscriminate use of pesticides caused great harm to human health, the environment, and unduly raised the costs of inputs. Ramroop, et al. (2000) observed that

It is not uncommon for farmers to use combinations of pesticides, often referred to as "cocktails." The "cocktails" can at times contain up to 4 or 5 pesticides and

this is applied between one and seven times weekly. The recommended dosages are usually not adhered to, safety intervals before harvest not observed, and there is poor storage of pesticides. (p. 65)

The misuse of pesticides in Trinidad and Tobago was chronicled as far back as the mid-1980s. Phillips-Flanagan's (1986) study on the indicators of pesticide illiteracy among Trinidad's small-scale farmers showed that though the farmers had been using pesticides for several years, some as many as fifteen years, their knowledge of the hazards or toxicity was low to non-existent. She reported that pesticide illiteracy was found in three areas: "the knowledge of hazards or toxicity of the pesticides being used, the knowledge of safe mixing and application practices, and the knowledge of the necessary protective clothing" (p. 1).

From 1997 to 2000, the Hibiscus Mealy Bug (HMB), a highly invasive pest species from Asia, threatened food security in the region by destroying many food crops (Caribbean Agricultural Research and Development Institute, 1997; Dolly, 2005). The crop protection services of the various ministries of agriculture in the Caribbean attempted unsuccessfully to control the HMB with routine pesticide applications. Ultimately, the introduction of biological parasites contained the spread of HMB and restored food crop cultivation. This experience highlighted the value of pest management systems that did not rely solely on chemical pesticides.

It is in this context that the Farm Management and Extension Service of the Ministry of Agriculture, Lands, and Marine Resources (MALMR) of the Government of

Trinidad and Tobago established the Farmer Field Schools (FFS) to introduce integrated pest management (IPM) technologies. The objective of the IPM approach is to use comprehensive information on the life cycles of pests and their interaction with the environment in combination with pest control methods that are economical and cause minimal harm to people and the environment (van den Berg, 2004). Thus, through the FFS educational program, MALMR seeks to improve farmers' capacities for critical analyses, decision-making, and stimulating innovation for increased agricultural productivity while also safeguarding human health and the environment. FFS, a popular contemporary model for agricultural extension, is a hands-on, experiential, participatory approach to teaching farmers about the ecology of their fields (Gallagher, 2003). Central to the approach is the emphasis on teaching farmers not only the "how" but also the "why" of agro-ecological systems.

In 2000, the Commonwealth Agricultural Bureau International (CABI) introduced the Farmer Field School (FFS) initiative to the Caribbean (Dolly, 2005). In 2003, the Trinidad and Tobago Ministry of Agriculture Lands and Marine Resources (MALMR) and CABI introduced FFS in two locations, in the Caura Valley and South Aranguez. As of January 2008, MALMR has carried out FFS in over thirty locations in Trinidad and Tobago (David Dolly, personal communication, January 2008). MALMR is using FFS as the vehicle for teaching farmers the principles and practices of integrated pest management (IPM) for vegetable production targeted for the local market.

The FFS approach to agricultural education and extension was developed by the Food and Agriculture Organization of the United Nations (FAO) in 1989 (van de Fliert,

1993). The approach was designed as a hands-on way of diffusing knowledge-intensive integrated pest management principles and practices for East Asian rice-based systems. According to Tripp, Wijeratne, and Piyadasa (2005), the “defining characteristics of FFS include discovery learning, farmer experimentation, and group action” (p. 1707). Pontius, Dilts, and Bartlett (2000) posit that four principles are the basis for any FFS focused on teaching IPM: (1) grow a healthy crop, (2) conserve natural enemies, (3) conduct regular field observations, and (4) farmers become IPM experts.

The purpose of FFS was to enable farmers to engage in decision-making processes on the ecology of their own fields by improving their analytical and decision-making skills. Agro-ecosystems analysis (AESA) is the discovery-learning methodology taught in FFS (Feder, Murgai, & Quizon, 2004a). The intent of the AESA approach is to discontinue dependency on pesticides as the primary pest-control measure. To achieve this, farmers needed to understand the ecological principles and processes governing pest population dynamics.

FFS groups are generally composed of 15-25 farmers who meet once a week in a designated field throughout the crop cycle. Farmer experimentation plays a critical role in FFS. Using AESA to understand pest population dynamics, farmers observe the processes and relationships between the harmful insects and their natural enemies in two plots, one using conventional practices and the other IPM practices. Farmers then draw their observations on flip-chart paper and discuss them. The FFS facilitator, usually an extension agent or NGO staff member, takes particular care to not provide answers through lectures, but to stimulate the farmers to ask questions and find their own

answers. FFS facilitators build group dynamics through activities designed to foster group action (Tripp, Wijeratne, & Piyadasa, 2005). FFS provide opportunities for farmers to learn-by-doing, based on the principles of non-formal and vocational education. Extension agents and farmer-trainers facilitate the learning process, stimulating farmers to discern key agro-ecological concepts and develop skills through experiential learning in the field (Braun, Thiele, & Fernandez, 2000).

Extension practitioners and academics have noted the effectiveness of FFS for the transmission of agricultural knowledge. In a study of rice-farmers in the Philippines, Rola, Jamias, and Quizon (2002) found that FFS graduates possessed greater knowledge of integrated pest management than their non-FFS peers and that graduates retained their field school knowledge. In recent years, extension agencies have expanded FFS to include in its curriculum other topics relevant to resource-poor farmers. In a study on the effectiveness of FFS for soil and crop management technologies in Kenya, Bunyatta, Mureithi, Onyango, and Ngesa (2006) found that FFS graduates acquired high to very high levels of knowledge of the technologies presented in comparison to non-FFS farmers. David (2007) noted that FFS graduates in Cameroon acquired “superior knowledge on cocoa-integrated crop and pest management generally compared to non-FFS farmers” (p. 35). The results of a study on FFS pilot projects in three South American countries showed that FFS-trained farmers, compared to other farmers, acquired increased knowledge on diseases affecting potatoes (Thiele, Nelson, Ortiz, &

Sherwood, 2001). FFS, a non-formal adult education program, holds great potential as a vehicle for the dissemination of agricultural knowledge and practice.

Every year millions of adults enroll in adult education programs (United Nations Educational, Scientific, and Cultural Organization, 2000). These programs may range from vocational training, including agricultural extension programs, to basic education classes, to sports and recreational classes. Adults' motivations for participating in adult education are as diverse as the lives they lead (Silva, Cahalan, & Lacireno-Paquet, 1998). Moreover, there are many adults, who despite the educational programs provided in their communities, either do not complete the educational programs or chose to not participate at all. It is widely believed by adult education theorists and practitioners that program non-completers and non-participants would benefit from completing the educational programming (Darkenwald & Gavin, 1987; Garrison, 1988; McGivney, 1993). As a result, a great deal of research (Burgess, 1971; Carp, Peterson, & Roelfs, 1974; Cross, 1992, Dirkx & Jha, 1994; Garrison, 1985) has been conducted in recent decades to identify factors that advance or constrain participation in adult education programs.

Statement of the Problem

David Dolly, of the Department of Agricultural Economics and Extension at the University of the West Indies in Trinidad and Tobago, and Pauline Dowlath of MALMR, identified the issue of participant attrition and non-participation as a challenge faced by agricultural extension in Trinidad and Tobago (personal communication,

January 2006). The limited understanding of the factors of participation in FFS hinders the progress of FFS as a means for agricultural education and extension in Trinidad and Tobago. In addition, Davis (2006) declared of FFS on a global scale, “The issue of participation in farmer field schools has barely been touched in the literature” (p. 94). The absence of literature on the issues surrounding participation in FFS in Trinidad and Tobago and elsewhere hinders the knowledge base required for effective scaling-up of this approach.

Considering that FFS is a financially expensive vehicle for conducting agricultural extension and educational outreach (Feder, Murgai, & Quizon, 2004a; Rola, Jamias, & Quizon, 2002), program attrition and the reticence of others to participate constitutes a challenge for the dissemination of FFS in Trinidad and Tobago. Understanding why adult education participants withdraw from adult education programs (Perin & Greenberg, 1994; Darkenwald & Gavin, 1987; Garrison, 1985) and why non-participants do not participate (Darkenwald & Valentine, 1985; Beder, 1990) is a major concern of researchers, policymakers, and practitioners of adult education, including agricultural extension (Norland, 1992).

Based on a review of the literature of the fields of adult education and agricultural extension, particularly the FFS, and the challenges faced by MALMR to establish effective and sustainable FFS programs in Trinidad and Tobago, there are six factors that are unknown: 1) the relationship between participation status and personal characteristics, 2) the relationship between participation status and individuals’ motivations for participation, 3) the relationship between participation status and

perceptions about selected farming practices, 4) the relationship between participation status and individuals' priority rankings of their sources of information regarding farming practices, 5) the relationship between participation status and the deterrents to participation, and 6) the relationship between participation status and their perception of the usefulness of competitions as a means for increasing the popularity of FFS.

Purpose and Objectives of the Study

The purpose of the study was to identify and analyze factors affecting completion, non-completion, and non-participation in FFS in Trinidad and Tobago. Following are the research objectives identified to accomplish the purpose of the study.

1. Determine the personal characteristics of FFS completers, non-completers, and non-participants.
 - a. Describe selected personal characteristics of FFS completers, non-completers, and non-participants.
 - b. Describe the relationship between participation status and personal characteristics.
2. Identify the motivations for participation in a FFS.
 - a. Describe FFS completers' and non-completers' motivations for participation in a FFS at the beginning of the program.
 - b. Determine if a significant relationship exists between motivations for participation and completion or non-completion of FFSs.

3. Determine the perceptions of selected farming practices (i.e., integrated pest management, financial factors, and the compatibility of integrated pest management in the social setting).
 - a. Describe FFS completers' and non-completers' perceptions of selected farming practices at the beginning of the FFS.
 - b. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the beginning of a FFS.
 - c. Describe FFS completers' and non-completers' perceptions of selected farming practices at the end of a FFS.
 - d. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the end of the FFS.
 - e. Determine if there was a statistically significant change in completers' perceptions at the beginning and end of a FFS on selected farming practices.
 - f. Determine if there was a statistically significant change in non-completers' perceptions at the beginning and end of FFS on selected farming practices.
 - g. Describe FFS program non-participants by selected farming practices.
 - h. Determine if a significant relationship exists between participation status and perceptions about selected farming practices.

4. Establish the priority rankings of their sources of information for farming.
 - a. Describe completers' priority ranking of their sources of information for farming at the beginning and end of FFS.
 - b. Describe FFS non-completers' priority ranking of their sources of information for farming at the beginning and end of a FFS.
 - c. Describe FFS non-participants' priority rankings of their sources of information for farming.
5. Identify the deterrents to participation in the FFS.
 - a. Describe FFS program completers, non-completers, and non-participants by the deterrents to participation (life situation factors, institutional factors, and dispositional factors).
 - b. Determine if a significant relationship exists between the deterrents to participation and participation status.
6. Determine the usefulness of competitions as a means for increasing the popularity of FFSs.
 - a. Describe FFS program completers, non-completers, and non-participants as to their perceptions of the usefulness of competitions as a means for increasing the popularity of the FFSs.
 - b. Determine if a significant relationship exists between respondents' perceptions of the usefulness of competitions as a means for increasing the popularity of FFS and participation status.

Theoretical Framework

This research task was bounded by two fields of study: adult education (Cross, 1992; Johnstone & Rivera, 1965; Knowles, Holton, & Swanson, 2005) and agricultural extension and education (Anderson & Feder, 2004). There is considerable overlap in these fields: FFS methodologies are founded on the principles of adult education as well as being an innovation for agricultural education and extension.

The Androgogical Model, as presented by Knowles (2005), undergirds the theoretical base of this study. Knowles distinguished the principles of adult learning from the principles of child learning based on six criteria: 1) the need to know, 2) the learners' self-concept, 3) the role of the learners' experiences, 4) readiness to learn, 5) orientation to learning, and 6) motivation.

A considerable portion of adult education research has attempted to address the issue of participation (Pryor, 1990). Understanding the role of participation in adult education is important for several reasons. First, education for adults and children fulfill differing functions. Adults, as opposed to children, perform multiple roles, such as spouse, parent, and worker. These competing responsibilities constrict the amount of time and energy adults may allot to any single activity. For this reason, adults' orientation to learning tends to be more problem centered. Adults are willing to invest their time and energy on the most pressing educational issues (Knowles, Holton, & Swanson, 2005).

It is critical to agree on a definition of extension, for it will guide the establishment of its purpose, goals and strategies. Purcell and Anderson (1997) have

defined extension as “the process of helping farmers to become aware of and adopt improved technology from any source to enhance their production efficiency, income, and welfare” (p. 55). Van den Ban and Hawkins (1996) offered this definition of extension: “The conscious use of communication of information to guide people to form sound opinions and make good decisions” (p. 9). Nagel’s (1997) observation that the overarching goals of extension are two-fold, technology transfer and human resource development, encompasses a historical perspective. Traditional agricultural extension has focused on the transfer of research knowledge to farmers (i.e., technology transfer) in a top-down fashion. Increasingly, agricultural extension theory and practice entails human resource development, meaning, “enabling [farmers] to clarify their own goals and possibilities, educating them on how to make better decisions, and stimulating desirable agricultural development” (Anderson & Feder, 2004, p. 41). There has been a shift, particularly in developing countries, for extension services to not only focus on the diffusion of innovations (Rogers, 2003) from experiment stations to the farmers but to also implement participatory approaches that enable farmers to conduct research on their own farms.

Significance of the Study

Agricultural extension is a vehicle for facilitating farmers to solve their own problems. As such, a study on their perceptions of their agronomic, financial, and personal conditions and the educational programs offered by the extension services

provide insights from the end-users' perspective. Thus, the farmers' feedback may help improve the extension delivery system to the farmers.

The voluntary nature of participation in FFS necessitates that agricultural extension policymakers and practitioners give careful attention to the current patterns of participation in FFS in Trinidad and Tobago. They may employ strategies that impair or eliminate the factors leading to attrition and non-participation, thus making programs more accessible, prevent attrition, and may decrease farmers' expenditures on pesticides, increase income, and benefit the environment. Understanding the perceptions of participating and non-participating farmers in Trinidad and Tobago regarding the Farmer Field Schools and integrated pest management is critical, particularly considering that the approach is being scaled-up in several other Caribbean islands and elsewhere.

Methodology

This study employed an ex post facto, causal comparative research design. According to Gall, Gall, and Borg (2007), an ex post facto research design relies on "observation of relationships between naturally occurring variations in the presumed independent and dependent variables" (p. 306). The research design used in this study allowed for researching natural, pre-existing variations in the independent and dependent variables as a result of the respondents' exposure to (or knowledge of) a Farmer Field School.

The population of the study is FFS-participating and non-participating agricultural producers in Trinidad and Tobago. The sample of the study encompassed

109 farmers associated with five Farmer Field Schools funded and facilitated by the Ministry of Agriculture, Lands, and Marine Resources of Trinidad and Tobago (MALMR). For the purposes of this study, the farmers were classified as FFS program completers ($n=56$), FFS program non-completers ($n=15$), or FFS program non-participants ($n=38$). The five FFS were located at Transfer Village, La Trinidad, Grand Fond, Cemetery Trace, and Platanite. These five FFS were selected by MALMR personnel for this study due to the time frame established by the researcher, the schedules of operation of the five FFSs, and the availability of extension personnel who served as data collectors.

Three instruments (*Participants at the Beginning of the Educational Cycle*, *Completers and Non-Completers*, and *Non-Participants*) were developed to gather information from the program completers, non-completers, and non-participants (see Appendices 2, 3, and 4). The questionnaires included quantitative, closed-ended category scale questions on a four-point Likert-scale measuring the farmers' agreement levels (1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree) with statements. The questionnaires also solicited information about the respondents' personal characteristics, including but not limited to gender, marital status, whether they had participated in any prior agricultural extension activities, and educational background.

The questionnaire *Participants at the Beginning of the Educational Cycle* sought information from participants about their motivations for participation in FFS, their perceptions of integrated pest management, and personal information. All of the participants at the beginning of the educational cycle completed this questionnaire, thus

allowing the researcher later to compare the responses of the farmers who completed and did not complete the program.

The two other questionnaires, *Completers and Non-Completers* and *Non-Participants*, consisted of three sections: 1) 38 Likert-scale statements on the life situation factors, institutional factors, and dispositional factors that influenced their decisions to complete or not complete the Farmer Field School. 2) 20 Likert-scale statements on the use of pesticides in farming, financial factors in adopting integrated pest management on their farms, the compatibility of integrated pest management with the social setting in Trinidad and Tobago. A paired-samples t-test between respondents at the beginning and end of FFS was conducted. In addition, program completers, non-completers, and non-participants were asked about the viability of competitions as a means for increasing the popularity of FFS.

Because non-participants were not active in the FFS program, there were no constraints on the extension agents as to a time or place for locating non-participants whom to administer the instrument, *Non-Participants*. The extension agents could administer the questionnaire *Non-Participants* at any time after the non-participants were presented with the opportunity to participate in the program and made a decision to not join the FFS group.

The instruments were checked for face validity by a panel of 15 MALMR extension agents with vast experience conducting FFS in Trinidad and Tobago. The panel gave suggestions to improve the clarity and cultural sensitivity of the questions. Reverse coding of some statements was used to reduce biasing effect (Tuckman, 1999).

Five members of the panel were selected to administer the survey in the five Farmer Field Schools. Training was conducted to ensure that the interviewers would follow a standard protocol, thus ensuring the content validity of the instruments. In addition, a measure for reducing social desirability bias and ensuring respondent anonymity was for the data collectors (i.e., the extension agents) to collect data in a FFS outside of their geographic region of service. At the conclusion of the data collection, the five extension agents who collected the data were compensated for their services rendered. Data were collected from May to September 2007.

Quantitative data analysis was conducted using the Statistical Package for Social Sciences (SPSS Version 15) to determine reliability of the instruments, frequencies, percentages, means, standard deviations, chi-square test for independence, independent samples t-tests, paired samples t-tests, one-way analysis of variance (ANOVA), and post-hoc tests of differences. Statistical significance was established at the 0.05 level.

Definition of Terms

Adult- anyone recognized by their own society as having reached maturity (Knowles, 2005)

Adult education- planned learning in which adults determine the program content in order to meet their needs (Knowles, 2005)

Andragogy- the art and science of teaching adults (Knowles, 2005)

Completer- At the end of the FFS educational cycle, the individual was an active member of the FFS group. This individual was recognized as a FFS graduate at the graduate recognition ceremony.

Experiential (and/or) problem-based learning- Learning in which the learner sorts things out for him/herself (Tight, 2002)

Non-completer- At the end of the FFS educational cycle, the individual was not an active member of the FFS group. This individual was not recognized as a FFS graduate at the graduate recognition ceremony.

Education- planned learning (Tight, 2002)

Non-formal education- any organized educational activity carried on outside the formal education system. Non-formal education provides learning opportunities to adults and children on topics of interest to the beneficiaries. Non-formal education includes agricultural extension and farmer-training programs. (Tight, 2002)

Non-participant- An individual who may be classified as any of the following:

1) Officer met with the intended participant and after describing the Field School to the person, the person declined an invitation to participate, 2) Participant visited the introductory Farmer Field School activity and decided not to continue to participate in the school, and 3) A member of the community or someone else described the school to the intended participant and the person decided not to participate.

Pedagogy- the art and science of teaching children (Knowles, 2005)

Abbreviations

AESA: Agro-Ecosystem Analysis

CABI- Commonwealth Agricultural Bureau International

FAO- Food and Agriculture Organization of the United Nations

FFS- Farmer Field School

IPM- Integrated Pest Management

MALMR- Trinidad and Tobago Ministry of Agricultural Lands and Marine Resources

Assumptions

1. Respondents' motives for participation (or non-participation) in FFS correspond to general adult education theory.
2. The study assumes that most people are motivated to participate in education and that the removal of external barriers will permit them to do so.
3. Non-formal adult education programs, such as FFS, can improve the capacities of participants to solve problems relevant to their lives, thus improving their livelihoods and wellbeing.
4. Program completers were motivated to improve their knowledge and skills whereas program non-completers and non-participants were less motivated.
5. Respondents represented a broad spectrum of adult learners.

Delimitations

1. This study was delimited to 109 small-scale farmers in the areas served by five different farmer field schools on the island of Trinidad in the twin-island nation of Trinidad and Tobago.
2. The 109 farmers were surveyed between May and October 2007.
3. The study was delimited further to those farmers who could be positively matched at the beginning and end of the educational cycle (and those classified as non-participants) in the FFSs.

Limitations

These were factors which the researcher may have controlled, but due to time, money, or other constraints, chose to not control them.

1. The researcher could not control for the small number ($n=15$) of program non-completers. This was an effect of an ex post facto research design which relies on observation of relationships between naturally occurring variations in the presumed independent and dependent variables.
2. There were thirteen respondents who were not included in the total sample population ($n=109$) because they filled out either the Beginning of Educational Cycle questionnaire or the Completers and Non-Completers questionnaire, but not both. There were components on these questionnaires that served as pre/post tests. These farmers could not be matched in the pre/post test.

3. The study was limited to only five FFSs, though MALMR has conducted over thirty FFS (as of January 2008). Caution should be exercised when generalizing to a broader FFS population and farmers in general in Trinidad and Tobago.
4. The researcher did not personally administer the three instruments. Bias may have been introduced into the data due to respondents' perceptions of social acceptability of their responses and the perceptions of response anonymity.
5. Purposive sampling: similarities and differences found in comparisons of completers, non-completers, and non-participants may arise simply because of the selection process. Random sampling was not an option.
6. The study fails to distinguish the category of individuals who started FFS, did not attend several contiguous weekly meetings, yet at the end of the educational cycle were active participants and were recognized as program completers. Within the study these individuals are classified as completers, yet a more nuanced approach may classify them as "start-stop-starters."
7. The study does not statistically control for the influence of the extension agent in the participation-status phenomenon.
8. The study evaluated FFS completers, non-completers, and non-participants during one FFS educational cycle, which parallels a cropping cycle. This time period may be insufficient for the questionnaire respondents to gain a well-balanced perspective on FFS. While this study takes a snap-shot approach, it is recommended that a follow up study capture the respondents' perceptions at a later date.

CHAPTER II

LITERATURE REVIEW

The purpose of this review of literature is to establish a conceptual basis for a study on the nature of participation in Farmer Field Schools (FFS) in Trinidad and Tobago. Two fields of study support this research task: first, agricultural extension, specifically the history of extension that paved the way for the Farmer Field School approach. A broad history of extension covering the leading paradigms and extension models is provided. The second field addressed is adult education, particularly the issue of participation in adult education. There is a great deal of overlap in these two fields; agricultural extension employs many of the theories of adult education. Finally, a description of Trinidad and Tobago's geography, history, culture, economy, and the events that paved the way for the introduction of the Farmer Field Schools set the stage for the study.

Agricultural and Extension Education

Agricultural extension, broadly defined, focuses on the delivery of information to farmers to improve agricultural productivity and increase farmers' incomes. Information transmitted may range from estimates of future commodity prices to the timing and intensity of pesticide use. Extension may deliver knowledge embodied in products, such as improved crop cultivars or machinery, or it may be more abstract information on agricultural practice. Extension services liaise between researcher and farmer by focusing on the delivery of information to farmers (Anderson & Feder, 2004).

According to van der Ban and Hawkins (1996), the goals of agricultural extension include the transfer of information from international and local research to farmers, thus providing them with the knowledge and skills to make better decisions, clarify their goals, and stimulate agricultural development leading to improvements in livelihoods and wellbeing. In similar fashion, Nagel (1997) stated that the overarching goals of agricultural extension are technology transfer and human resource development.

Agricultural development plays an integral role in national economic and social development (World Bank, 2007). Over the course of the last five decades, agricultural extension in developing countries has been one of the largest development efforts undertaken by governments and international agencies. Worldwide, hundreds of thousands of extension agents have been trained and millions of farmers have had contact with extension services (Anderson & Feder, 2004; World Bank, 2000).

Conducting agricultural extension is not without its challenges (Feder, Willett, & Zijp, 2000). In developing countries where the vast majority of farmers cultivate fairly small plots, extension services face a daunting task of reaching a geographically dispersed target audience. Complicating matters, resource-poor farmers typically possess low levels of literacy and are limited in their contacts with mass media communications mediums that extension services may use to disseminate their messages. Inadequate road infrastructure adds to the challenge and cost of reaching these farmers. Moreover, the diversity of information needs of farmers due to “variations in soil, elevation, microclimate, and farmers’ means, capabilities, and access to resources” (Anderson, Feder, & Ganguly, 2006, p. 5) require location-specific

messages. The number of farmers needing extension services is large and the effort and expense to service all of them is quite high (Anderson & Feder, 2004).

After independence, the vast majority of the former colonies organized the agricultural extension service within the ministry of agriculture. Ministry-based general extension has historically applied top-down, transfer of technology (TOT) methods for disseminating new technologies. The TOT approach focuses on spreading technologies generated on research stations to the end-users, the farmers (Nagel, 1997). According to Chambers, Pacey, and Thrupp (1989), the farmer's lack of involvement in the technology-generation process led to the perception, particularly among resource-poor farmers, that they were powerless to experiment in their own fields. On the other hand, better-endowed farmers whose farming conditions are similar to those found on the research stations, possessed more favorable circumstances and thus, had greater opportunity to apply cutting-edge technologies. Moreover, large-scale farmers are not typical of the broader farming population, thus small-scale farmers are unlikely to follow the advice given large-scale farmers due to the limited applicability of the messages to their own socioeconomic and agronomic conditions. For these reasons, extension services typically concentrated their attentions on "larger-scale, better-endowed, and more innovative farmers who can provide some in-kind payment and are likely to exhibit better performance" (Anderson & Feder, 2004, p. 45).

Where efforts have been made to reach small-scale farmers with messages consistent with their conditions, the general strategy has been to mobilize a large number of extension agents to reach their disparate audiences. This strategy necessitated a large

administrative organization from the national down to local levels. This, in turn, brought about “a centralized, hierarchical, top-down management system” generally not “receptive to participatory approaches to information delivery and priority setting” (Anderson & Feder, 1994, p. 45). The extension service personnel commonly made decisions about message content far from the field level without the consultation of the message recipients, often leading to suboptimal decisions.

Transfer of Technology (TOT) and Diffusion of Innovations Theory

Transfer of Technology (TOT) approaches are largely based on the Diffusion of Innovation theory developed and popularized by Rogers (2003). Rogers defined diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (p. 5). The rate of diffusion is largely dependent upon the adopter categories of the users (i.e., innovator, early adopter, early majority, late majority, and laggards) and the characteristics of the technology (i.e., relative advantage, compatibility with the social setting, trialability, observability, and complexity).

In the context of international agricultural development, the diffusion of innovation model (Rogers, 2003) presents an unduly linear approach to the development and dissemination of technology. Rogers acknowledged the criticisms of the theory: a pro-innovation bias, blaming farmers for failing to adopt technologies (despite their unsuitability to their agronomic and economic conditions), a lack of recognition of the centrality of farmers’ innovations to their conditions, and an overly simplistic focus on the change agency and change agent rather than the end users of the technologies.

Scholars and development practitioners (Bunch, 1982; Chambers, 1983; Davis, 2004; Rhoades & Booth, 1982; Rogers, 2003) have noted that that the theory of innovations and the Transfer of Technology (TOT) model are better adapted to developed, rather than developing nations. This is due to the complexity of the socio-economic environment, particularly in relation to the disparities between the well- and poorly-endowed farmers. One of the earliest scholars to suggest a different approach was E.F. Schumacher (1973). He noted that developing countries would benefit more from “intermediate technologies,” meaning technologies that are more effective and expensive than traditional methods, yet are less expensive than the technologies produced in the industrialized nations. By the early 1980s, leading development scholars and practitioners (Bunch, 1982; Chambers, 1983) stimulated the trend by proposing a shift in priorities and strategy: a more participatory approach to development. Gradually, this movement toward more farmer-centered approaches would shift development practice. In accordance with the participatory approaches, contemporary theory (and practice) places farmers as the primary actors in every stage, from needs assessment, to technology generation, testing, dissemination, and evaluation.

Extension Modalities

The shift over time from the Transfer of Technology-led extension paradigm to a more participatory, farmer-centered extension paradigm is reflected in the dominant models of extension over the last several decades: the Training and Visit (T&V) Model, the Decentralized Extension Model, and Privatized Extension. Each of these modalities

attempts to overcome the challenges to the effectiveness of extension. These extension models subsequently paved the way for more participatory approaches, including the Farmer Field School methodology.

The Training and Visit (T&V) Extension Model

In the late 1960s and early 1970s, the diffusion of the Green Revolution technology cluster was the primary focus of agricultural extension systems in many developing countries (Benor, Harrison, & Baxter, 1984; Picciotto & Anderson, 1997). The technology cluster developed by the international research centers, including high-yielding varieties of staple crops, irrigation systems, mechanization, fertilizers, and pesticides, needed to be released and made known to as broad an audience as possible. The need for new systems for disseminating the technology gave rise to the Training and Visit (T&V) model of extension in the early 1970s. It was championed by the World Bank in more than 50 countries, primarily in Asia and Africa, but not in Latin America. As noted in Anderson, Feder, & Ganguly (2006), the T&V model was a highly hierarchical system with several layers of management which supervised a large cohort of subject-matter specialists. These subject-matter specialists conducted bi-weekly meetings with a set of contact farmers (later revised to include contact groups) to teach messages pre-determined by the ministry of agriculture, irrespective of the actual needs of the farmers. The expected role of the contact farmers (or groups) was to pass on the messages to other local farmers, thus maximizing coverage over a geographic area.

The design of having highly structured, bi-weekly meetings with an established group was intended to increase the accountability of the extension agents to the clientele.

But due to the top-down, hierarchical flow of information, the concerns of farmers were largely overlooked, leading to the transmission of irrelevant messages to resource-poor farmers. Also, in many cases, the contact farmers chosen to interact with other farmers were not opinion leaders within their own social system. Many have observed, however, that what eventually led to the demise of the Training and Visit extension system was that it was financially unsustainable. In the absence of donor funds, governments could not afford to maintain the expense of the administrative burden for carrying out extension under the T&V model.

The Decentralized Extension Model

Decentralized extension maintained the government-funded and delivered qualities of traditional centralized extension (Anderson & Feder, 2004; Parker, 1995; Rivera, 1996). Within this framework, the locus of responsibility for delivery rested upon local district or county governments. Seeking to address a shortcoming of the Training and Visit extension system, an objective of decentralization was to “improve accountability by moving services closer to the people who use them” (Anderson & Feder, 2004, p. 50). While this was a positive step, decentralization tended to shift the financial burden onto local governments, which too, proved to be unsustainable. To address this challenge, some reformist governments devolved the extension function from the local government level to farmers’ associations. This maneuver improved accountability by placing the employer even closer to the clientele and financial sustainability because farmers’ associations could recover their costs through membership fees. The primary deficiencies of the decentralized extension model

included “difficulties maintaining agent quality due to loss of economies of scale in training and more difficult linkages with research” (Anderson & Feder, 2004, p. 51).

Fee-for-Service and Privatized Extension Model

Fee-for-service extension programs tend to require some public funding, such as government-funded vouchers or other forms of public support, but do reduce the financial burden of publicly funded extension services. “Small groups of farmers typically contract for extension services to address their specific information needs. Because this solves the accountability problem, the quality of service is likely to be high” (Anderson & Feder, 2004, p. 51). The primary drawback to fee for service extension is that “less commercial farmers-poorer farmers, women farmers, farmers with smaller or less favorable plots-for whom the value of information is lower, may purchase fewer extension services, because the price of the service will tend to be market-determined” (Anderson & Feder, 2004, p. 51). In order to avoid the undesirable social and economic implications of this policy, small-scale and resource-poor farmers may be serviced by public extension or by government-subsidized contracted extension services. In developing countries, a fully privatized extension service is not a viable option due to the large numbers of farmers unable to pay for extension services.

Farmer Field Schools as a Modality for Agricultural Extension

Early History of FFS

During the 1970s and 1980s, severe losses in rice production in Asia caused by the brown plant hopper (*Nilaparvata lugens*) moved the Food and Agriculture

Organization of the United Nations (FAO) to seek solutions. This was critical considering that the livelihoods of 200 million rice farmers were at stake. Research in the Philippines and Indonesia showed that capricious pesticide use on rice crops created resistance by *N. Lugens* and killed its natural enemies, thus encouraging subsequent outbreaks (Pontius, Dilts, and Barlett, 2002). The FAO Intercountry IPM Programme, the innovators of Farmer Field Schools, pointed out that the recurring brown plant hopper outbreaks were signs of pesticide dependency, a negative consequence of modern agriculture. FAO recognized the shortcomings in the dominant pest management strategy: the formal agricultural research institutions communicated with the farmers in a hierarchical, top-down fashion, many of the technical recommendations were irrelevant to the realities faced by the farmers, and farmers typically chose pesticides over pest resistant crop varieties because they perceive them as less risky (Braun, Thiele, & Fernandez, 2000).

According to Gallagher (1999), the first FFSs were established in central Java, Indonesia in 1989. Fifty plant protection officers of the FAO-assisted Indonesian National IPM Programme tested field-training methods in order to develop a training-of-trainers course. The following year, two hundred FFSs were established with 5,000 farmers participating. In 1991, 50,000 farmers joined FFSs. Since 1992, the program currently trains about 100,000 Indonesian farmers every year.

Essential Elements of a FFS for IPM

Farmer Field Schools are not limited to teaching IPM technologies. The methodology has been used to teach a wide variety of topics including, but not limited

to, organic agriculture, soil and crop management, animal husbandry, and even the development of small, income-earning enterprises (Gallagher, 2003). The focus of this research task is on FFS programs focused on IPM.

FFS was designed as a program that offered participatory, hands-on learning experiences for farmers in order to sharpen their skills of observation, decision-making, and critical thinking. FFS aimed to improve farmers' analytical and decision-making skills through developing an agro-ecological approach to farming with the intent of discontinuing dependency on pesticides as the primary pest-control measure (Braun, Thiele, & Fernandez, 2000). To achieve this, farmers needed to understand the ecological principles and processes governing pest population dynamics. The development of expert farmers who observe crops regularly, grow healthy crops, and conserve natural enemies is the objective of FFS (Gallagher, 1999). The benefit to FFS farmers is an increased capacity for informed decision-making for appropriate interventions for water, soil, and plant management based on ecological and economic assessments.

FFS facilitators educate farmers on agro-ecological systems analysis (AESA), including topics such as “plant health, water management, weather, weed density, disease surveillance, plus observation and collection of insect pests and beneficials” (Indonesian National IPM Program Secretariat, 1991). Gallagher (2003) pointed out that an IPM FFS consists of three activities: first, agro-ecosystem observation, analysis (AESA), and the presentation of the results, second, a special topic, and third, a group-dynamics activity.

AESA is the core activity of an FFS; all other activities (such as the special topic and group dynamics activities) revolve around and support AESA. The typical FFS educational cycle consists of 20-25 farmers, though they tend to divide into smaller groups (of about five) for the weekly AESA field observations. Each FFS meeting begins with the small groups (of about five) collecting field data, such as the varieties of pests and plant samples, on IPM and non-IPM plots. A facilitator is present to assist the farmers in their observations (Gallagher, 2003).

After the field observation, the farmers return to their meeting place to draw their small groups' observations on large sheets of paper. The drawings include the stages and conditions of the plants, the pests and their natural enemies, and other important features of the environment. As the farmers draw, they analyze the field data and determine a management plan. The management plan is then added to the drawing.

A member of each small group presents the field data, the drawing, the analysis, and the management plan to the entire group of FFS farmers. The other farmers are encouraged to ask questions and add comments based on their own experience. This cycle is repeated until all of the groups have presented their findings. The drawings are retained and added to those from previous weeks to serve a reference for future FFS weekly meetings throughout the cropping cycle.

The FFS facilitator plays a critically important role in the AESA process (Gallagher, 2003). The effective facilitator enables the farmers to notice changes in the fields that may easily be overlooked. Moreover, the facilitator employs learner-centered teaching strategies: the more the farmers talk about what they see and know, the more

they will learn. The effective facilitator stimulates critical and creative thinking by posing alternative ‘if-then’ questions. The effective facilitator encourages all farmers to participate in the discussion, and ensures that the farmers’ AESA management plan is appropriate and reasonable.

Thus, FFS provide opportunities for farmers to learn-by-doing, based on the principles of non-formal education. Extension agents and farmer-trainers facilitate the learning process, stimulating farmers to discern key agro-ecological concepts and develop IPM skills through experiential learning in the field (Braun, Thiele, & Fernandez, 2000). The FFS approach uses participatory, non-formal, adult education training methods to develop FFS participants into “confident [integrated pest management] experts, self-teaching experimenters, and effective trainers of farmers and extension workers” (Wiebers, 1993, p. 32). Through group interactions, discovery-based learning and hands-on experimentation, participating farmers develop their decision-making abilities and their leadership, communication, and management skills (van de Fliert, 1993).

At the conclusion of the educational cycle, FFS participants are awarded graduation certificates and are presented in a ceremony as FFS “graduates” (Gallagher, 2003). It is the intent of FFS planners and facilitators that the benefits of participation do not end with the FFS farmers, but rather that the impacts are “scaled up” to the national level (Davis, 2006). A key to scaling up is informal farmer-to-farmer dissemination of the knowledge and technologies learned in FFS. There is evidence (Feder, et al., 2004b; Tripp, et al., 2005) that informal farmer-to-farmer dissemination is

not occurring, thus halting the spread of the benefits of FFS to the national level.

Nevertheless, the success of FFS as a tool for agricultural extension in Asia has placed the methodology at the forefront of extension practice in Africa and Latin America with a variety of crops and topics.

FFS in Asia and Other Regions

Studies have shown that the first 50,000 FFS graduates in Indonesia “reduced insecticide applications from an average of 2.8 sprays per season to less than one, with most [rice] farmers not spraying at all. When [rice] farmers did apply insecticide, they could identify a specific target pest” (Matteson, 2000, p. 558). By 1999, over two million small-scale rice farmers in twelve Asian countries had learned through FFS how become informed decision-makers regarding crop management and protection (Matteson, 2000; Pontius, Dilts, & Bartlett, 2002).

Not all of the analyses of FFS have yielded positive reviews. Feder, Murgai, and Quizon (2004b) conducted one of the first studies to analyze a large-scale and long-term FFS program. Their evaluation focused on “whether program participation [in Indonesia from 1991-1999] has improved yields and reduced pesticide use among graduates and their neighbors who may have gained knowledge from graduates through informal communications” (p. 45). The respondents in the study were 1) 112 FFS-participant households, 2) 156 non-participant households in villages where field schools were implemented, and 3) 52 households in villages where field schools were not implemented. The latter group was the control group. Thus, the researchers were able to compare the FFS effects upon farm-level yields and pesticide use among three sample

populations. The data led the researchers to conclude that FFS in Indonesia had not “induced significant improvements in yields or reduction in pesticide use by graduates relative to other farmers. Not surprisingly then, secondary diffusion effects on those exposed to graduates are also not significant” (p. 47). The authors questioned the effectiveness of FFS for strengthening farmers’ capacities for improving yields, reducing pesticide use, and disseminating crop production methods. Moreover, the authors suggested that the effectiveness of other FFS programs should be evaluated in light of their study.

FFSs have been replicated with other crops and topics in Africa. According to Braun, Jiggins, Roling, van den Berg, and Snijders (2006), there are FFS programs in over 27 African countries. The topics covered in these FFSs range from integrated production and pest management (IPPM) of annual and perennial crops, soil management, livestock production, and HIV/AIDS. For example, Bunyatta et al. (2006) examined the effectiveness of Farmer Field Schools for stimulating the acquisition, adoption, and spread of soil and crop management (S&CM) technologies in Kenya. The objectives framed the investigation in terms of comparing FFS participants’ and FFS non-participants’ knowledge acquisition of S&CM technologies, the adoption of these technologies on their farms, and the degree to which FFS participants shared their new-found knowledge with FFS non-participants. Sixty FFS graduates and sixty non-FFS farmers were selected for this study. The results of the study showed that there was a significant difference on the knowledge acquired of S&CM technologies by FFS and non-FFS farmers, a significant difference on the adoption of S&CM technologies by FFS

and non-FFS farmers, and a significant difference in the dissemination levels of S&CM technologies by FFS and non-FFS farmers. Bunyatta et al. (2006) concluded “that the FFS methodology is a very effective tool for cultivating farmers’ learning...they encourage farmers to develop their critical thinking and make sound farm management decisions, resulting in the adoption of improved technologies such as the S&CM technologies promoted in Kenya” (p. 60).

FFS have also been established in the Andean nations of Ecuador, Peru, and Bolivia (Braun, Thiele, & Fernandez, 2000). According to Ortiz, Garrett, Heath, Orrego, and Nelson (2004), the management of potato late blight is the most important problem facing Andean potato growers. To that end, the International Potato Center (CIP) adapted the FFS model to address the needs of potato farmers in Cajamarca, Peru. Ortiz et al. (2004) examined the benefits of participation in FFS with regards to knowledge about the control of potato late blight and productivity gains. First, a baseline survey was conducted to compare the knowledge levels of late blight of FFS and non-FFS farmers. They reported that FFS farmers’ possessed higher levels of knowledge prior to the FFS program than did non-FFS farmers. After the program, the knowledge differential was even greater. Moreover, FFS farmers’ productivity was statistically significantly higher than that of non-FFS farmers. They concluded that the FFS participants benefited from increased knowledge of potato late blight and increased their productivity.

Theories of Adult Learning Applicable to FFS

FFS methodology not only teaches farmers new technologies, but more importantly, stimulates farmers' capacities to think critically about the ecology of their fields and work out their own solutions (Bunyatta, et al., 2006). Central to the approach is the emphasis on teaching farmers not only the "how" but also the "why" of agro-ecological systems (Gallagher, 2003) through hands-on, experiential learning experiences. Pontius, Dilts, and Bartlett (2000) pointed out that the educational procedures used in FFSs are based on several of the leading theories that guide the practice of adult non-formal education.

FFS methodologies are influenced by the theories of andragogy (Knowles, 2005), the learning cycle (Kolb, 1984), and learner-centered approaches to teaching (Rogers, 1969). Critical theory, as framed by Freire (1970), has also strongly influenced FFS practice.

The Andragogical Model

The Andragogical Model (Knowles, 2005) is concerned with the principles of adult learning, as opposed to pedagogy, the principles of child learning. Knowles et al. distinguished the Andragogical Model from the Pedagogical Model based on six criteria: 1) the need to know, 2) the learners' self-concept, 3) the role of the learners' experiences, 4) readiness to learn, 5) orientation to learning, and 6) motivation.

The principle of pedagogy states that learners must learn what the teacher wants them to learn in order to advance to the next school grade. The learner does not need to know how that which is learned will be applied to future situations. On the other hand,

the principle of andragogy indicates that learners desire to know why they need to learn something before attempting to learn it. Among the first tasks of the facilitator of adult education is to increase awareness of the usefulness of that which is to be learned.

The Pedagogical Model assumes that the learner is dependent on the teacher for instructions and subject-matter content. The Andragogical Model assumes that adults are self-directed in their educational pursuits. As a result, in adult education programs, learners exert a great degree of control in establishing the content and delivery methods.

The basis of pedagogy is that the learners' limited experience due to their young age diminishes their contributions to the learning experience. The experience that is valued is that of the teacher, who is older and wiser. In contrast, andragogy values the breadth and depth of experience of the adult learner. As a result, within adult education there is a greater emphasis on individualization of content and learning strategies, such as peer-helping activities.

According to the Pedagogical Model, learners are not ready to learn independently from the teacher. The Andragogical Model stipulates that adults are naturally ready to learn about topics of importance to them. Adults' readiness to learn stems from a desire to better address real-life situations. Adult education does not focus on theories, but rather on enabling adults to solve real-world problems through new skills, behaviors, and attitudes.

Within pedagogy, learning is promoted as the mastery of specific subject matters. To the contrary, within andragogy, learning exercises are focused on life-centered, task-

centered, or problem-centered activities. Adults desire to learn that which will help them better confront the challenges they encounter in real-life situations.

According to the Pedagogical Model, learners are motivated by extrinsic motivators, such as parental approval or grades. Extrinsic motivators, such as a promotion or an increase in salary, may also motivate adult learners. However, it is certain that adults demonstrate a greater degree of intrinsic motivation to learn than do children or youth.

The Learning Cycle

Kolb (1984) proposed that the learner undergoes a “learning cycle” in four stages: a concrete experience, observation and reflection, generalization and abstract conceptualization, and active experimentation. Pontius, Dilts, and Bartlett (2002) pointed out that the agro-ecosystems analysis (AESAs) embodies the learning cycle as proposed by Kolb (1984). AESAs is a concrete experience based upon the observation of events and processes in the IPM and non-IPM fields within specific time periods. The farmers reflect on their observations through the process of drawing and discussion. Later, the farmers make generalizations and abstract conceptualizations leading to their suggested management plan. During the subsequent week, the farmers engage in active experimentation by implementing the management plan. Then, the learning cycle begins anew.

Learner-Centered Teaching Approaches

Rogers (1969) proposed that adults learn best when they are put in control of their own learning. Critical to the learner-centered teaching approach is that the teacher

take on the role of facilitator, rather than an instructor who knows-it-all (Pontius, Dilts, & Bartlett, 2002). In addition, adult learners require learning to be relevant to their needs, activities that encourage independence, creativity, self-direction, self-reliance, self-criticism, and self-evaluation. The effective FFS facilitator practices learner-centered teaching approaches.

Critical Theory

According to van de Fliert, et al. (2002), non-formal education is based on Freire's (1972) concept that the purpose of education is to raise individuals' consciousness such that they are empowered to solve their own problems. Freire (1972) placed great emphasis on education as a means for empowerment and social action. The FFS methodology seeks to empower farmers "by fostering participation, self-confidence, dialogue, joint decision-making, and self-determination. Translating these underlying principles to IPM learning, farmer field schools (FFS) are designed to capacitate farmers by enhancing their agro-ecological, science-based knowledge and develop skills needed for informed decision-making and problem-solving" (van de Fliert, et al, 2002, p. 2).

Research on Motivation and Participation in Adult Education

"One of the most widespread, enduring, and passionate commitments of continuing education practitioners is to reduce barriers and to encourage participation and persistence in our educational programs for adults" (Knox, 1987, p.7). A considerable portion of adult education research has attempted to address the issue of participation (Pryor, 1990). There are a number of reasons why adult education theorists

and practitioners have dedicated so much effort in understanding the issue of motivation for participation. First, as Knowles (2005) pointed out, education plays differing roles for children and adults. Due to the competing responsibilities of adult life, adults are more likely to be “problem oriented” in their educational pursuits than are children. Adults invest their money, time, and energy in learning activities that enable them to overcome the challenges they face. Second, it is of great value to adult education program planners to understand, and even anticipate, the learning needs of adult learners. Possession of this knowledge allows program planners to create better programs that will attract participants to their programs, and encourage participant persistence (i.e., completion). Third, success at attracting participants ensures the survival and continuation of adult-education programming (Kowalik, 1989).

Houle’s (1961) theoretical typology is a seminal work in the area of participation motivation. His typology provided a framework in which adult learners could be classified based on their reasons or motives for participation in educational programming. He identified three motivational types. Learners in the first category are goal-oriented. They participate in educational programming to accomplish clear-cut objectives. The second group, activity-oriented learners, participates in educational programming because they find meaning in the activity of learning but do not necessarily seek a meaning that is connected with the content or the intended purposes of the activity. The third group, the learning-oriented learners, seeks knowledge for its own sake.

Houle (1961) recognized that there may be some overlap in these classifications, yet the typology provides heuristic value. This is evidenced by the numerous subsequent studies that utilized the typology as a conceptual framework. Most of these studies begin with psychometrically constructed instruments and then subject the responses to factor analysis techniques. Morstain and Smart's (1974) factor analysis of Boshier's (1971) Educational Participation Scale (EPS) yielded six factors for motivation in adult education programming: social relationships, external expectations, social welfare, professional advancement, escape/stimulation, and cognitive interest (Cross, 1992).

Houle (1961) did not address the barriers to participation faced by adults. Based on Houle's typology, Boshier (1973) attempted to describe the role of motivation in dropout and persistence among adult learners. Boshier's Congruence Model presented motivational orientations for participation and persistence as a continuum (Kowalik, 1989). Incorporating concepts of other theories, Cross's (1992) Chain of Response (COR) Model explained that motivation to participate in educational activities "assumes that participation in a learning activity... is not a single act but the result of a chain of responses, each based on an evaluation of the position of the individual in his or her environment" (Cross, 1992, p.125).

Cross (1992) also provided a framework for conceptualizing the barriers to participation. She used national survey data (Carp, Peterson, & Roelfs, 1974; Johnstone & Rivera, 1965) to construct a framework consisting of three categories of barriers: situational, institutional, and dispositional barriers. Situational barriers arise from one's situation in life at a given time. Examples include, but are not limited to, a lack of time

due to responsibilities at home or work, or a lack of money. Institutional barriers are the practices and procedures related to the institution which exclude or discourage adults from participating in educational activities. Inconvenient schedules or locations and inappropriate course content are examples of institutional barriers. Dispositional barriers are those deterrents related to attitudes and self-perceptions of the individual.

Johnstone and Rivera (1965) addressed the issue of deterrents to participation in a study in which non-participants in adult education programming were asked to select from a predetermined list of ten statements reasons why they did not attend adult education programs. The ten statements were divided into two categories of barriers, namely, environmental/situational, which are factors beyond the individual's control, and second, internal/dispositional, which are factors related to the individual's attitudes and self-perception. They found that situational barriers are mentioned more often than internal/dispositional barriers. In addition, they also explored the relationship between demographic characteristics and the deterrents to participation. They found that sex, age, and socioeconomic status were related to individual's perceptions of barriers to participation (Kowalik, 1989).

In a study on the perceptions of non-participants regarding the deterrents to participation, Wilcox, Saltford, and Veres (1979) asked respondents to identify barriers to their own participation and that of other non-participants. The results of the study were that only two percent of the non-participants indicated that a lack of interest (i.e., a dispositional factor) was the primary reason why they did not attend educational

programming. Respondents, however, believed that a lack of interest was the leading reason why others did not attend educational programming.

Studies on Participation in FFS

The issue of participant attrition and non-participation is a challenge faced by agricultural extension in Trinidad and Tobago (D. Dolly & P. Dowlath, personal communication, January 2006). The absence of literature on the issues surrounding participation in FFS in Trinidad and Tobago and elsewhere hinders the knowledge base required for effective scaling-up of this approach. Davis (2006) declared of FFS on a global scale,

The issue of participation in farmer field schools has barely been touched in the literature. FFS usually target women and encourage them to join, but is this indeed happening? Are some farmers unable to join the groups, and if so, why? Can farmer field schools, as they are currently configured, reach everyone? (Davis, 2006, p. 94)

Few studies have addressed, to any extent, the issues related to participation in FFS. For example, in a comparison of FFS and non-FFS households in the Philippines, Rola, Jamias, and Quizon (2002) found that the average FFS and non-FFS participating farmers were significantly different on three measures of their personal characteristics. First, there were significantly more women FFS participants. Rola et al.'s conclusion was that though women were not the primary decision makers in agriculture in the Philippines, they participated in FFS in disproportionately high numbers because they,

rather than the men, had time to participate. Second, FFS-participating farmers tended to be tenants rather than owners of land; non-FFS farmers tended to be land-owners. Third, FFS-participating farmers tended to have other sources of income than did non-participating farmers, thus they were less dependent on agriculture as a source of income.

Tripp, Wijeratne, and Piyadasa (2005) highlighted participation issues in a study about Farmer Field Schools in Sri Lanka. They noted that the only significant difference between the participants with their neighbors “was in terms of additional income sources; those farmers who also worked as farm laborers or as casual laborers were much less likely to participate in the FFS...” (p. 708).

Moreover, this has implications for gender. There is evidence in Sri Lanka and the Philippines that farmers with off-farm employment may send their wives to join the FFS. In principle, this may be a step in the right direction. It is men, however, who are the on-farm decision-makers, not women. The implication is that those who are in greatest need for the IPM training, the men, are not participating in FFS programming. Pontius, Dilts, and Bartlett (2000) pointed out that historically FFSs have focused on the empowerment of underrepresented and marginalized populations, including women.

There is evidence (Godtland, Sadoulet, de Janvry, Murgai, & Ortiz, 2003) from Peru that FFS participation is “highly correlated with labor availability, and many farmers said that lack of time and labor was the main reason for not participating” (p.1709). In addition, a FFS program in Zanzibar excluded poorer farmers because they lacked the physical and financial buffer for experimentation (Bruin & Meerman, 2001).

Tripp, Wijeratne, and Piyadasa (2005) indicated that in a study on the FFS program in Indonesia, “FFS participants own more land, are better educated, and are more active in community groups” (p. 1708). According to Roling and van de Fliert (1994), in the early years of FFS in Indonesia, the program tended to reach better educated and wealthier farmers. This, however, may have been due to an act of cronyism by the hamlet leader. There is also evidence that participation in an FFS in Peru was determined by favoritism toward wealthier participants and family members of the communal leadership (Godtland, et al., 2003).

Farmers’ Sources of Information

An exploration of FFS- and non-FFS farmers’ sources of information on farming provides insight for FFS planners and practitioners with regards to the effective targeting of FFS-related messages. In their study on the impact of FFS on knowledge and productivity among potato farmers in the Peruvian Andes, Godtland, et.al., (2003) concluded that the majority of farmers get information on potato cultivation practices from family members. Foster and Rosenzweig (1995) concluded from several surveys in India that information from near peers, such as neighbors and family, was as important as information from government extension services. Ortiz and Valdez (1993) found that in Cajamarca, Peru neighboring farmers played a central role for influencing other farmers’ technological adoption habits. Feder and Slade (1986) noted that farmers in central India were each others’ main source of advice for general agricultural practices but were more likely to seek the advice of agricultural extension agents for technically complex issues. What the researcher wanted to find out in the study reported herein were the most sought

sources of information. Farmers' most frequently cited sources of information are indications of their role in diffusing technologies presented in the FFS.

The Context of Trinidad and Tobago

Geography and People

The twin-island state of Trinidad and Tobago is the southeastern-most nation in the Caribbean. It is located to the northeast of Venezuela on the South American mainland. Trinidad is the larger of the two islands (Figure 1). Port of Spain is the capital. Other leading cities are San Fernando, Chaguanas, Arima, and Scarborough (in Tobago).



Figure 1. Map of Trinidad and Tobago (Britannica Student Encyclopedia, 2008).

The islands have a combined population of about 1.3 million (U.S. Department of State, 2008). The descendants of East Indians (40%) and Africans (37.5%) comprise the majority of the population, while there are considerably fewer mixed (20.5%), European (0.6%), Chinese (0.3%), and other (1.1%). English is the national language, though small percentages also speak Hindi and French patois. Trinidad and Tobago possesses a high literacy rate (98.6%).

The combined surface area for Trinidad and Tobago is approximately 5130 sq. km. (1980 sq. m.). Trinidad, the larger of the two islands, has an area of approximately 4814 sq. km. (1858 sq. m.). The Caribbean Land and Water Resources Network (2005) of the MALMR estimated that the various land use types are arable agricultural land (14%), agricultural land under permanent crops (9%), permanent pasture (2%), forest and woodlands (46%), and all other land (29%).

The climate in Trinidad and Tobago is tropical. According to Ramroop, et al. (2000), the average daytime temperature is between 81-90 degrees Fahrenheit (27-32 degrees Celcius) and it is cool at night. The average rainfall ranges from 59-141 inches (1500-3600 mm). The dry season runs from January to May while the wet season typically runs from June to December. During the dry season there is an increase in insect pests. In the wet season, there is an increase in diseases.

History and Culture

In 1498, Christopher Columbus landed on and named Trinidad (U.S. Department of State, 2008). The Spaniards settled the island and wiped out most of the Arawak and Carib Indians, the original inhabitants. The surviving Arawak and Carib were

assimilated with the French, free black, and other non-Spanish settlers living under the Spanish crown. The British captured Trinidad in 1797. Control of Tobago proved tenuous for the colonial powers: it changed hands twenty-two times, more than any other West Indies island. Britain gained final control of Tobago in 1803. In 1888, the two islands were incorporated into a single colony. In 1962, Trinidad and Tobago achieved full independence and joined the British Commonwealth. In 1976, Trinidad and Tobago became a republic.

Two major folk traditions take precedence in the culture of Trinidad and Tobago: Creole and East Indian (U.S. Department of State, 2008). The Creole culture is a mixture of elements from the African, Spanish, French, and English cultures. Trinidad and Tobago's East Indian culture began in 1845 with the arrival of indentured servants brought to fill a labor shortage created by the emancipation of the African slaves. Today, most of the agricultural sector is comprised of peoples of East Indian descent, though many are successful businesspeople and professionals. The East Indians have maintained many of their traditions, including Hindu and Muslim religious festivals and practices.

Economy, Including Agriculture

Tobago's economy is based on tourism. Until the mid-1900s, Trinidad's economy was largely based on the sugar industry and, to a lesser extent, cocoa, coffee, and coconuts. Today, Trinidad is the Caribbean's largest producer of oil and natural gas (U.S. Department of State, 2008). In 2007, economic growth from the petroleum, natural gas, chemicals, and tourism increased the national GDP to \$20.9 billion USD.

The largest contribution to GDP was the petroleum industry (44.3%), while only 0.4% was derived from the agriculture sector. Due to external market forces, the sugar industry in Trinidad is in decline.

The country's primary crops are cocoa, sugarcane, rice, citrus, and coffee. The key exports are sugar, cocoa, coffee, citrus, and flowers. Small-scale producers maintain the country's self-sufficiency in vegetable and fruit production (Caribbean Land and Water Resources Network, 2005). The vast majority of the fruits and vegetables are produced for the local market. According to Ramroop, et al. (2000), a mixed vegetable-based farming system is most common. The principle vegetable crops are tomato, sweet pepper, hot pepper, cabbage, watermelon, and melongene (i.e., eggplant). Other crops of less importance include bodi (a vegetable-type cowpea), ochro (okra), sorrel (a relative of rhubarb), lettuce, patchoi, celery, caraille (bitter melon), cucumber, pumpkin, and papaya. The leading vegetable export crops are papayas, hot peppers, and pumpkins.

Farming employs 9.5% of the country's labor force (Caribbean Land and Water Resources Network, 2005), which constitutes roughly 123,500 farmers. The average landholding is less than 5 ha (12 ac.). Each extension officer is responsible for up to 900 farmers, thus necessitating group methods, such as FFSs, to disseminate information (Ramroop, et. al., 2000).

Pesticide Use in Trinidad and Tobago

Agrochemicals are widely used in vegetable and fruit gardens. Given the tropical climate, pest control is critical for maintaining or improving crop yield. "Farmers tend to equate pest management with pesticide use in the mistaken belief that a direct

relationship exists between an efficient product yield and the amount of pesticide applied” (Pinto Pereira, Boysielal, & Siung-Chang, 2007, p. 84). Unsustainable pesticide use was documented as early as the 1980s. Phillips-Flanagan’s (1985) study on pesticide illiteracy in Trinidad and Tobago showed that farmers possessed little knowledge of the hazards or toxicity of the pesticides they used and little knowledge of protective measures, such as safe mixing, application practices, and protective clothing.

Dolly (2005) noted that farmers’ indiscriminate use of pesticides was causing great harm to human health, the environment, and unduly raised the costs of inputs. According to Ramroop, et al. (2000), farmers frequently used pesticide “cocktails,” sometimes containing four to five pesticides, and disregarded safety measures, such as protective clothing and safety intervals before harvests. Momsen (2006) pointed out that most farmers used “prophylactic spraying, that is spraying on a regular weekly or even more frequent basis to prevent the emergence of pests” (p.168). Though this practice is more expensive than the recommended application practices, farmers perceived that the saved time from checking on the levels of pests was worth the expense.

Yen, Bekele, and Kalloo (1999) reported that farmers commonly exceeded manufacturers’ recommended application rates and disregarded the recommended pre-harvest intervals after pesticide application. As a result, pesticide residues on produce in the markets posed a risk to consumers. They also reported that a market-basket survey of produce over an eight month period showed that “10% of the produce exceeded the internationally acceptable maximum residue limits (MRLs) for the respective pesticides” (p. 991).

Pinto Pereira, Boysielal, and Siung-Chang (2007) reported that in Trinidad, only 2.9% (21) of 720 registered products from the four chemical classes were commonly used. “Paraquat, methomyl, and alpha-cypermethrin (respective trade names are Gramoxone, Lannate, and Fastac) from World Health Organization (WHO) Hazard Classes I and II, and glyphosate isopropylamine (Swiper, Class U) are the most frequently purchased pesticides” (p. 83). Moreover, access to pesticides is uncontrolled: even children may buy them. Legislative controls have proven to be ineffective due to lack of human and technical resources.

Hibiscus Mealy Bug Infestation, 1997-2000

Just as Asian rice farmers suffered food production losses from the brown plant hopper, the Caribbean experienced infestations from 1997 to 2000 of an invasive pest, the Hibiscus Mealy Bug (HMB) (Dolly, 2005). The HMB threatened food security in several Caribbean islands by destroying the food crops upon which many farmers and consumers relied. The crop protection services in the region applied pesticides but were unable to contain the spread of HMB. The subsequent introduction of biological parasites, however, controlled the spread of HMB. Food production in the region rebounded. This course of events demonstrated the effectiveness of pest management systems which do not rely solely on pesticides. Trinidad and Tobago’s success in controlling the HMB with biological controls laid the groundwork for the introduction of FFS. FFS-IPM programs were needed due to pesticide illiteracy and the potential threats to human health and the environment. In addition, consumers in Trinidad and Tobago

were increasingly aware of health concerns and, as a result, were increasingly demanding pesticide-free foods (Ramroop, et.al., 2000).

FFS in Trinidad and Tobago

In 2000, the Commonwealth Agricultural Bureau International (CABI) introduced the Farmer Field School (FFS) initiative to the Caribbean (Dolly, 2005). In 2003, the Trinidad and Tobago Ministry of Agriculture Lands and Marine Resources (MALMR) and CABI introduced FFS in two locations, in the Caura Valley and South Aranguez. As of January 2008, MALMR has carried out FFSs in over thirty locations in Trinidad and Tobago (David Dolly, personal communication, January 2008).

There are very few studies on FFS in Trinidad and Tobago. Ramroop, et.al. (2000) noted that in Trinidad and Tobago, “Gender roles on the farm are clearly defined with the male being responsible for decision-making, while females are merely assistants” (p. 63). In similar fashion, Dolly (2005) pointed out that in the first two FFSs conducted in Trinidad and Tobago, that though women outnumbered men as participants, gender barriers inhibited information-sharing. Though males dominated the FFS activities, females gained sufficient confidence to share their opinions, whereas before their exposure to the participatory learning methods in FFS they would have remained silent. Pontius, Dilts, and Bartlett (2000) pointed out that historically FFSs have focused on the empowerment of underrepresented and marginalized populations, including women.

Dolly (2005) reported that the FFS participants had a mean age of 45 years while the non-participants had a mean age of 55 years. Participants and non-participants had

farmed 20 years and 27 years, respectively. Participants reported a monthly farm income of \$TT 3,409 (in January 2005, \$550 USD) and the non-participants reported \$TT 3,197 (at that time, \$516 USD). Mean monthly expenditures on pesticides for FFS participants was \$TT 2,516 (\$406 USD) and for non-participants it was \$TT 1,883 (\$298 USD).

Dolly (2005) reported non-participants' purported reasons for not attending a FFS. First, non-participants cited an unwillingness to give up their time, particularly considering the time commitment of weekly meeting times of four hours each during the months of cultivation. Second, they believed that they did not need the training. Third, they claimed that they were unaware of the educational programming being offered. Dolly (2005) noted that in two Farmer Field Schools in Trinidad and Tobago, less than 40% of the program participants indicated that they had sought advice from the government agricultural officer, the agribusiness shop, neighbors, or relatives. This is an unusual and unlikely statistic. Moreover, the priority ranking of the sources of information for the 60% who have sought advice from those sources is unknown.

Dolly (personal communication, January 2006) pointed out that those who participated in the earliest FFSs in Trinidad and Tobago were individuals who had frequent contacts with the extension officers. They were participants who regularly worked and cooperated with the officers. He expressed his candid view that if the FFSs were to be a viable option as an extension methodology for improved pest control management in Trinidad and Tobago, farmers with little to no contact with the ministry must be targeted.

Finally, one of the topics that was approached during the feasibility study in October 2006 was the concept of using competitions, whether within the FFSs or between the various FFSs, as a means for increasing the popularity of FFS for those already involved, and to attract non-participants to join the program. It was recognized at that time the likelihood that there would be little, if any, literature on the use of competitions within FFS. In addition, it is possible that competitions have never been used within a FFS to spur learning and the program's popularity among farmers. For the above reasons, the researcher determined to explore the concept of whether competitions may be a vehicle for increasing the popularity of FFS in Trinidad and Tobago.

Figure 2 provides a conceptual framework for this study on the factors in completion, non-completion, and non-participation in five Farmer Field Schools in Trinidad and Tobago from May to September 2007.

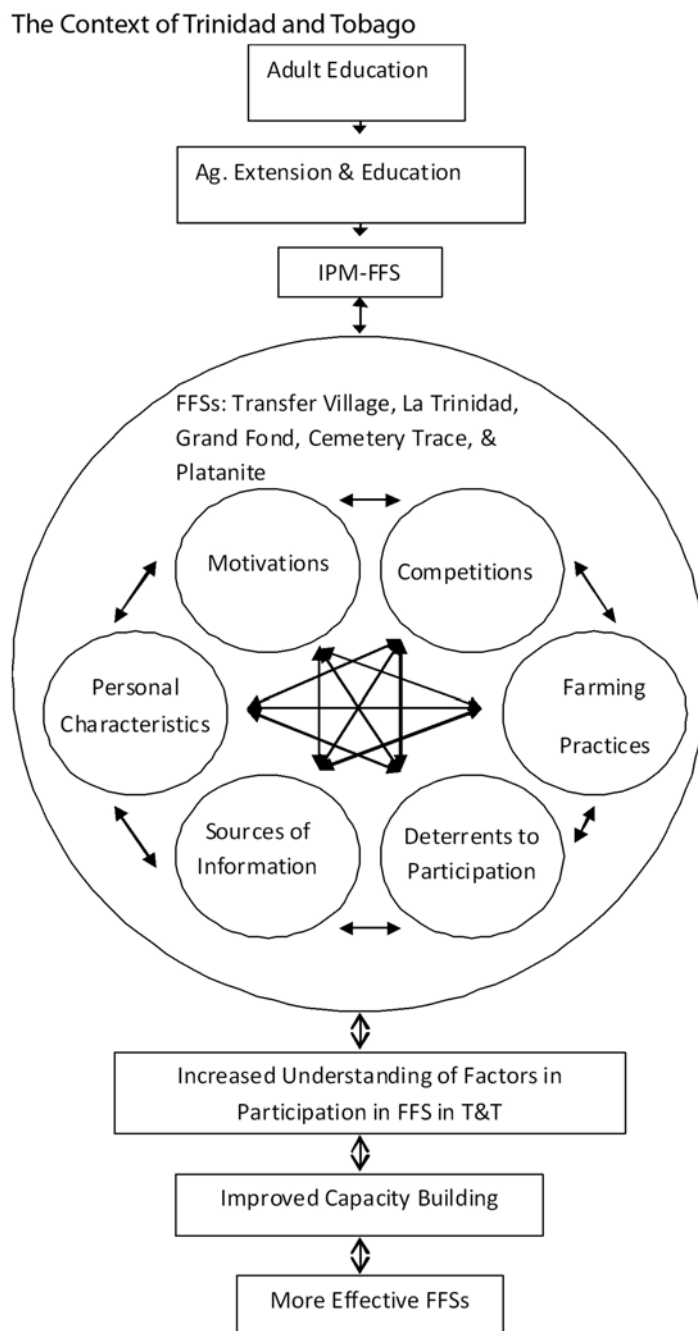


Figure 2. Conceptual Framework: The Factors in Completion, Non-Completion, and Non-Participation in Five Farmer Field Schools in Trinidad and Tobago, 2007

CHAPTER III

METHODOLOGY

This chapter presents the research design, population and sample, instrument development, data collection, and data analysis procedures of the study. The purpose of the study was to identify and analyze factors affecting completion, non-completion, and non-participation in the Farmer Field Schools funded and managed by the Ministry of Agriculture, Lands, and Marine Resources (MALMR) in Trinidad and Tobago.

Following are the research objectives identified to accomplish the purpose of the study.

1. Determine the personal characteristics of FFS completers, non-completers, and non-participants.
 - c. Describe selected personal characteristics of FFS completers, non-completers, and non-participants.
 - d. Describe the relationship between participation status and personal characteristics.
2. Identify the motivations for participation in a FFS.
 - a. Describe FFS completers' and non-completers' motivations for participation in a FFS at the beginning of the program.
 - b. Determine if a significant relationship exists between motivations for participation and completion or non-completion of FFSs.
3. Determine the perceptions of selected farming practices (i.e., integrated pest management, financial factors, and the compatibility of integrated pest management in the social setting).

- a. Describe FFS completers' and non-completers' perceptions of selected farming practices at the beginning of the FFS.
 - b. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the beginning of a FFS.
 - c. Describe FFS completers' and non-completers' perceptions of selected farming practices at the end of a FFS.
 - d. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the end of the FFS.
 - e. Determine if there was a statistically significant change in completers' perceptions at the beginning and end of a FFS on selected farming practices.
 - f. Determine if there was a statistically significant change in non-completers' perceptions at the beginning and end of FFS on selected farming practices.
 - g. Describe FFS program non-participants by selected farming practices.
 - h. Determine if a significant relationship exists between participation status and perceptions about selected farming practices.
4. Establish the priority rankings of their sources of information for farming.
 - a. Describe completers' priority ranking of their sources of information for farming at the beginning and end of FFS.

- b. Describe FFS non-completers' priority ranking of their sources of information for farming at the beginning and end of a FFS.
 - c. Describe FFS non-participants' priority rankings of their sources of information for farming.
5. Identify the deterrents to participation in the FFS.
 - a. Describe FFS program completers, non-completers, and non-participants by the deterrents to participation (life situation factors, institutional factors, and dispositional factors).
 - b. Determine if a significant relationship exists between the deterrents to participation and participation status.
6. Determine the usefulness of competitions as a means for increasing the popularity of FFSs.
 - a. Describe FFS program completers, non-completers, and non-participants as to their perceptions of the usefulness of competitions as a means for increasing the popularity of the FFSs.
 - b. Determine if a significant relationship exists between respondents' perceptions of the usefulness of competitions as a means for increasing the popularity of FFS and participation status.

Research Design

To meet these objectives, an ex-post facto causal-comparative research design was utilized to investigate the attitudes and perceptions of Farmer Field School (FFS) program completers, non-completers, and non-participants regarding their motivations

for participation, perceptions on the use of pesticides in farming, the financial factors involved in the adoption of integrated pest management, and the compatibility of integrated pest management within the setting of Trinidad and Tobago, and the use of competitions as a means to increase the popularity of FFS. The relationship between the life situation factors, institutional factors, and personal preference factors and completion, non-completion, or non-participation in FFSs was also investigated.

Ex-post facto research relies on “observations of relationships between naturally occurring variations in the presumed independent and dependent variables” (Gall, Gall, & Borg, 2007, p. 306). The research design allowed for studying natural, pre-existing variations in the independent and dependent variables as a result of the survey respondents’ exposure to (or knowledge of) a Farmer Field School.

Population and Sample

The research objectives addressed issues pertaining to participating and non-participating farmers in the Farmer Field Schools (FFSs). The population was FFS-participating and non-participating farmers in Trinidad and Tobago. The sample was limited to farmers who participated (i.e., completers and non-completers) in five specific FFSs and farmers who possessed knowledge of the program but chose to not participate.

FFS completers began and were active participants until the end of the educational program. These individuals were recognized at the end of the program as FFS graduates at the graduate-recognition ceremony. FFS program non-completers were those farmers who initiated participation in the FFS program but at the end of the

program were not active members of the FFS group. These individuals were not recognized as FFS graduates at the graduate-recognition ceremony. Non-participants were classified as such because they fit at least one of the following descriptions: 1) The agricultural officer (i.e., extension agent) met with the intended participant and after describing the Field School to the person, the person declined an invitation to participate. 2) The individual visited the introductory Farmer Field School activity and decided not to continue to participate in the school. 3) A member of the community or someone else described the school to the intended participant and the person decided not to participate.

There were one-hundred nine respondents: fifty-six completers (51.3%), fifteen non-completers (13.7%), and thirty-eight non-participants (34.8%) across five Farmer Field Schools. The five FFSs were at Transfer Village, La Trinidad, Grand Fond, Cemetery Trace, and Platanite.

- Transfer Village FFS is located in the Debe District, County Victoria, in southern Trinidad.
- La Trinidad FFS is located in the Talparo District, County Saint George East, in north-central Trinidad.
- Grand Fond FFS is located in the Santa Cruz District, County Saint George West, in northwest Trinidad.
- Cemetery Trace FFS is located in the Freeport District, County Caroni, in central Trinidad.
- Platanite FFS is located in the Rochard District, County Saint Patrick East, in south Trinidad.

These five FFS were selected by MALMR personnel and the researcher due to the time frame established by the researcher, the overlapping schedules of operation of the FFS, and the availability of extension personnel who served as data collectors. The respondents were identified through a process according to whether they were a completer, non-completer, or non-participant. At the beginning of the educational cycle, the data collectors attended a FFS outside the geographic region in which they work. At that stage in the educational cycle, program participants could not yet be categorized as completers or non-completers. The data collectors gathered information from all of the program participants (completers and non-completers: $n=71$) for the questionnaire *Participants at the Beginning of the Educational Cycle*. At the end of the educational cycle, the non-completers were identified by the agricultural officers who serve as FFS facilitators on a weekly basis and by the program completers. The non-participants were identified by the FFS facilitators, program completers, and program non-completers.

Instrument Development

Farmer Field School completers', non-completers', and non-participants' attitudes and perceptions were collected using three questionnaires (*Participants at the Beginning of the Educational Cycle*, *Completers and Non-Completers*, and *Non-Participants*) containing Likert-scaled questions and open-ended responses. Reverse coding of some statements was used to reduce the biasing effect (Tuckman, 1999). The Likert-type scales measured the farmers' agreement levels (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) with statements. The open-ended

questions were limited to seven questions requesting personal information: the number of friends who had previously participated in an FFS, the number of family members who had previously participated in an FFS, age, the size of their farm, the number of years they had lived in the community, the number of years they had farmed, and the percentage of annual income derived from agriculture. The administration of each of the three questionnaires took approximately fifteen to twenty minutes to complete.

Validity

Validity is an important construct in research used to measure the value of an instrument. Validity determines how well and instrument measures what it is meant to measure (Gall, Gall, & Borg, 2007).

The instruments were checked for face validity by a panel of 15 MALMR extension agents with vast experience conducting FFSs in Trinidad and Tobago. The panel gave suggestions to improve the clarity and cultural sensitivity of the questions. Five members of the panel were selected to carry out the survey in the five FFS. Training was conducted to ensure that the interviewers would follow a standard protocol, thus ensuring the content validity of the instruments. In addition, a measure for reducing social desirability bias was established. The data collectors (i.e., the extension agents) traveled to FFSs outside of their geographic region. They did not know any of the respondents, thus reducing the possibility of social desirability bias.

Questionnaire: Participants at the Beginning of the Educational Cycle

The questionnaire, *Participants at the beginning of the educational cycle*, was only completed by program participants (i.e., completers and non-completers). It

consisted of three sections: motivations for joining FFS, agricultural practices, and personal characteristics. The section exploring motivations for participation consisted of 27 Likert-type scale questions. The section exploring perceptions of selected farming practices consisted of 12 Likert-type scale questions. The questions regarding personal characteristics consisted of 11 categorical options and open-ended questions.

The statements about motivations for participation in the FFS, an adult education program, were drawn from statements from the Educational Participation Scale (EPS) developed by Morstain and Smart (1974). Their study of the motivations for participation in adult education programs yielded six factors: social relationships, external expectations, social welfare, professional advancement, escape and stimulation, and cognitive interest. Based on these factors, the following five factors were investigated: 1) social reasons (two sample statements: *Meeting people with similar interests at FFS encouraged me to participate* and *I joined FFS to be accepted by my family or friends*), 2) concern for other people, community, humanity, and the environment (sample statement: *I expect FFS to help me to make the people, animals, plants, and land safer*), 3) expectations for improving occupational performance and status (sample statement: *I joined FFS to be better off than I am now*), 4) stimulation and escape (sample statement: *I joined FFS to have a few hours away from other responsibilities*), and 5) cognitive interest (sample sentence: *I need to learn new farming skills*). The researcher's factor, "social reasons", encompassed the two factors found by Morstain and Smart (1974), social relationships and external expectations.

The second set of questions on *Participants at the Beginning of the Educational Cycle* consisted of twelve Likert-scale statements. It investigated the completers' and non-completers' perceptions about the use of pesticides in farming (sample statement: *Pollution from agricultural chemicals is a serious problem on my farm*), financial factors involved in the adoption of integrated pest management (sample statement: *I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants, and land*), and the compatibility of integrated pest management with the social setting of Trinidad and Tobago (sample statement: *Consumers will pay higher prices for pesticide-free produce*). The section consisting of statements on the use of pesticides in farming were drawn from statements developed by McCann, Sullivan, Erickson, and DeYoung (1997) in a study comparing the perceptions of organic and conventional farmers in Washtenaw County, Michigan regarding farming practices, environmental awareness, and their orientation toward economic factors in adopting organic farming.

The third set of questions on *Participants at the Beginning of the Educational Cycle* requested personal information, including the number of family members who have participated in an FFS, the number of friends who have participated in an FFS, gender, age, marital status, educational background, size of their farm, number of years lived in the community, number of years farmed, the percentage of annual income derived from agriculture, and whether they have participated in any agricultural extension programs prior to the FFS. Included in this section was the question: *Where*

do you most often get information on farming? The question asked the respondent to rank their top three sources of information on farming.

Questionnaires: Completers & Non-Completers and Non-Participants

The second and third questionnaires, *Completers and Non-Completers* and *Non-Participants*, consisted of three sections. First, there were 38 Likert-scale questions on the factors that influenced individuals to complete, not complete, or not participate in FFS. Utilizing the framework established by Cross (1992), the questions explored the life situation barriers, institutional barriers, and dispositional barriers to participation. Sample statements of the life situation barriers are: *Responsibilities at work/farming kept me from participating in the FFS* and *I joined FFS because the agricultural officer suggested it to me*. The statements regarding the institutional factors were classified into the following four constructs: 1) Convenience (sample statement: *FFS was offered in an acceptable location*), 2) Process and Application (sample statement: *The practices promoted in FFS are relevant to my farming situation*), 3) Climate (sample statement: *I could freely voice my opinions during FFS meetings*), and 4) Outcomes (sample statement: *I am happy with the quality of the FFS program*). For increased clarity for the respondents, the researcher renamed Cross' (1992) third barrier to participation, dispositional barriers, to Personal Preferences. Sample statements of the respondents' personal preferences (i.e., dispositional barriers to participation) include: *I like learning by myself more than with a group of people* and *I know enough about farming and do not need the FFS*.

The second sections on the questionnaires *Completers and Non-Completers* and *Non-Participants* consisted of 37 Likert-type scale questions about selected agricultural practices, including a new section on the use of competitions as a means for increasing the popularity of FFS. The added section on competitions included statements such as, *I like participating in competitions* and *A FFS-sponsored vegetable-growing competition for FFS participants will increase the popularity of FFS in my community.*

The third section consisted of the same questions requesting respondents' personal information found on the questionnaire administered at the beginning of the educational cycle, including the request to rank their sources of information on farming.

Data Collection

A feasibility study was conducted in October 2006. The researcher met with farmers of two FFSs, several extension agents from MALMR, and Dr. David Dolly from the University of the West Indies. It was concluded that a study on the factors influencing participation in FFS in Trinidad and Tobago was a timely endeavor. The researcher contacted the Ministry of Agriculture, Lands, and Marine Resources (MALMR) in writing to request permission to conduct the study. Ms. Phillippa Ford, the Permanent Secretary of Agriculture at MALMR, Ms. Pauline Dowlath of MALMR, and Dr. David Dolly from the University of the West Indies in Trinidad and Tobago offered their support to the study.

The five data collectors received training to ensure that they would follow a standard protocol, thus ensuring the content validity of the instruments. Moreover, in an

effort to reduce social desirability bias, the agricultural officers serving as data collectors, traveled to FFSs outside of the geographic region in which they work. They did not know any of the respondents prior to the data collection phase of the study. The non-completers and non-participants were identified by the agricultural officer who served as a FFS facilitator on a weekly basis and by the program completers.

Data were gathered from late May to late September 2007. In May, the FFS participants completed the questionnaire *Participants at the Beginning of the Educational Cycle*. Upon completion of the five FFSs in August 2007, the participants completed the questionnaire *Completers and Non-Completers*. The five extension agents who served as data collectors indicated on the questionnaire whether the respondent was a completer or non-completer, according to the prescribed definitions of those classifications. Because non-participants were not active in the FFS program, and merely possessed an awareness of the program and decided to not join the FFS, the extension agents could administer the questionnaire *Non-Participants* at any time after the initial FFS meeting.

The 109 respondents were not compensated for their contributions to the study. The data collectors, however, were financially compensated for their services rendered. The five extension agents were selected by MALMR personnel to serve as data collectors due to their familiarity with the purposes and methods used in FFS, their professionalism, and integrity.

At the onset of administering the survey, the data collectors ensured respondents' confidentiality. Each respondent had the right to refuse participation in the study. Upon

agreeing to participate in the study, the respondents' signed the consent form. The questionnaires were coded to ensure confidentiality and to facilitate the exploration of the relationships between the perceptions of FFS program completers, non-completers, and non-participants. Data were collected in conformity with the research guidelines set by the Texas A&M University Institutional Review Board (IRB).

Data Analysis

Quantitative data analysis was conducted via the Statistical Package for Social Sciences (SPSS Version 15) to determine reliability, frequencies, percentages, means, standard deviations, chi-square test for independence, independent samples t-tests, and paired samples t-tests, one-way analysis of variance (ANOVA), and post-hoc tests of differences. Statistical significance was established at the .05 level of probability.

Thirteen of the items included in the instrument were negative statements. The negative statements were subsequently recoded so that the summated scale would consist of unidirectional responses.

Reliability

Reliability is an important construct in research used to measure the value of an instrument. Reliability establishes how well the instrument produces the same results on recurring occasions (Gall, Gall, & Borg, 2007).

The constructs of the three instruments were reliable (Table 1). Cronbach Alpha and the inter-item correlation were used to show the internal consistency of the constructs investigated. Cronbach alpha is the most commonly used statistic for

reliability. It provides an average correlation among all of the items in the scale (Pallant, 2005). Nunnally (1978) recommended a minimum Cronbach alpha level of 0.7.

Cronbach alpha values, however, are dependent on the number of items in the scale. When there are fewer than ten items in the scale, Cronbach alpha values tend to be small, thus it may be better to calculate and report the mean inter-item correlation for the scales. The optimal mean inter-item correlation values range from 0.2 to 0.4 (Briggs & Cheek, 1986).

By the standard of a minimum Cronbach alpha of 0.7, only eight of the eighteen constructs suggested sufficient reliability. Tuckman (1999) opined, however, that the minimum reliability for attitude tests (i.e., perceptions) is .50. Ary, Jacobs, and Razavieh (1996) also supported the minimum threshold of 0.50:

The degree of reliability needed in a measure depends to a great extent on the use that is to be made of the results. If the measurement results are to be used for making a decision about a group or even for research purposes, a lower reliability coefficient (in the range of 0.50 to 0.60) might be acceptable. (p. 287)

By a minimum standard of Cronbach alpha of 0.50 (Tuckman, 1999; Ary, Jacobs & Razavieh, 1996), fourteen of the eighteen constructs were considered sufficiently reliable.

Table 1

Tests of Instrument Reliability (N=109)

	Cronbach's Alpha	Inter-item correlation
Constructs		
<i>Participants at the Beginning of the Educational Cycle</i>		
Cognitive interest	.86	.56
Expectation for improving occupational performance & status	.82	.50
Concern for people, community, and environment	.75	.32
Use of pesticides (pre-test)	.68	.30
Social reasons	.61	.18
FFS as Stimulation and Escape	.57	.23
Compatibility of IPM (pre)	.48	.23
Financial factors (pre-test)	.32	.10
<i>Completers and Non-Completers & Non-Participants</i>		
Inst: Outcomes	.84	.48
Compatibility of IPM (post-test)	.81	.38
Inst.: Convenience	.78	.37
Competitions	.74	.45
Use of pesticides (post-test)	.73	.32
Inst.: Climate	.65	.35
Personal preferences	.55	.12
Financial factors (post-test)	.35	.14
Inst.: Process & application	.30	.04
Life situation factors	.30	.07

Descriptive statistics were employed to describe the sample. The mean was used as the measure of central tendency and the standard deviation was the measure of dispersion. According to Gall, Gall, and Borg (2007), when presented together, the mean and standard deviation provide a good description of how respondents scored on a particular measure.

The Likert-scales measured the farmers' agreement levels (1=Strongly Disagree, 2=Disagree, 3=Agree, and 4=Strongly Agree) with statements. For the data analysis

purposes, however, the scale was measured as 1-1.5=Strongly Disagree; 1.51-2.50=Disagree; 2.51-3.50=Agree; and 3.51-4.0=Strongly Agree.

Other basic statistical measures included frequency counts and percentages. This approach was used in the analysis of the distribution of personal characteristics by participation status and in the respondents' ranking of their most important sources of information about farming.

Chi-square test for independence was used to determine whether two categorical variables were related. It compares the frequency of cases found in the categories of one variable across the different categories of another variable (Pallant, 2005). The chi-square test for independence was used to explore the frequency of the categorical personal characteristics (gender, marital status, educational background, and whether they had or had not participated in MALMR extension programming prior to FFS) across the three participation statuses (i.e., completion, non-completion, or non-participation).

Independent samples t-tests are used to compare the mean scores of two different groups of people or conditions. An independent samples t-test indicates whether there is a statistically significant difference in the mean scores for the two groups. If the probability score is less than 0.05, there is a significant relationship between the means. If the probability score is greater than 0.05, the difference between the means is probably due to chance, and there is not a significant relationship between the means. An assumption of the independent samples t-test is that the sample scores are independent of each other.

Paired samples *t*-tests, on the other hand, are used when there is one group of people and they are tested twice. Pre-test/post test experimental designs use paired samples *t*-tests. Two paired samples *t*-tests was used in this study: 1) to test whether there was a significant difference in the scores on the measures of the completers' perceptions on the use of pesticides in farming, financial factors, and compatibility of integrated pest management with the social setting at the beginning and end of FFS. 2) To test whether there was a significant difference in the scores on the measures of the non-completers' perceptions on the use of pesticides in farming, financial factors, and compatibility of integrated pest management with the social setting at the beginning and end of FFS.

A one-way analysis of variance (ANOVA) is used when there is one independent variable with three or more levels and one dependent continuous variable. In this case, the independent variable is participation status (completers, non-completers, or non-participants) and the dependent variables are the scores on the measures of the constructs. An ANOVA indicates whether there are significant differences in the means scores on the dependent variable across the three groups. Post-hoc tests can then be used to find out where these differences lie (Pallant, 2005).

The general guidelines for analyzing effect size developed by Cohen (1988) were used to determine the practical significance of the relationships between participation status and the personal characteristics. The effect size (eta squared) for ANOVA was determined according to Cohen's (1988) guidelines: .01-.059 (small effect), .06-.139 (moderate effect), and .14 or more (large effect). The eta squared value indicates the

percentage of the variance in the dependent variable that is explained by the independent variable.

Summary of the Chapter

This chapter addressed the purpose of the study, the research objectives, the research design, population and sample, instrument development, data collection, and data analysis procedures of the study. The validity and reliability of the instruments *Participants at the Beginning of the Educational Cycle, Completers and Non-Completers*, and *Non-Participants* were discussed. Data were collected in conformity with the research guidelines set by Institutional Review Board (IRB) of Texas A&M University. The questionnaires and the consent form used in the study are included in the appendices.

CHAPTER IV

RESULTS AND FINDINGS

The purpose of the study was to identify and analyze the factors affecting completion, non-completion, and non-participation in the Farmer Field School program in Trinidad and Tobago. Chapter III described the method for the study, which included details on the sample, instrumentation, and data analysis. Chapter IV presents an analysis of the data gathered from the three questionnaires: *Participants at the beginning of the educational cycle*, *Completers and Non-Completers*, and *Non-Participants*.

Demographics of the Five Farmer Field Schools

All of the respondents from Transfer Village were men (Table 2). There were eleven completers, nine non-completers, and nine non-participants. Completers had larger farms and earned a greater proportion of their income from farming than did non-completers and non-participants.

Table 2

Personal Characteristics of Respondents in Transfer Village FFS (n=30)

	Gender	Age (M)	Education	Farm Size (ac.) (M)	% income from agriculture (M)
Completers	F	51.3	Prim.	7.6	95.4
			9		
	M		11		
			Other	0	
Non-Completers	F	47.7	Prim.	4.2	72.2
			5		
	M		9		
			Other	1	
Non-Participants	F	53.7	Prim.	4.0	65.5
			7		
	M		10		
			Other	0	

There were thirteen completers and nine non-completers in the La Trinidad (Table 3). All of the farmers who initiated participation in FFS completed the program. Non-participants reported owning larger farms and a larger percentage of their income derived from agriculture than did program completers.

Table 3

Personal Characteristics of Respondents in La Trinidad FFS (n=22)

	Gender	Age (M)	Education	Farm Size (ac.) (M)	% income from agriculture (M)
Completers	F	48.0	Prim.	1.7	79.2
			6		
	M		7		
			Other	0	
Non-Completers	F		Prim.	0	0
			0		
	M		0		
			Other	0	
Non-Participants	F	48.8	Prim.	2.0	82.7
			2		
	M		7		
			Other	0	

In Grand Fond, there were nine completers and seven non-participants. All of the farmers who initiated participation in FFS completed the program (Table 4).

Completers farm more land than non-participants yet the percentage of their income derived from agriculture is less than that reported by non-participants.

Table 4

Personal Characteristics of Respondents in Grand Fond FFS (n=16)

	Gender	Age (M)	Education	Farm Size (ac.) (M)	% income from agriculture (M)
Completers	F	45.6	Prim.	6.3	51.1
	M		6		
	7		Sec.		
Non-Completers	F	48.6	Other	4.4	80.7
	M		0		
	0		Prim.		
Non-Participants	F	48.6	Sec.	4.4	80.7
	M		0		
	6		Other		

In Cemetery Trace, there were eight completers and six non-participants. All of the farmers who began FFS completed the program (Table 5). Completers reported farming larger farms and a larger percentage of their income derived from agriculture than did non-participants.

Table 5

Personal Characteristics of Respondents in Cemetery Trace FFS (n=14)

	Gender	Age (M)	Education	Farm Size (ac.) (M)	% income from agriculture (M)		
Completers	F	50.5	Prim.	4.6	90.6		
	M		8			Sec.	0
						Other	0
Non-Completers	F		Prim.	0	0		
	M		0			Sec.	0
						Other	0
Non-Participants	F	46.7	Prim.	3.4	36.6		
	M		6			Sec.	3
						Other	0

In Platanite, there were fifteen completers, six non-completers, and six non-participants (Table 6). Completers possessed more land, on average, than the non-completers and non-participants. Agriculture contributed the most to the annual income of non-participants.

Table 6

Personal Characteristics of Respondents in Platanite FFS (n=27)

	Gender	Age (M)	Education	Farm Size (ac.) (M)	% income from agriculture (M)		
Completers	F	35.5	Prim.	4.0	71.3		
	M		7			Sec.	8
						Other	0
Non-Completers	F	29.8	Prim.	3.0	66.7		
	M		5			Sec.	4
			1			Other	0
Non-Participants	F	48.3	Prim.	3.8	75.0		
	M		0			Sec.	4
			6			Other	0

Objective 1: Personal Characteristics

1a. Describe the Personal Characteristics Which Describe FFS Completers, Non-Completers, and Non-Participants

The personal characteristics investigated included the number of family who have participated in FFS, the number of friends who have participated in FFS, gender, age, current marital status, last class level completed (education), size of farm, years lived in the community, years farmed, percentage of annual income derived from agriculture, and whether they have participated in agricultural extension programs before participating in a FFS (Table 7).

Following are some highlights of the characteristics of completers, non-completers, and non-participants in the five FFSs.

- The majority of FFS completers (57.1%), non-completers (66.7%), and non-participants (71.1%) had no family members who had participated in previous FFS.
- Completers (39.5%) had five or more friends who had participated in FFS while non-completers (77.3%) and non-participants (44.7%) typically had fewer (0-1 friends) who had participated in an FFS.
- The vast majority of respondents were men: completers (73.2%), non-completers (66.7%), and non-participants (92.1%).
- Program completers (41.1%) and non-completers (46.7%) were younger than 44 years old while program non-participants (42.1%) were older than 53 years of age.

- The vast majority of completers (80.3%), non-completers (73.3%), and non-participants (81.5%) were married.
- Program completers (69.6%), non-completers (46.6%), and non-participants (55.3%) attained a grade level of at least Standard 6.
- Completers (44.6%), non-completers (40.0%), and non-participants (65.8%) farmed between three to five acres of land.
- Completers (23.2%), non-completers (46.7%), and non-participants (44.7%) have lived in their communities for more than forty-nine years.
- Completers (41.1%), non-completers (40%), and non-participants (28.9%) have farmed less than twenty years.
- Completers (57.1%), non-completers (46.7%), and non-participants (47.4%) indicated that all of their annual income was derived from agriculturally-based commerce.
- The vast majority of the completers (67.9%), non-completers (60%), and non-participants (71.1%) indicated that they had not participated in any agricultural extension educational programming.

Table 7

Distribution of Personal Characteristics by Participation Status (N=109)

Statement	Completers		Non-Completers		Non-Participants	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
<i>Total</i>	56	51.3	15	13.7	38	34.8
<i>Number of family who have participated</i>						
0	32	57.1	10	66.7	27	71.1
1	10	17.9	3	20.0	6	15.8
2+	14	25	2	13.3	5	13.2
<i>Number of friends who have participated</i>						
0-1	16	28.6	11	73.3	17	44.7
2-4	18	32.1	4	26.7	12	31.6
5+	22	39.3	0	0	9	23.7
<i>Gender</i>						
Female	15	26.8	5	33.3	3	7.9
Male	41	73.2	10	66.7	35	92.1
<i>Age</i>						
0-44	23	41.1	7	46.7	10	26.3
45-52	18	32.1	5	33.3	12	31.6
53+	15	26.8	3	20.0	16	42.1
<i>Current Marital Status</i>						
Single	10	17.9	4	26.7	4	10.5
Married	45	80.3	11	73.3	31	81.5
Separated/Divorced	1	1.8	0	0	3	7.9
Widowed	0	0	0	0	0	0
<i>Education</i>						
Standard 1-3	5	8.9	3	20.0	3	7.9
Standard 4-5	18	32.1	2	13.3	10	26.3
Standard 6	16	28.6	2	13.3	8	21.1
Form 1-3	4	7.1	2	13.3	5	13.2
Form 4-5	12	21.4	4	26.7	9	23.7
Form 6	1	1.8	1	6.7	2	5.3
Other	0	0	1	6.7	1	2.6

Table 7 (continued)

Statements	Completers		Non-Completers		Non-Participants	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
<i>Size of farm</i>						
0-2	23	41.1	6	40.0	10	26.3
3-5	25	44.6	6	40.0	25	65.8
6+	8	14.3	3	20.0	3	7.9
<i>Years lived in the community</i>						
0-26	18	32.1	6	40.0	10	26.3
27-48	25	44.6	2	13.3	11	28.9
49+	13	23.2	7	46.7	17	44.7
<i>Years farmed</i>						
0-20	23	41.1	6	40.0	11	28.9
21-35	17	30.4	3	20.0	12	31.6
36+	16	28.6	6	40.0	15	39.5
<i>Percentage of annual income derived from agriculture</i>						
0-50	16	28.6	7	46.7	16	42.1
51-99	8	14.3	1	6.7	4	10.5
100	32	57.1	7	46.7	18	47.4
<i>Participated in agricultural extension programs before FFS</i>						
Yes	18	32.1	6	40.0	11	28.9
No	38	67.9	9	60.0	27	71.1

Ib. Determine if a Significant Relationship Exists Between the Personal Characteristics and Participation Status

A one-way between-groups analysis of variance was conducted to explore the impact of the personal characteristics on participation status. In the one-way between-groups analysis of variance (Table 8), a statistically significant relationship was found between participation status and the number of friends who had participated in FFS [$F(2, 106) = 5.7, p < .05$]. The effect size (Cohen, 1988) was moderate (eta squared = .10).

Ten percent of the variance in the number of friends is explained by participation status. The Tukey post-hoc analysis (Table 9) indicated that the mean score for non-completers ($M=3.50$, $SD= 4.6$) was significantly different from the completers ($M=5.2$, $SD= 5.2$). The non-participants ($M=3.5$, $SD=4.6$) did not differ significantly from either the completers or non-completers. The finding was that completers had more friends who had participated in FFS than did non-completers and non-participants.

A statistically significant relationship was found between participation status and age [$F(2,106) = 3.7$, $p<.05$]. The effect size (Cohen, 1988) was moderate (eta squared=.07). Seven percent of the variance in age was explained by participation status. The post-hoc comparison of means (Table 10) indicated that the mean score for non-completers ($M=40.5$, $SD=14.2$) was significantly different from non-participants ($M=49.6$, $SD=10.2$). The completers ($M=45.3$, $SD=11.6$) did not differ significantly from either non-completers or non-participants. The finding was that, on average, the non-completers were the youngest, the completers were in the middle, and non-participants were the oldest of the three classifications.

Table 8

Analysis of Variance: Participation Status and Personal Characteristics (N=109)

Personal characteristics	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>d</i>
<i>Number of family who have participated in FFS</i>						
Completers	56	1.1	2.0	2.1	1.22	.04
Non-Completers	15	.5	.9			
Non-Participants	38	.5	.1			
<i>Number of friends who have participated in FFS</i>						
Completers	56	5.2	5.2	5.7	.00*	.10
Non-Completers	15	.8	.9			
Non-Participants	38	3.5	4.6			
<i>Age</i>						
Completers	56	45.3	11.6	3.7	.03*	.07
Non-Completers	15	40.5	14.2			
Non-Participants	38	49.6	10.2			
<i>Size of Farm</i>						
Completers	56	4.6	5.8	.7	.5	.01
Non-Completers	15	3.7	2.4			
Non-Participants	38	3.6	1.9			
<i>Years lived in community</i>						
Completers	56	35.9	17.2	1.3	2.7	.02
Non-Completers	15	37.8	17.4			
Non-Participants	38	41.7	16.6			
<i>Years Farmed</i>						
Completers	56	26.8	15.2	1.8	.17	.03
Non-Completers	15	26.3	18.6			
Non-Participants	38	32.5	13.4			
<i>Percentage of annual income derived from agriculture</i>						
Completers	56	77.4	30.3	.86	.43	.02
Non-Completers	15	70.0	31.6			
Non-Participants	38	69.3	32.8			

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < 0.05$

Cohen' *d* (1988): 0.01-.059 (small effect), 0.06-.139 (moderate effect), 0.14 or more (large effect)

Table 9

Post Hoc: Number of Friends Who Have Participated in FFS by Participation Status

Participation Status	Means for Groups (Subset for alpha=.05)	
Non-Completers	.80	
Non-Participants	3.50	3.50
Completers		5.20

Table 10

Post Hoc: Age by Participation Status

Participation Status	Means for Groups (Subset for alpha=.05)	
Non-Completers	40.53	
Completers	45.27	45.27
Non-Participants		49.63

A Chi-square test for independence (Table 11) was conducted to explore the impact of the (categorical) personal characteristics on participation status. Only gender was statistically significant [$\chi^2(1, df = 109), 6.41, p < .05$]. The effect size (Cohen, 1988) was large (eta squared=.24). The finding was that men vastly outnumbered women in the five FFSs.

Table 11

Chi-Square Tests: Personal Characteristics by Participation Status

<i>Personal characteristics</i>	<i>df</i>	<i>X²</i>	<i>P</i>	<i>d (phi)</i>
Gender	1	6.41	.04*	.24
Current Marital Status	3	5.21	.52	.22
Education	6	9.99	.62	.30
Participated in agricultural extension programs before FFS	1	.603	.74	.07

* $p < .05$ Effect size (*phi*) (Cohen, 1988): .19 or less (very small), .2-.49 (small), .5-.79 (moderate), .8 or more (large)**Objective 2: Motivations for Participation***2a. Describe FFS Completers and Non-Completers' Motivations for Participation in FFS at the Beginning of the Program*

Five constructs provided the framework for understanding the motivations of FFS completers and non-completers: 1) social reasons for participation in FFS, 2) concern for other people, community, humanity, and the environment, 3) expectations for improving the occupational performance and status, 4) FFS as a means for stimulation and escape, and 5) cognitive interest (Table 12).

Completers ($M=2.86$, $SD=.53$) tended to agree and non-completers ($M=2.49$, $SD=.23$) tended to disagree that they participated in FFS for social reasons. Both FFS completers ($M=2.35$, $SD=.66$) and non-completers ($M=2.49$, $SD=.35$) tended to disagree that they participated in FFS as a means of escape from the routine of life. Completers ($M=3.46$, $SD=.42$) and non-completers ($M=3.19$, $SD=.49$) tended to agree that their concern for other people, community, humanity, and the environment played a role in

their decision to join FFS. Completers ($M=3.50$, $SD=.50$) and non-completers ($M=3.04$, $SD=.48$) also tended to agree that they joined FFS expecting to gain skills which would enable them to improve their occupational performance and status. Finally, completers ($M=3.44$, $SD=.50$) and non-completers ($M=3.06$, $SD=.59$) tended to agree that their cognitive interest was a motivating factor in their participation in FFS.

2b. Determine if a Significant Relationship Exists Between Motivations for Participation and Completion or Non-Completion of FFS

An independent-samples t -test was conducted to compare the self-reported scores on the motivations for participation in FFS of program completers and non-completers (Table 13). Four of the five constructs were statistically significantly different for completers and non-completers. There was not a statistically significant difference between completers and non-completers on their perceptions of FFS as a means for stimulation and escape.

A statistically significant relationship was found between completers ($M=2.86$, $SD=.53$) and non-completers [$M=2.49$, $SD=.23$; $t(69)=2.65$, $p<.05$] regarding their social reasons for participating in FFS. The effect size (Cohen, 1988) was small (eta squared=.04). This means that only four percent of the variance in completers' and non-completers' perceptions of the social reasons for participating in FFS was explained by their participation status.

Table 12

Completers' (n=56) and Non-Completers' (n=15) Motivations for Participation in FFS

Statements	<i>Completers</i>		<i>Non-Completers</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Social reasons for participation in FFS</i>				
The agricultural officer encouraged me to participate in FFS.	3.25	.92	3.33	.49
Meeting people with similar interests at FFS encouraged me to participate.	3.21	.83	2.53	.64
I joined FFS because the agricultural officer suggested it to me.	3.20	.92	3.20	.41
A friend or family member encouraged me to participate in FFS.	2.96	.91	2.67	.62
The farmers presently in the group influenced my decision to join FFS.	2.86	.98	2.40	.51
I joined FFS to belong to a group.	2.63	1.12	1.73	.59
I joined FFS to be accepted by my family and friends.	1.96	1.10	1.60	.51
Construct	2.86	.53	2.49	.23
<i>Concern for other people, community, humanity, and the environment</i>				
Through the FFS I want to be able to produce healthier foods.	3.69	.47	3.40	.51
My farm must not destroy the people, animals, plants, and land.	3.52	.63	3.40	.51
I expect FFS to help me to make the people, animals, plants and land safer.	3.52	.63	2.93	.70
After FFS, members in my farming community can improve their incomes.	3.48	.54	3.47	.64
After FFS, I want to be able to teach others about pest control practices.	3.29	.93	2.87	.92
I expect FFS to help me reduce my use of pesticides.	3.28	.68	3.27	.70
Construct	3.46	.42	3.19	.49

Table 12 (continued)

Statements	Completers		Non-Completers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Expectations for improving the occupational performance and status</i>				
After the FFS, my customers will like the healthier crops I produce.	3.68	.47	3.33	.49
I see FFS as a chance to improve my farming practices.	3.61	.53	3.20	.41
I saw FFS as a chance to learn how to improve my income.	3.57	.60	3.33	.72
I joined FFS to be better off than I am now.	3.36	.80	2.80	.86
I am aware of the benefits of FFS.	3.27	.84	2.53	.74
Construct	3.50	.50	3.04	.48
<i>FFS as a means for stimulation and escape</i>				
FFS is a different experience to the other activities now in my life.	3.16	.76	3.00	.38
FFS gives me a relaxation break (from the routine of home or work).	2.20	1.07	2.33	.49
I joined FFS to have a few hours away from other responsibilities.	1.68	.83	2.13	.64
Construct	2.35	.66	2.49	.35
<i>Cognitive interest</i>				
I enjoy learning new things.	3.68	.47	3.33	.62
I need to learn new farming skills.	3.57	.57	3.27	.70
I joined the FFS to find out more about the benefits of the field school.	3.54	.57	3.27	.60
I joined FFS to improve the decisions I make on the farm.	3.52	.63	3.33	.49
I like learning just to know more.	3.41	.60	2.93	.80
FFS will teach me new skills to help me cope with life.	2.93	1.13	2.27	.88
Construct	3.44	.50	3.06	.59

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

A statistically significant relationship was found for completers ($M=3.46$, $SD=.42$) and non-completers [$M=3.19$, $SD=.49$; $t(69)=2.15$, $p<.05$] on the construct *Concern for other people, community, humanity, and the environment*. The finding was

that completers agreed more than did the non-completers with the statements regarding their concern for other people and the environment. The effect size (Cohen, 1988) was moderate (eta squared=.06). Only six percent of the variance in completers' and non-completers' perceptions of their concern for people, community, humanity, and the environment was explained by participation status.

A statistically significant relationship was found between completers ($M=3.50$, $SD=.50$) and non-completers [$M=3.04$, $SD=.48$; $t(69)=3.17$, $p<.05$] on the construct *Expectations for improving occupational performance and status*. The finding was that completers agreed more than did the non-completers with the statements regarding their expectations for improving their occupational performance and status. The effect size (Cohen, 1988) was moderate (eta squared=.13). Thirteen percent of the variance in completers' and non-completers' expectations of FFS to improve their occupational performance and status was explained by participation status.

There was a significant difference in scores for completers ($M=3.44$, $SD=.50$) and non-completers [$M=3.06$, $SD=.59$; $t(69)=2.46$, $p<.05$] regarding cognitive interest as a motivation for participation in FFS. The finding was that completers agreed more than did non-completers with the statements regarding cognitive interest as a motivator for participation in FFS. The effect size (Cohen, 1988) was moderate (eta squared=.08). Eight percent of the variance in completers' and non-completers' cognitive interest as a motivation for participation in FFS was explained by participation status.

Table 13

T-tests: Completers' (n=56) and Non-Completers' (n=15) Motivations for Participation in FFS

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
<i>Social reasons for participating in FFS</i>					
Completers	2.86	.53	2.65	.00*	.04
Non-Completers	2.49	.23			
<i>Concern for other people, community, humanity, environment</i>					
Completers	3.46	.42	2.15	.03*	.06
Non-Completers	3.19	.49			
<i>Expectations for improving occupational performance and status</i>					
Completers	3.50	.50	3.17	.00*	.13
Non-Completers	3.04	.48			
<i>FFS as Stimulation and Escape</i>					
Completers	2.35	.66	-.81	.42	.01
Non-Completers	2.49	.35			
<i>Cognitive interest</i>					
Completers	3.44	.50	2.46	.02*	.08
Non-Completers	3.06	.59			

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < .05$

Cohen's *d* (1988): .01-.059 (small effect), .06-.139 (moderate effect), .14 or more (large effect)

Objective 3: Farming Practices

3a. Describe FFS Completers' and Non-Completers' Perceptions of Selected Farming Practices at the Beginning of a FFS

At the beginning of a FFS, all participants responded to questions regarding their perceptions of selected farming practices related to the concepts presented in the FFS. Once the FFS educational cycle was complete and program participants could be classified as completers or non-completers, then the researcher returned to the participants' responses collected at the beginning of FFS in order to compare them for differences.

Completers ($M=3.17$, $SD=.48$) and non-completers ($M=2.88$, $SD=.32$) tended to agree with the statements regarding the use of pesticides in farming (Table 14). Completers ($M=3.07$, $SD=.46$) and non-completers ($M=2.95$, $SD=.42$) tended to agree with the statements on the financial factors involved in adopting farming methods such as those presented in FFS. Completers ($M=3.21$, $SD=.47$) and non-completers ($M=3.00$, $SD=.35$) believed that integrated pest management was compatible with the social setting in Trinidad and Tobago.

Table 14

Completers' (n=56) and Non-Completers' (n=15) Perceptions of Selected Agricultural Practices at the Beginning of the FFS

Statements	Completers		Non-Completers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Perceptions on the use of pesticides in farming</i>				
Pesticides are a serious threat to human health.	3.61	.56	3.87	.35
Loss of crops due to insects and disease is a serious problem.	3.50	.54	3.00	.76
Pesticides are a serious problem for people, animals, plants and land.	3.46	.60	3.27	.59
I believe that farmers' decisions affect people, animals, plants and land.	3.39	.73	3.13	.52
My use of pesticides affect people, animals, plants and land.	2.57	1.09	2.13	.83
Pollution from agricultural chemicals is a serious problem on my farm.	2.50	.87	1.87	.35
Construct	3.17	.48	2.87	.32
<i>Financial factors</i>				
Making money from farming is my most important concern.	3.52	.81	3.87	.35
I worry about how to keep my farm productive over the long term.	2.89	.89	2.07	.46
I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land.	2.82	.97	2.93	.96
Construct	3.07	.46	2.95	.42
<i>Compatibility of integrated pest management with the social setting</i>				
Consumers want pesticide-free produce.	3.59	.56	3.27	.46
Farmers will accept farming with less poisonous pesticides.	3.54	.57	3.07	.26
Consumers will pay higher prices for pesticide-free produce.	2.50	1.02	2.67	.90
Construct	3.20	.47	3.00	.35

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

3b. Determine if There Is a Statistically Significant Difference in Completers' and Non-Completers' Perceptions of Selected Farming Practices at the Beginning of FFS

An independent-samples *t*-test was conducted to compare the scores of FFS completers' and non-completers' perceptions of the use of pesticides in farming, financial factors in adopting new farming practices, and the compatibility of integrated pest management with the social setting (Table 15). The participants reported these scores at the beginning of the FFS educational cycle.

A statistically significant relationship was found between completers ($M=3.17$, $SD=.48$) and non-completers [$M=2.88$, $SD=.32$; $t(69)=2.26$, $p<.05$] on the measure of their perceptions of the use of pesticides in farming. The finding was that at the beginning of a FFS, completers agreed more strongly than did non-completers with the statements concerning the use of pesticides in farming. The effect size (Cohen, 1988) was moderate (eta squared=.07). This means that seven percent of the variance in completers' and non-completers' perceptions regarding the use of pesticides in farming was explained by their participation status.

There was not a statistically significant relationship for completers ($M=3.07$, $SD=.46$) and non-completers ($M=2.95$, $SD=.42$; $t(69)=.924$, $p>.05$] on the construct of *Financial factors*. In addition, there was not a statistically significant relationship for completers ($M=3.21$, $SD=.47$) and non-completers [$M=3.00$, $SD=.35$; $t(69)=1.59$, $p>.05$] on the construct *Compatibility of integrated pest management with the social setting*. The finding was that at the beginning of FFS, completers and non-completers did not

differ in their perceptions of the financial factors involved in the adoption of IPM or in their perceptions regarding the compatibility of IPM within the social setting.

Table 15

T-tests: Completers' (n=56) and Non-Completers' (n=15) Perceptions of Selected Agricultural Practices at the Beginning of the FFS

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
<i>The use of pesticides in farming</i>					
Completers	3.17	.48	2.26	.03*	.07
Non-Completers	2.88	.32			
<i>Financial factors</i>					
Completers	3.07	.46	.924	.36	.01
Non-Completers	2.95	.42			
<i>Compatibility of integrated pest management with social setting</i>					
Completers	3.21	.47	1.59	.12	
Non-Completers	3.00	.35			

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < .05$

Cohen's *d* (1988): .01-.059 (small effect), .06-.139 (moderate effect), .14 or more (large effect)

3c. Describe FFS Completers' and Non-Completers' Perceptions of Selected Farming Practices at the End of FFS

At the end of FFS, program completers and non-completers answered questions regarding their perceptions of selected farming practices in relation to the principles of IPM as presented in the FFS. Completers ($M=2.83$, $SD=.58$) and non-completers ($M=2.87$, $SD=.18$) tended to agree with the statements regarding the use of pesticides (Table 16). Completers ($M=3.06$, $SD=.51$) and non-completers ($M=2.55$, $SD=.41$) tended to agree with the statements regarding the financial factors involved in the

adoption of IPM. Completers ($M=3.19$, $SD=.47$) and non-completers ($M=2.81$, $SD=.17$) also tended to agree that IPM was compatible with the social setting in Trinidad and Tobago.

3d. Determine if There Is a Statistically Significant Difference in Completers' and Non-Completers' Perceptions of Selected Farming Practices at the End of FFS

An independent-samples t -test was conducted to compare the perceptions of FFS program completers and non-completers at the end of the educational cycle regarding the use of pesticides in farming, financial factors in the adoption of IPM, and the compatibility of IPM with the social setting (Table 17).

At the end of FFS, there was not a statistically significant relationship between completers' ($M=2.83$, $SD=.58$) and non-completers' [$M=2.87$, $SD=.18$; $t(69)=-.29$, $p>.05$] perceptions on the use of pesticide in farming. The finding was that at the end of FFS, completers and non-completers tended to agree in their views with regard to the use of pesticides in farming. It is worth noting that at the beginning of FFS there was a statistically significant relationship between completers and non-completers on the construct. The relationship was explored further through a paired sample t -test. The implication is that at the end of FFS, completers and non-completers held similar views on the use of pesticides in farming.

Table 16

Completers' (n=56) and Non-Completers' (n=15) Perceptions at the End of the FFS of Selected Agricultural Practices

Statement	Completer		Non-Completer	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>The use of pesticides in farming</i>				
Pesticides are a serious threat to human health.	3.45	.93	3.87	.35
Loss of crops due to insects and disease is a serious problem.	3.27	.86	3.00	.76
Pesticides are a serious problem for people, animals, plants and land.	3.21	.93	3.60	.51
I believe that farmers' decisions affect people, animals, plants and land.	2.91	1.0	3.00	.00
My use of pesticides affects people, animals, plants and land.	2.13	.97	2.13	.83
Pollution from agricultural chemicals is a serious problem on my farm.	2.04	.85	1.67	.49
Construct	2.83	.58	2.87	.18
<i>Financial factors</i>				
Making money from farming is my most important concern.	3.46	.74	3.53	.52
I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land.	2.93	.93	2.07	.80
I worry about how to keep my farm productive over the long term.	2.80	.84	2.07	.26
Construct	3.06	.51	2.55	.41

Table 16 (continued)

Statement	Completer		Non-Completer	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Compatibility of integrated pest management with the social setting</i>				
Consumers want pesticide-free produce.	3.55	.54	3.20	.41
Farmers will accept farming with less poisonous pesticides.	3.38	.56	3.07	.26
Integrated pest management fits in well with our way of agriculture.	3.21	.68	2.47	.51
Consumers are more likely to buy FFS participants' produce if participants could display MALMR-issued certificates certifying the produce as "IPM practices produce".	3.14	.75	2.60	.62
IPM practices are better than the way I farmed before FFS.	3.13	.61	2.80	.41
MALMR-issued certificates guaranteeing FFS participants' produce as "IPM practices produce" will increase sales.	3.05	.64	3.07	.46
Consumers will pay higher prices for pesticide-free produce.	2.91	.88	2.53	.52
Construct	3.19	.47	2.81	.17

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

A statistically significant relationship was found between completers ($M=3.06$, $SD=.51$) and non-completers [$M=2.55$, $SD=.41$; $t(69)=3.56$, $p<.05$] regarding their perceptions of the financial factors in the adoption of IPM. The finding was that at the end of FFS, completers agreed more strongly than did non-completers with the

statements concerning the financial factors in the adoption of IPM. The implication was that at the end of FFS, completers were more willing than non-completers to take on the financial risk of adopting IPM on their farms. The effect size (Cohen, 1988) was large ($\eta^2=.16$). Sixteen percent of the variance in completers' and non-completers' perceptions of the financial factors in the adoption of IPM was explained by their participation status.

A statistically significant relationship was found between completers ($M=3.19$, $SD=.43$) and non-completers ($M=2.81$, $SD=.17$; $t(69)=3.34$, $p<.05$] with regard to the compatibility of IPM with the social setting of Trinidad and Tobago. The finding was that at the end of FFS, completers agreed more strongly than did non-completers with the statements concerning the compatibility of IPM with the social setting of Trinidad and Tobago. The implication is that at the end of FFS, completers believed more strongly than did non-completers that IPM was compatible with farming practices in Trinidad and Tobago. The effect size (Cohen, 1988) was large ($\eta^2=.14$). Fourteen percent of the variance in completers' and non-completers' perceptions of the compatibility of IPM with the social setting was explained by their participation status.

Table 17

T-tests: Completers' (n=56) and Non-Completers' (n=15) Perceptions of Selected Agricultural Practices at the End of the FFS

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
<i>The use of pesticides in farming</i>					
Completers	2.83	.58	-.29	.77	.00
Non-Completers	2.87	.18			
<i>Financial factors</i>					
Completers	3.06	.51	3.56	.00*	.16
Non-Completers	2.55	.41			
<i>Compatibility of integrated pest management with social setting</i>					
Completers	3.19	.43	3.34	.00*	.14
Non-Completers	2.81	.17			

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < .05$

Cohen' *d* (1988): .01-.059 (small effect), .06-.139 (moderate effect), .14 or more (large effect)

3e. Determine if There Was a Statistically Significant Change in Completers'

Perceptions of Selected Farming Practices at the Beginning and End of FFS

A paired samples *t*-test was conducted to evaluate the impact of FFS on completers' measures of the use of pesticides in farming, financial factors involved in the adoption of IPM, and the compatibility of IPM with the setting in Trinidad and Tobago (Table 18). Of the three constructs, only one yielded a significant difference. A statistically significant relationship was found between the completers' scores at the

beginning ($M=3.17, SD=.47$) and end [$M=2.83, SD=.58; t(55)=3.5, p<.05$] of FFS with regard to their perceptions of the use of pesticides in farming. The finding was that on a pre/post comparison, program completers indicated less agreement with the statement regarding the impacts of pesticides on people and the environment. The effect size (Cohen, 1988) was large ($\eta^2=.18$). Eighteen percent of the variance in the change of perception on the use of pesticides in farming can be explained by completion status.

A statistically significant relationship was not found for completers at the beginning ($M=3.07, SD=.46$) and end [$M=3.06, SD=.51; t(55)=.16, p>.05$] of FFS regarding their perceptions of the financial factors involved in adopting IPM. In addition, a statistically significant relationship was not found for completers at the beginning ($M=3.20, SD=.46$) and end [$M=3.19, SD=.42; t(55)=.18, p>.05$] of FFS regarding their perceptions of the compatibility of IPM with the setting in Trinidad and Tobago. The finding was that on a pre/post test, completers showed no change in their perceptions of the financial factors and the compatibility of IPM with the setting.

Table 18

Comparison of Completers' (n=56) Perceptions of Selected Agricultural Practices at the Beginning and End (Pre/Post) of the FFS

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
<i>The use of pesticides in farming</i>					
Beginning	3.17	.47	3.5	.00*	.18
End	2.83	.58			
<i>Financial factors</i>					
Beginning	3.07	.46	.16	.87	.00
End	3.06	.51			
<i>Compatibility of integrated pest management with social setting</i>					
Beginning	3.20	.46	.18	.86	.00
End	3.19	.42			

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < .05$

Cohen's *d* (1988): .01-.059 (small effect), .06-.139 (moderate effect), .14 or more (large effect)

3f. Determine if There Was a Statistically Significant Change in Non-Completers'

Perceptions of Selected Farming Practices at the Beginning and End of FFS

A paired-samples *t*-test was conducted to evaluate the impact of the FFS program on FFS non-completers' perceptions of selected farming practices at the beginning and end of the educational program (Table 19). A statistically significant relationship was not found between non-completion status and any of the three constructs tested.

A statistically significant difference was not found for non-completers at the beginning ($M=2.87$, $SD=.32$) and end [$M=2.87$, $SD=.18$; $t(55)=2.0$, $p>.05$] of FFS regarding their perceptions of the use of pesticides in farming. A statistically significant relationship was not found for non-completers at the beginning ($M=2.95$, $SD=.41$) and

end [$M=2.55$, $SD=.41$; $t(55)=2.0$, $p>.05$] of FFS regarding their perceptions of the financial factors involved in adopting IPM. A statistically significant relationship was not found for non-completers at the beginning ($M=3.00$, $SD=.35$) and end [$M=2.81$, $SD=.16$; $t(55)=1.6$, $p>.05$] of FFS with regard to the compatibility of IPM with the social setting. The finding was that on a pre/post test, non-completers' perceptions did not

Table 19

Comparison of Non-Completers' (n=15) Perceptions of Selected Agricultural Practices at the Beginning and End of the FFS

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
<i>The use of pesticides in farming</i>					
Beginning	2.87	.32	.00	1.0	.00
End	2.87	.18			
<i>Financial factors</i>					
Beginning	2.95	.41	2.0	.06	.07
End	2.55	.41			
<i>Compatibility of integrated pest management with social setting</i>					
Beginning	3.00	.35	1.6	.14	.04
End	2.81	.16			

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree
Cohen's *d* (1988): .01-.059 (small effect), .06-.139 (moderate effect), .14 or more (large effect)

change regarding (1) the harm that pesticides can cause to people and the environment, (2) their willingness to take on financial risk to try integrated pest management technologies on their farms, and (3) whether IPM was compatible with the social environment in Trinidad and Tobago.

3g. Describe FFS Program Non-Participants by Selected Farming Practices

Non-participants were classified as such because they fit in one of the following three categories: 1) Officer met with the intended participant and after describing the Field School to the person, the person declined an invitation to participate, 2) Participant visited the introductory Farmer Field School activity and decided not to continue to participate in the school, and 3) A member of the community or someone else described the school to the intended participant and the person decided not to participate.

Non-participants tended to agree with the statements about the use of pesticides in farming ($M=3.18$, $SD=.54$), the financial factors involved in adopting integrated pest management ($M=2.86$, $SD=.73$), and the compatibility of integrated pest management with the social setting ($M=2.75$, $SD=.61$) (Table 20).

Table 20

Non-Participants' (n=38) Perceptions on Selected Agricultural Practices

Statements	Non-Participants	
	<i>M</i>	<i>SD</i>
<i>The use of pesticides in farming</i>		
Pesticides are a serious threat to human health.	3.68	.47
Loss of crops due to insects and disease is a serious problem.	3.58	.68
Pesticides are a serious problem for people, animals, plants and land.	3.47	.51
I believe that farmers' decisions affect people, animals, plants and land.	3.37	.54
My use of pesticides affects people, animals, plants and land.	2.55	1.0
Pollution from agricultural chemicals is a serious problem on my farm.	2.45	1.0
Construct	3.18	.54
<i>Financial factors</i>		
Making money from farming is my most important concern.	3.58	.92
I worry about how to keep my farm productive over the long term.	2.66	.99
I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land.	2.37	1.1
Construct	2.86	.73
<i>Compatibility of integrated pest management with the social setting</i>		
Consumers want pesticide-free produce.	3.47	.60
Farmers will accept farming with less poisonous pesticides.	3.21	.84
MALMR-issued certificates guaranteeing FFS participants' produce as "IPM practices produce" will increase sales.	2.66	1.0
Consumers are more likely to buy FFS participants' produce if participants could display MALMR-issued certificates certifying the produce as "IPM practices produce".	2.66	1.0
Consumers will pay higher prices for pesticide-free produce.	2.61	.91
Integrated pest management fits in well with our way of agriculture.	2.53	.89
IPM practices are better than the way I farmed before FFS.	2.13	.66
Construct	2.75	.61

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

3h. Determine if a Significant Relationship Exists Between Participation Status and Perceptions About Selected Farming Practices

A one-way between-groups analysis of variance was conducted to explore the impact of the perceptions on the use of pesticides in farming, financial factors, and the compatibility of integrated pest management with the social setting on participation status (Table 21). A statistically significant relationship was found between participation status and the use of pesticides in farming [$F(2,106)=5.14, p<.05$]. The effect size (Cohen, 1988) was moderate (eta squared=.09). Nine percent of the variance in their perceptions of the use of pesticides in farming was explained by completion status. The post hoc comparison of the means (Table 22) indicates that the mean score for completers ($M=2.83, SD=.58$) and non-completers ($M=2.87, SD=.18$) was significantly different from non-participants ($M=3.18, SD=.54$). The finding was that at the end of FFS, non-participants agreed more strongly than did completers and non-completers with the statements regarding the use of pesticides in farming. A second finding was that at the end of the FFS the completers and non-completers held similar views concerning the use of pesticides in farming.

A statistically significant relationship was found between participation status and the financial factors related to the adoption of integrated pest management [$F(2,106)=4.74, p<.05$]. The effect size (Cohen, 1988) was moderate (eta squared=.08). Eight percent of the variance in their perceptions of the financial factors was explained by participation status. The post hoc comparisons of the means (Table 23) indicated that the mean score for non-completers ($M=2.55, SD=.41$) was significantly different from

completers ($M=3.06$, $SD=.51$). Non-participants ($M=2.86$, $SD=.73$) did not differ significantly from the non-completers or completers. The first finding was that completers agreed more strongly than did non-completers and non-participants with the statements regarding the financial factors related to the adoption of IPM. A second finding was that non-completers agreed the least with the statements. The implication is that non-completers are the group that is least willing to take on the financial risk of adopting IPM on their farms and completers are the most willing. Though non-participants did not engage in the activities of the FFS, they are moderately receptive to the idea of taking on financial risk for the sake of adopting IPM.

A statistically significant relationship was found between participation status and the compatibility of IPM with the social setting [$F(2,106)= 10.9$, $p<.05$]. The effect size (Cohen, 1988) was large ($\eta^2=.17$). Seventeen percent of the variance in their perceptions regarding the compatibility of IPM with the setting was explained by participation status. The post hoc analysis (Table 24) indicated that the mean score for completers ($M=3.19$, $SD=.43$) was significantly different from non-participants ($M=2.75$, $SD=.61$) and non-completers ($M=2.81$, $SD=.17$). Non-participants and non-completers were not significantly different. A finding was that completers agreed more strongly than did non-completers and non-participants with the statements regarding the compatibility of IPM with the social setting. The implication is that completers believe much more strongly than do non-completers and non-participants that IPM is compatible with the social setting in Trinidad and Tobago.

Table 21

Analysis of Variance: Perceptions of Selected Farming Practices and Participation Status (N=109)

Constructs	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>d</i>
<i>The use of pesticides in farming</i>						
Completers	56	2.83	.58	5.14	.00*	.09
Non-Completers	15	2.87	.18			
Non-Participants	38	3.18	.54			
<i>Financial factors</i>						
Completers	56	3.06	.51	4.74	.01*	.08
Non-Completers	15	2.55	.41			
Non-Participants	38	2.86	.73			
<i>Compatibility of integrated pest management with the social setting</i>						
Completers	56	3.19	.43	10.9	.00*	.17
Non-Completers	15	2.81	.17			
Non-Participants	38	2.75	.61			

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < 0.05$

Cohen's *d* (1988): 0.01-.059 (small effect), 0.06-.139 (moderate effect), 0.14 or more (large effect)

Table 22

Post Hoc: Perceptions on the Use of Pesticides in Farming by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)
Completers	2.83
Non-Completers	2.87
Non-Participants	3.18

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Table 23

Post Hoc: Perceptions on Financial Factors by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)	
Non-Completers	2.55	
Non-Participants	2.86	2.86
Completers		3.06

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Table 24

Post Hoc: Perceptions on the Compatibility of IPM With the Social Setting by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)	
Non-Participants	2.75	
Non-Completers	2.81	
Completers		3.19

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Objective 4: Priority Rankings of Sources of Information

4a. Describe FFS Completers' Priority Ranking of Their Sources of Information for Farming at the Beginning and End of a FFS

At the beginning of a FFS, those who later completed the FFS program, ranked MALMR as their most important source of information for farming, agro-shops as their second most important source of information, and other farmers as the third most important source of information (Table 25). At the end of FFS, program completers ranked MALMR as their most important source for information about farming, the agro-shops as the second most important, and other farmers as the third most important (Table 26). The finding is that in a pre/post test, completers' priority rankings of their sources

of information about farming did not change. Completers most highly valued the information received from MALMR, then the agro-shops, and finally, the other farmers.

Table 25

Completers' (n=56) Priority Ranking of Their Sources of Information at the Beginning of FFS

Statements	Completers	
	f	%
<i>Get information from these sources most often</i>		
MALMR	23	41.1
Agro-shop	19	33.9
Other farmers	5	8.9
Friends	3	5.4
Family	2	3.6
Self (own experience)	2	3.6
Media	1	1.8
Market	1	1.8
<i>Get information from these sources second most often</i>		
Agro-shop	18	32.1
Other farmers	15	26.8
MALMR	4	12.5
Friends	7	12.5
Media	2	3.6
Market	2	3.6
Self (own experience)	2	3.6
Family	1	1.8
None listed	2	3.6
<i>Get information from these sources third most often</i>		
None listed	21	37.5
Other farmers	15	26.8
MALMR	8	14.3
Friends	4	7.1
Agro-shop	5	8.9
Media	1	1.8
Family	1	1.8
Self (own experience)	1	1.8

Table 26

Completers' (n=56) Priority Ranking of Their Sources of Information at the End of FFS

Statements	Completers	
	f	%
<i>Get information from these sources most often</i>		
MALMR	22	39.3
Agro-shops	18	32.1
Other farmers	7	12.5
Friends	3	5.4
Media	2	3.6
Family	2	3.6
Self (own experience)	2	3.6
<i>Get information from these sources second most often</i>		
Agro-shops	18	32.1
Other farmers	16	28.6
MALMR	7	12.5
Friends	5	8.9
Self	3	5.4
Media	1	1.8
Family	1	1.8
None	5	8.9
<i>Get information from these sources third most often</i>		
None given	16	28.5
Other farmers	11	19.6
MALMR	11	19.6
Agro-shops	10	17.8
Friends	4	7.1
Self (own experience)	2	3.6
Media	1	1.8
Family	1	1.8

4b. Describe FFS Non-Completers' Priority Ranking of Their Sources of Information for Farming at the Beginning and End of the Program

At the beginning of FFS, the respondents who at the end of the program were classified as non-completers, ranked MALMR as the most important source of

information about farming practices and agro-shops as the second most important source (Table 27). At the end of FFS, however, non-completers ranked the agro-shops as the most important source of information. There was a tie for the second most important sources of information: the agro-shops and MALMR (Table 28). The finding was that in a pre/post test, non-completers' priority rankings of their sources of information changed.

Table 27

Non-Completers' (n=15) Priority Ranking of Their Sources of Information at the Beginning of the FFS

Statements	Non-Completers	
	<i>f</i>	%
<i>Get information from these sources most often</i>		
MALMR	5	33.3
Agro-shops	4	26.6
Family	2	13.3
Friends	1	6.7
Other farmers	1	6.7
Self (own experience)	1	6.7
Media	1	6.7
<i>Get information from these sources second most often</i>		
Agro-shops	6	40.0
MALMR	3	20.0
Other farmers	2	13.3
Friends	2	13.3
Family	1	6.7
None listed	1	6.7
<i>Get information from these sources third most often</i>		
None listed	8	53.4
MALMR	4	26.7
Agro-shops	2	13.3
Friends	1	6.7

Table 28

Non-Completers' (n=15) Priority Ranking of Their Sources of Information at the End of the FFS

Statements	Completers	
	f	%
<i>Get information from these sources most often</i>		
Agro-shops	6	40.0
MALMR	3	20.0
Other farmers	2	13.3
Family	2	13.3
Friends	1	6.7
Self (own experience)	1	6.7
<i>Get information from these sources second most often</i>		
Agro-shops	5	33.3
MALMR	5	33.3
Friends	3	20.0
Family	1	6.7
None	1	6.7
<i>Get information from these sources third most often</i>		
None given	8	53.3
Agro-shops	3	20.0
MALMR	3	20.0
Friends	1	6.7

4c. Describe FFS Non-Participants' Priority Ranking of Their Sources of Information for Farming

Non-participants ranked the agro-shops as their two most important sources of information regarding farming practices. One (2.6%) non-participant ranked MALMR as their most important source of information on farming, five (13.2%) ranking MALMR as their second most important source of information, and eight (21.1%) ranking MALMR as the third highest source of information for them (Table 29). Non-participants rank agro-shops as their most important source of information for farming.

Table 29

Non-Participants' (n=38) Priority Ranking of Their Sources of Information

Statements	Completers	
	<i>f</i>	%
<i>First Most Important</i>		
Agro-shops	19	50.0
Other farmers	8	21.1
Self	6	15.8
Media	3	7.9
MALMR	1	2.6
Friends	1	2.6
<i>Second Most Important</i>		
Agro-shops	13	33.3
Other farmers	9	23.7
MALMR	5	13.2
Media	2	5.3
Family	2	5.3
Friends	2	5.2
Self (own experience)	1	2.6
None	4	10.5
<i>Third Most Important</i>		
None	14	36.8
MALMR	8	21.1
Other farmers	6	15.8
Friends	5	13.2
Family	2	5.3
Agro-shops	2	5.3
Media	1	2.6

Objective 5: The Deterrents to Participation*5a. Describe FFS Program Completers, Non-Completers, and Non-Participants by the Deterrents to Participation*

Completers ($M=2.49$, $SD=.39$) tended to disagree with the statements regarding the life situation factors which may have played a role in their participation in FFS

(Table 30). Completers ($M=3.36$, $SD=.39$) most strongly agreed with the statement, “The agricultural officer encouraged me to participate in FFS.” They ($M=1.71$, $SD=.39$) most strongly disagreed with the statement, “A health problem kept me from participating in FFS.”

Completers ($M=3.41$, $SD=.44$) agreed with all of the statements regarding the convenience factors of participating in a FFS. Completers agreed ($M=3.19$, $SD=.44$) with all of the statements about the process and application of participation in a FFS. Completers agreed ($M=3.38$, $SD=.43$) with all of the statements regarding the climate for learning in the FFS. Completers agreed ($M=3.31$, $SD=.46$) with all of the statements on the construct *Institutional factors: Outcomes*.

Program completers tended to agree ($M=3.16$, $SD=.37$) with the statements concerning their *Personal Preferences*. Completers agreed with all of the statements, with the exception of, “I like learning by myself more than with a group of people” ($M=2.18$, $SD=.88$). The last four questions of the construct *Personal Preferences* were reversed coded so that all of the statements would be positively worded.

Table 30

FFS Completers (n=56): Factors Impacting Participation

Statements	Completers	
	<i>M</i>	<i>SD</i>
<i>Life situation factors</i>		
The agricultural officer encouraged me to participate in FFS.	3.36	.75
I saw FFS as a chance to learn how to improve my income.	3.29	.59
A friend or family member encouraged me to participate in FFS.	2.89	.91
Responsibilities at work/farming kept me from participating in the FFS.	1.89	.65
Responsibilities at home kept me from participating in FFS.	1.80	.84
A health problem kept me from participating in FFS.	1.71	.73
Construct	2.49	.39
<i>Institutional factors: Convenience</i>		
FFS was offered in a safe place.	3.48	.50
I am happy with the frequency of the FFS meetings.	3.46	.57
FFS was offered at a convenient location.	3.43	.68
FFS was scheduled at a convenient time.	3.43	.57
FFS was offered in an acceptable location.	3.39	.49
I am satisfied with the length of the FFS meetings.	3.30	.66
Construct	3.41	.44
<i>Institutional factors: Process and Application</i>		
Topics covered in FFS were important to my farming situation.	3.46	.54
The practices promoted in FFS are relevant to my farming situation.	3.29	.68
The real problems on my farm were addressed.	3.07	.91
I have suggested to farmers in my community that they participate in FFS.	2.96	.91
Construct	3.19	.44
<i>Institutional factors: Climate</i>		
I could freely voice my opinions during FFS meetings.	3.61	.49
My FFS group usually accomplished our daily agenda.	3.36	.65
The FFS facilitator asked the students what they wanted to learn.	3.30	.60
FFS program activities were well planned.	3.29	.76
Construct	3.38	.43

Table 30 (continued)

Statement	Completers	
	<i>M</i>	<i>SD</i>
<i>Institutional factors: Outcomes</i>		
I am aware of the benefits of FFS.	3.52	.50
I am happy with the quality of the FFS program.	3.48	.50
After FFS, I want to participate in other MALMR programs.	3.43	.62
FFS helped me improve the decisions I make on the farm.	3.34	.58
FFS participants are using IPM on their farms.	3.21	.71
FFS gave me new skills to help me cope with life.	2.91	.90
Construct	3.31	.46
<i>Personal preferences</i>		
I enjoy learning new things.	3.59	.50
I need to learn new farming skills.	3.55	.54
I like learning with a group of people rather than by myself.	3.39	.78
I only came to the FFS to support the officer*.	3.27	.75
The ministry does not have anything to offer me*.	3.20	.86
I know enough about farming and do not need the FFS*.	3.09	.88
I find that the teaching methods used in FFS are too childish*.	3.09	.82
I like learning by myself more than with a group of people.	2.18	.88
Construct	3.16	.37

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

*Reverse coded

Non-completers ($M=2.61$, $SD=.14$) tended to agree with the statements concerning the life situation factors (Table 31). They ($M=2.93$, $SD.46$) most strongly agreed with the statement, “The agricultural officer encouraged me to participate in FFS.” Non-completers ($M=1.71$, $SD.70$) most strongly disagreed with the statement, “A health problem kept me from participating in FFS.”

Non-completers ($M=3.01$, $SD=.38$) tended to agree with all of the statements regarding the *Institutional factors: Convenience*. They ($M=3.06$, $SD=.32$) also agreed with all of the statements in the construct *Institutional factors: Climate*.

Non-completers ($M=2.70$, $SD=.42$) tended to agree with the statements in the construct *Institutional factors: Process and Application*. They agreed most strongly with the statement, “The practices promoted in FFS are relevant to my farming situation” ($M=2.93$, $SD=.70$). Non-completers ($M=2.40$, $SD=.63$) most strongly disagreed with the statement, “I have suggested to farmers in my community that they participate in FFS.”

Non-completers ($M=2.81$, $SD=.37$) tended to agree with the statements on the construct *Institutional factors: Outcomes*. They ($M=3.20$, $SD=.86$) most strongly agreed with the statement, “I am happy with the quality of the FFS program,” and most strongly disagreed ($M=2.00$, $SD=.54$) with the statement, “FFS gave me new skills to help me cope with life.”

Non-completers tended to agree ($M=2.94$, $SD=.23$) with the statements concerning their *Personal Preferences*. Completers ($M=2.27$, $SD=.59$) agreed with all of the statements, with the exception of, “I like learning by myself more than with a group of people.” The last four questions of the construct *Personal Preferences* were reversed coded so that all of the statements would be positively worded.

Table 31

FFS Non-Completers (n=15): Factors Impacting Participation

Statements	Non-Completers	
	<i>M</i>	<i>SD</i>
<i>Life situation factors</i>		
I saw FFS as a chance to learn how to improve my income.	3.20	.68
The agricultural officer encouraged me to participate in FFS.	2.93	.46
A friend or family member encouraged me to participate in FFS.	2.73	.70
Responsibilities at work/farming kept me from participating in the FFS.	2.67	.49
Responsibilities at home kept me from participating in FFS.	2.40	.51
A health problem kept me from participating in FFS.	1.73	.70
Construct	2.61	.14
<i>Institutional factors: Convenience</i>		
I am happy with the frequency of the FFS meetings.	3.27	.46
FFS was offered in a safe place.	3.20	.41
FFS was offered at a convenient location.	3.07	.46
FFS was offered in an acceptable location.	3.00	1.00
I am satisfied with the length of the FFS meetings.	2.80	.78
FFS was scheduled at a convenient time.	2.73	.70
Construct	3.01	.38
<i>Institutional factors: Process and Application</i>		
The practices promoted in FFS are relevant to my farming situation.	2.93	.70
Topics covered in FFS were important to my farming situation.	2.87	.51
My real problems on my farm were addressed.	2.60	.63
I have suggested to farmers in my community that they participate in FFS.	2.40	.63
Construct	2.70	.42
<i>Institutional factors: Climate</i>		
I could freely voice my opinions during FFS meetings.	3.20	.41
My FFS group usually accomplished our daily agenda.	3.13	.35
The FFS facilitator asked the students what they wanted to learn.	3.13	.35
FFS program activities were well planned.	2.80	.56
Construct	3.06	.32

Table 31 (continued)

Statement	Non-Completers	
	<i>M</i>	<i>SD</i>
<i>Institutional factors: Outcomes</i>		
I am happy with the quality of the FFS program.	3.20	.86
FFS helped me improve the decisions I make on the farm.	3.00	.38
After FFS, I want to participate in other MALMR programs.	3.00	.54
I am aware of the benefits of FFS.	2.87	.64
FFS participants are using IPM on their farms.	2.80	.41
FFS gave me new skills to help me cope with life.	2.00	.54
Construct	2.81	.37
<i>Personal Preferences</i>		
I enjoy learning new things.	3.20	.41
I need to learn new farming skills.	3.20	.56
I like learning with a group of people rather than by myself.	3.07	.80
I only came to the FFS to support the officer*.	3.07	.60
I find that the teaching methods used in FFS are too childish*.	3.00	.00
The ministry does not have anything to offer me*.	2.93	.46
I know enough about farming and do not need the FFS*.	2.80	.41
I like learning by myself more than with a group of people.	2.27	.59
Construct	2.94	.23

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

*Reverse coded

Non-participants tended to disagree ($M=2.50$, $SD=.34$) with the statements about the life situation factors impacting participation (Table 32). They ($M=3.29$, $SD=.90$) most strongly agreed with the statement, “Responsibilities at work/farming kept me from participating in FFS.” Non-participants ($M=1.50$, $SD=.69$) most strongly disagreed with the statement, “A health problem kept me from participating in FFS.” In addition, non-participants ($M=2.47$, $SD=.95$) disagreed with the statement, “I saw FFS as a chance to learn how to improve my income.”

Non-participants ($M=2.74$, $SD=.54$) tended to agree with the statements concerning the issues of convenience influencing participation. The statement, “FFS was offered in an acceptable location” received the highest mean score ($M=3.26$, $SD=.86$) while the statement, “FFS was scheduled at a convenient time” received the lowest mean score ($M=1.92$, $SD=.92$).

Non-participants ($M=2.69$, $SD=.59$) indicated an overall agreement with the statements on the construct *Institutional factors: Process and Application*. They ($M=3.58$, $SD=.64$) agreed most strongly with the statement, “I have suggested to farmers in my community that they participate in FFS.” They ($M=2.26$, $SD=.59$) most strongly disagreed with the statement, “My real problems on my farm were addressed.” In addition, non-participants ($M=2.37$, $SD=.97$) disagreed with the statement, “Topics covered in FFS were important to my farming situation.”

Non-participants ($M=2.88$, $SD=.60$) tended to agree with the statements on the construct *Institutional factors: Outcomes*. The statement, “I am aware of the benefits of FFS,” was the only statement on the construct with which the non-participants disagreed ($M=2.37$, $SD=.71$).

Non-participants ($M=2.96$, $SD=.49$) tended to agree with the statements concerning their *Personal Preferences*. Non-participants agreed with all of the statements. Worth noting is that non-participants ($M=2.76$, $SD=1.03$), but not completers or non-completers, agreed with the statement, “I like learning by myself more than with a group of people.”

Table 32

FFS Non-Participants (n=38): Factors Impacting Participation

Statement	Non-Participants	
	<i>M</i>	<i>SD</i>
<i>Life situation factors</i>		
Responsibilities at work/farming kept me from participating in the FFS.	3.29	.90
The agricultural officer encouraged me to participate in FFS.	2.74	.86
A friend or family member encouraged me to participate in FFS.	2.55	.83
Responsibilities at home kept me from participating in FFS.	2.47	.98
I saw FFS as a chance to learn how to improve my income.	2.47	.95
A health problem kept me from participating in FFS.	1.50	.69
Construct	2.50	.34
<i>Institutional factors: Convenience</i>		
FFS was offered in a safe place.	3.34	.89
FFS was offered in an acceptable location.	3.26	.86
FFS was offered at a convenient location.	2.74	1.03
I am happy with the frequency of the FFS meetings.	2.66	.91
I am satisfied with the length of the FFS meetings.	2.55	.95
FFS was scheduled at a convenient time.	1.92	.94
Construct	2.74	.54
<i>Institutional factors: Process and Application</i>		
I have suggested to farmers in my community that they participate in FFS.	3.58	.64
The practices promoted in FFS are relevant to my farming situation.	2.58	.79
Topics covered in FFS were important to my farming situation.	2.37	.97
My real problems on my farm were addressed.	2.26	1.13
Construct	2.69	.59
<i>Institutional factors: Outcomes</i>		
I expect that the FFS program will be of high quality.	3.32	.90
I want to participate in other MALMR programs.	3.16	.75
I want to participate in FFS sometime in the future.	3.13	.81
I expect that FFS participants are using IPM on their farms.	2.71	.80
I am interested in joining FFS.	2.63	.94
I am aware of the benefits of FFS.	2.37	.71
Construct	2.88	.60

Table 32 (continued)

Statement	Non-Participants	
	<i>M</i>	<i>SD</i>
<i>Personal preferences</i>		
I enjoy learning new things.	3.39	.50
I need to learn new farming skills.	3.21	.78
I only came to the FFS to support the officer*.	3.16	.79
I find that the teaching methods used in FFS are too childish*.	3.05	.77
I know enough about farming and do not need the FFS*.	2.84	1.00
I like learning by myself more than with a group of people.	2.76	1.03
The ministry does not have anything to offer me*.	2.68	.96
I like learning with a group of people rather than by myself.	2.58	1.03
Construct	2.96	.49

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

*Reverse coded

5b. Determine if a Significant Relationship Exists Between the Factors That Impact

Participation and Participation Status

A one-way between-groups analysis of variance was conducted to explore the relationships between participation status and the constructs *Life Situation Factors*, *Institutional Factors*, and *Personal Preference Factors* (Table 33). There was a statistically significant relationship between participation status and all of the constructs, except one: life situation factors and participation status [$F(2,106)=.70, p>.05$]. The finding was that completer, non-completers, and non-participants did not differ in their degree of agreement with the statements concerning the life situation factors.

A statistically significant relationship was found between participation status and the *Institutional factors: Convenience* [$F(2,106)=23.6, p<.05$]. The effect size (Cohen, 1988) was large (eta squared=.31). Thirty-one percent of the variance in their perceptions of convenience factors was explained by their participation status. The post-

hoc analysis (Table 34) indicated that the mean score for completers ($M=3.41$, $SD=.43$) was significantly different from that of the non-participants ($M=2.74$, $SD=.53$) and non-completers ($M=2.61$, $SD=.14$). The finding was that completers agreed much more strongly than did non-completers or non-participants with the statements regarding the schedule and meeting place convenience factors.

A statistically significant relationship was found between participation status and the *Institutional factors: Process and Application* scores [$F(2,106)=14.9$, $p<.05$]. The effect size (Cohen, 1988) was large (eta squared=.22). Twenty-two percent of variance in the processes and application scores can be explained by participation status. The post-hoc analysis (Table 35) indicated that the mean score for completers ($M=3.19$, $SD=.39$) was significantly different from the mean of the non-participants ($M=2.69$, $SD=.59$) and non-completers ($M=2.70$, $SD=.42$). The finding was that completers agreed much more strongly than did non-completers and non-participants with the statements regarding the process and application elements of the institutional factors.

A statistically significant relationship was found between participation status and the *Institutional factors: Outcomes* [$F(2,106)=10.7$, $p<.05$]. The effect size (Cohen, 1988) was large (eta squared=.17). Seventeen percent of the variance in the *Outcome*

scores can be explained by participation status. The post-hoc test (Table 36) indicated that the mean score for completers ($M=3.31$, $SD=.46$) was significantly different from the mean of the non-completers ($M=2.81$, $SD=.37$) and non-participants ($M=2.88$, $SD=.60$). The finding was that completers agreed much more strongly than did non-completers and non-participants with the statements concerning their expectations of the outcomes of FFS.

A statistically significant relationship was found between participation status and the *Personal Preferences* scores [$F(2,106)=3.85$, $p<.05$]. The effect size (Cohen, 1988) was moderate (eta squared=.08). Eight percent of the variance in *Personal Preferences* scores was explained by participation status. The post-hoc analysis (Table 37) indicated that the mean score for completers ($M=3.16$, $SD=.37$) was significantly different from the mean of the non-completers ($M=2.94$, $SD=.23$) and non-participants ($M=2.96$, $SD=.49$). The finding was that completers agreed much more strongly than did non-completers and non-participants with the statements regarding their personal learning preferences.

Table 33

Analysis of Variance: Factors Impacting Participation by Participation Status (N=109)

Constructs	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>d</i>
<i>Life situation factors</i>						
Completers	56	2.49	.39	.70	.50	.01
Non-Completers	15	2.61	.14			
Non-Participants	38	2.50	.34			
<i>Institutional factors: Convenience</i>						
Completers	56	3.41	.43	23.6	.00*	.31
Non-Completers	15	3.01	.38			
Non-Participants	38	2.74	.53			
<i>Institutional factors: Process and Application</i>						
Completers	56	3.19	.39	14.9	.00*	.22
Non-Completers	15	2.70	.42			
Non-Participants	38	2.69	.59			
<i>Institutional factors: Outcomes</i>						
Completers	56	3.31	.46	10.7	.00*	.17
Non-Completers	15	2.81	.37			
Non-Participants	38	2.88	.60			
<i>Personal Preferences</i>						
Completers	56	3.16	.37	3.85	.02*	.08
Non-Completers	15	2.94	.23			
Non-Participants	38	2.96	.49			

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < 0.05$

Cohen's *d* (1988): 0.01-.059 (small effect), 0.06-.139 (moderate effect), 0.14 or more (large effect)

Table 34

Post Hoc: Institutional Factors (Convenience) by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)
Non-Participants	2.74
Non-Completers	3.01
Completers	3.41

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Table 35

Post Hoc: Institutional Factors (Process and Application) by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)
Non-Participants	2.69
Non-Completers	2.70
Completers	3.19

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Table 36

Post Hoc: Institutional Factors (Outcomes) by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)
Non-Completers	2.81
Non-Participants	2.88
Completers	3.31

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Table 37

Post Hoc: Personal Preferences by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)	
Non-Completers	2.94	
Non-Participants	2.96	
Completers		3.16

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Statements on the construct *Institutional Factors: Climate* were asked of the FFS program completers and non-completers based on their experience during the FFS educational program. Not having participated in the educational program, non-participants were not asked about their perceptions of the educational climate within FFS. Therefore, it was appropriate to conduct an independent-samples t-test to investigate whether there were statistically significant differences in the perceptions of FFS program completers and non-completers regarding the educational climate in FFS.

A statistically significant relationship was found between completers ($M=3.38$, $SD=.42$) and non-completers [$M=3.06$, $SD=.31$; $t(69)=2.72$, $p<.05$] regarding the educational climate in the FFS (Table 38). The effect size (Cohen, 1988) was moderate ($\eta^2=.10$). Non-completers gave lower scores than did completers to all the statements regarding the educational climate of the FFS. The finding was that completers agreed more strongly than non-completers with the statements regarding the educational climate in the FFSs.

Table 38

T-test: Completers' (n=56) and Non-Completers' (n=15) Perceptions of Institutional Factors (Climate)

Constructs	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>d</i>
Completers	3.38	.42	2.72	.01*	.10
Non-Completers	3.06	.31			

Notes. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

p<.05

Cohen's *d* (1988): 0.01-.059 (small effect), 0.06-.139 (moderate effect), 0.14 or more (large effect)

Objective 6: Competitions

6a. Describe FFS Program Completers, Non-Completers, and Non-Participants by the Usefulness of Competitions as a Means for Increasing the Popularity of FFS

Completers (*M*=3.16, *SD*=.52) and non-completers (*M*=2.93, *SD*=.49) tend to agree with the statements regarding the usefulness of competitions as a way to increase the popularity of FFS (Table 39).

Table 39

Completers' (n=56) and Non-Completers' (n=15) Perceptions of the Usefulness of Competitions as a Means for Increasing the Popularity of FFSs

Statements	Completers		Non-Completers	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Competitions as a way to increase the popularity of FFS</i>				
An FFS-sponsored vegetable-growing competition for FFS participants will increase the popularity of FFS in my community.	3.30	.50	2.93	.46
An FFS-sponsored competition within FFSs will increase learning.	3.30	.66	3.00	.54
An FFS-sponsored competition between several FFSs will increase learning.	3.11	.84	2.93	.80
I like participating in competitions.	2.96	.76	2.87	.74
Construct	3.16	.52	2.93	.49

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

Non-participants tended to disagree ($M=2.35$, $SD=.90$) with the statements regarding the usefulness of competitions as a means for increasing the popularity of a FFS (Table 40).

Table 40

Non-Participants' (n=38) Perceptions of the Usefulness of Competitions as a Means for Increasing the Popularity of FFSs

Statements	Non-Participants	
	<i>M</i>	<i>SD</i>
<i>Competitions as a way to increase the popularity of the FFS</i>		
I like competitions.	2.61	.95
A vegetable-growing competition will encourage me to join FFS.	2.13	.99
Construct	2.35	.90

Note. 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

6b. Determine if a Significant Relationship Exists Between Respondents' Perceptions of the Usefulness of Competitions as a Means for Increasing the Popularity of FFS and Participation Status

A statistically significant relationship was found between participation status and the perception as to whether or not competitions are a viable means for increasing the popularity of FFS [$F(2,106)=16.4, p<.05$]. The effect size (Cohen, 1988) was large (eta squared=.24) (Table 41). Twenty-four percent of the variance in their perceptions regarding competitions was explained by their participation status. The post-hoc comparison of means (Table 42) indicated that the mean score for non-participants ($M=2.35, SD=.90$) was significantly different from non-completers ($M=2.93, SD=.49$) and completers ($M=3.16, SD=.52$). The finding was that non-participants disagreed with the statements regarding the use of competitions to increase the popularity of FFS while the completers and non-completers agreed with the same statements.

Table 41

Analysis of Variance: Perceptions on Competitions as a Way to Increase the Popularity of FFS by Participation Status (N=109)

Constructs	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>d</i>
<i>Competitions as a way to increase the popularity of FFS</i>						
Completers	56	3.16	.52	16.4	.00*	.24
Non-Completers	15	2.93	.49			
Non-Participants	38	2.35	.90			

Notes: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

* $p < 0.05$

Cohen's *d* (1988): 0.01-.059 (small effect), 0.06-.139 (moderate effect), 0.14 or more (large effect)

Table 42

Post Hoc: Competitions as a Way to Increase the Popularity of FFS by Participation Status (N=109)

Participation Status	Means for Groups (Subset for alpha=.05)
Non-Participants	2.35
Non-Completers	2.93
Completers	3.16

Note: 1=Strongly Disagree; 2=Disagree; 3=Agree; 4=Strongly Agree

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the problem the study addressed, the research objectives, a summary of the methodology, a summary of the findings of the study, the conclusions and implications emerging from the findings, recommendations for future practice, and recommendations for further research.

Statement of the Problem

It has been noted (Dolly, 2005) that farmers' indiscriminate use of pesticides was causing great harm to human health, the environment, and unduly raising the cost of inputs. Particularly alarming is the use of pesticide "cocktails," containing up to 4 to 5 pesticides which may be applied between one to seven times weekly (Ramroop, et.al, 2000). To address this challenge, the Ministry of Agriculture, Lands, and Marine Resources (MALMR) has funded and managed Farmer Field Schools in more than thirty locations throughout Trinidad. The objective of the FFSs is to improve farmers' capacities for critical analyses, decision-making, and stimulating innovation for increased agricultural productivity while also safeguarding human health and the environment.

David Dolly of the University of the West Indies and Pauline Dowlath of MALMR identified participant attrition and non-participation as a challenge faced by agricultural extension in Trinidad and Tobago. The researchable problem addressed in this study was that the factors in completion, non-completion, and non-participation in

Farmer Field Schools in Trinidad and Tobago were not known. Farmer Field Schools are used as a vehicle for agricultural extension in all regions of the world. Despite the global phenomenon, “the issue of participation in farmer field schools has barely been touched in the literature.” (p. 94) The absence of literature on the issues surrounding participation in FFS in Trinidad and Tobago and elsewhere hinders the knowledge-base required for effective scaling-up of this approach in Trinidad and Tobago and elsewhere. This research constitutes a first step in the development of new promising lines of inquiry.

Purpose and Objectives of the Study

The purpose of the study was to identify and analyze factors affecting completion, non-completion, and non-participation in FFS in Trinidad and Tobago. Following are the research objectives identified to accomplish the purpose of the study.

1. Determine the personal characteristics of FFS completers, non-completers, and non-participants.
 - a. Describe selected personal characteristics of FFS completers, non-completers, and non-participants.
 - b. Describe the relationship between participation status and personal characteristics.
2. Identify the motivations for participation in a FFS.
 - a. Describe FFS completers’ and non-completers’ motivations for participation in a FFS at the beginning of the program.

- b. Determine if a significant relationship exists between motivations for participation and completion or non-completion of FFSs.
3. Determine the perceptions of selected farming practices (i.e., integrated pest management, financial factors, and the compatibility of integrated pest management in the social setting).
 - a. Describe FFS completers' and non-completers' perceptions of selected farming practices at the beginning of the FFS.
 - b. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the beginning of a FFS.
 - c. Describe FFS completers' and non-completers' perceptions of selected farming practices at the end of a FFS.
 - d. Determine if there is a statistically significant difference in completers' and non-completers' perceptions of selected farming practices at the end of the FFS.
 - e. Determine if there was a statistically significant change in completers' perceptions at the beginning and end of a FFS on selected farming practices.
 - f. Determine if there was a statistically significant change in non-completers' perceptions at the beginning and end of FFS on selected farming practices.
 - g. Describe FFS program non-participants by selected farming practices.

- h. Determine if a significant relationship exists between participation status and perceptions about selected farming practices.
- 4. Establish the priority rankings of their sources of information for farming.
 - a. Describe completers' priority ranking of their sources of information for farming at the beginning and end of FFS.
 - b. Describe FFS non-completers' priority ranking of their sources of information for farming at the beginning and end of a FFS.
 - c. Describe FFS non-participants' priority rankings of their sources of information for farming.
- 5. Identify the deterrents to participation in the FFS.
 - a. Describe FFS program completers, non-completers, and non-participants by the deterrents to participation (life situation factors, institutional factors, and dispositional factors).
 - b. Determine if a significant relationship exists between the deterrents to participation and participation status.
- 6. Determine the usefulness of competitions as a means for increasing the popularity of FFSs.
 - a. Describe FFS program completers, non-completers, and non-participants as to their perceptions of the usefulness of competitions as a means for increasing the popularity of the FFSs.

- b. Determine if a significant relationship exists between respondents' perceptions of the usefulness of competitions as a means for increasing the popularity of FFS and participation status.

Summary of the Methodology

Type of Research and Theoretical Framework

This study employed an ex post facto, causal comparative research design. The theoretical framework of this study was based on the Androgogical Model, as presented by Knowles (2005). Knowles' theory of andragogy, that is, the principles of adult learning that may be distinguished from the principles of child learning, inform agricultural education and extension practice. Farmer Field Schools, an innovative contemporary vehicle for agricultural education and extension, employs the principles of adult education. In addition, this study focused on the issue of participation in FFS, a topic largely overlooked in the literature.

Population and Sample

The population was FFS-participating and non-participating farmers in Trinidad and Tobago. The sample was limited to farmers who participated (i.e., completers and non-completers) in five specific FFSs and farmers who possessed knowledge of the program but chose to not participate.

FFS completers began and were active participants until the end of the educational program. These individuals were recognized at the end of the program as FFS graduates at the graduate-recognition ceremony. FFS program non-completers were

those farmers who initiated participation in the FFS program but at the end of the program were not active members of the FFS group. These individuals were not recognized as FFS graduates at the graduate-recognition ceremony. Non-participants were classified as such because they fit at least one of the following descriptions: 1) The agricultural officer (i.e., extension agent) met with the intended participant and after describing the Field School to the person, the person declined an invitation to participate. 2) The individual visited the introductory Farmer Field School activity and decided not to continue to participate in the school. 3) A member of the community or someone else described the school to the intended participant and the person decided not to participate.

There were one-hundred nine respondents: fifty-six completers (51.3%), fifteen non-completers (13.7%), and thirty-eight non-participants (34.8%) across five Farmer Field Schools. The five FFSs were at Transfer Village, La Trinidad, Grand Fond, Cemetery Trace, and Platanite.

- Transfer Village FFS is located in the Debe District, County Victoria, in southern Trinidad.
- La Trinidad FFS is located in the Talparo District, County Saint George East, in north-central Trinidad.
- Grand Fond FFS is located in the Santa Cruz District, County Saint George West, in northwest Trinidad.
- Cemetery Trace FFS is located in the Freeport District, County Caroni, in central Trinidad.

- Platanite FFS is located in the Rochard District, County Saint Patrick East, in south Trinidad.

These five FFS were selected by MALMR personnel and the researcher due to the time frame established by the researcher, the overlapping schedules of operation of the FFS, and the availability of extension personnel who served as data collectors.

Respondents were selected by the FFS facilitators and the data collectors. The data collectors gathered information from all of the program participants (completers and non-completers: $n=71$) for the questionnaire *Participants at the Beginning of the Educational Cycle*. At the end of the educational cycle, the non-completers were identified by the agricultural officers who serve as FFS facilitators on a weekly basis and by the program completers. The non-participants were identified by the FFS facilitators, program completers, and program non-completers.

Instrument Development

Three instruments (*Participants at the Beginning of the Educational Cycle*, *Completers and Non-Completers*, and *Non-Participants*) were developed to gather information from the program completers, non-completers, and non-participants. The questionnaires included quantitative, closed-ended category scale questions on a four point Likert-scale measuring the farmers' agreement levels (1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree) with statements. The open-ended questions were limited to seven questions requesting personal information: the number of friends who had previously participated in an FFS, the number of family members who had previously participated in an FFS, age, the size of their farm, the number of years they

had lived in the community, the number of years they had farmed, and the percentage of annual income derived from agriculture. The administration of each of the three questionnaires took approximately fifteen to twenty minutes to complete.

Validity and Reliability

The instruments were checked for face and content validity by a panel of fifteen MALMR extension agents with vast experience conducting FFSs in Trinidad and Tobago. The panel gave suggestions to improve the clarity and cultural sensitivity of the questions.

The constructs of the three instruments were reliable. By the standard of a minimum Cronbach alpha of 0.7, only eight of the eighteen constructs suggested sufficient reliability. Tuckman (1999) opined, however, that the minimum reliability for attitude tests (i.e., perceptions) is .50. Ary, Jacobs, and Razavieh (1996) also supported the minimum threshold of 0.50. By a minimum standard of Cronbach alpha of 0.50 (Tuckman, 1999; Ary, Jacobs & Razavieh, 1996), fourteen of the eighteen constructs were considered sufficiently reliable.

Data Collection

Data were collected from May to September 2007. Five MALMR agricultural officers who serve as FFS facilitators and were members of the panel were selected to carry out the survey in the five FFS. The five extension agents were selected by MALMR personnel to serve as data collectors due to their familiarity with the purposes and methods used in FFS, their professionalism, and integrity.

Training was conducted to ensure that the interviewers would follow a standard protocol, thus ensuring the content validity of the instruments. In addition, a measure for reducing social desirability bias was established. The data collectors (i.e., the agricultural officers) traveled to FFSs outside of their geographic region. They did not know any of the respondents, thus reducing the possibility of social desirability bias.

The 109 respondents were not compensated for their contributions to the study. The data collectors, however, were financially compensated for their services rendered. At the onset of administering the survey, the data collectors ensured respondents' confidentiality. Each respondent had the right to refuse participation in the study. The questionnaires were coded to ensure confidentiality and to facilitate the exploration of the relationships between the perceptions of FFS program completers, non-completers, and non-participants. Data were collected in conformity with the research guidelines set by the Texas A&M University Institutional Review Board (IRB).

Data Analysis

Quantitative data analysis was conducted via the Statistical Package for Social Sciences (SPSS Version 15) to determine reliability of the instruments, frequencies, percentages, means, standard deviations, chi-square test for independence, independent samples t-tests, paired samples t-tests, one way analysis of variance (ANOVA), and post-hoc tests of differences. Alpha for all statistical procedures was set a priori at 0.05.

Key Findings, Conclusions, Implications, and Recommendations for Future Practice

This section presents a summary of the key findings, conclusions, implications, and recommendations for future practice for each of the six research objectives.

Objective 1: Personal Characteristics

This study established that there were no statistically significant differences between participation status and the following variables: the number of family members who have participated in FFS, the size of their farm, the number of years lived in the community, the number of years farmed, the percentage of annual income derived from agriculture, marital status, educational background, and whether they had participated in agricultural extension programs prior to FFS. This study found statistically significant relationships between participation status and three personal characteristics: the number of friends who have participated in FFS, age, and gender.

The first key finding was that completers had more friends who had participated in FFSs than did non-completers and non-participants. The conclusion is that individuals with a greater number of participating friends are more likely to complete the program. The implication is that a greater number of individuals with many friends in the FFS may decrease the likelihood of non-completion. A second implication is that the participation of family members in the FFS has no bearing on participation status.

Therefore, it is recommended that in the process of initiating an FFS, FFS facilitators make special efforts to encourage the potential program participants to invite

their friends. FFS facilitators may, of course, encourage the potential participants to invite their family members, but the participation of friends, rather than family, is more likely to increase the rates at which the farmers complete the program.

A second finding was that men disproportionately outnumbered women in the FFS. The conclusion is that few women participated in the FFSs. The implication is that more women should participate in FFSs.

Therefore, it is recommended that MALMR determine whether a concerted effort to encourage the participation of women in the FFSs is merited or whether the proportion of men to women in the FFSs mirror the cultural norms for gender roles, thus, not requiring a campaign for increasing the participation of females in FFS. FFS programs have historically sought to empower marginalized populations, including women (Pontius, Dilts, & Bartlett, 2000; Davis, 2006). As mentioned in Chapter II, Dolly (2005) pointed out that in the first two FFSs conducted in Trinidad and Tobago, there were more female than male participants. In the five FFS upon which this study is based, however, men far outnumbered the women. The total number of men ($n=86$; 78.9%) respondents across the classifications of completers, non-completers, and non-participants vastly outnumbered women respondents ($n=23$; 21.1%). Men constituted roughly two-thirds of the completers (73%) and non-completers (67%). This aligns with Ramroop et.al.'s (2000) observation about gender roles in Trinidad and Tobago: "Gender roles on the farm are clearly defined with the male being responsible for decision-making, while females are merely assistants." (p. 63)

The statistically significant difference found between participation levels and gender is likely a function of sampling bias, particularly with regards to the sample of non-participants (Males: $n=35$; 92.1% of non-participants; Females: $n=3$; 7.9% of non-participants). Agriculture in Trinidad and Tobago is a male-dominated sector. It is possible that non-participating males were resistant to letting their wives respond to the survey. Non-participating females may have chosen to not respond to remain within the socially acceptable norms.

The third finding was that, on average, the non-completers were the youngest ($M=40$), the completers were the middle group in age, and non-participants were the oldest ($M=49$). The average ages in the three groups ranged from forty to fifty. While it is not feasible or ethical for the MALMR to target younger farmers to the exclusion of older farmers, it is helpful to possess the awareness that there is a significant relationship between age and participation status. It is unlikely that an increased awareness that there is a significant relationship between age and participation status will impact FFS practice.

Objective 2: Motivations for Participation

The first key finding is that at the beginning of the FFS program there already existed some significant differences among program completers and non-completers. It is likely that these differences were inherent to each group, thus serving as a filter for the messages received and impacting their likelihood to persist or desist in the program. The conclusion is that there is little, if anything, that the MALMR can do about the

individuals' perceptions prior to the educational program. The implication is that the FFS facilitators can change participants' minds once they made the decision to join the FFS group. It is recommended that MALMR agricultural officers note the differing motivations of FFS completers and non-completers and implement strategies to meet the participants' needs, thus resulting in more effective FFSs.

As a result of this study, it was established that a significant relationship existed between participation status and four of the five constructs testing their motivations for participation in FFS. There were statistically significant differences between completers and non-completers on 1) their social reasons for participating in FFS (with a small effect size), 2) their concern for other people, community, humanity, and the environment (with a moderate effect size), 3) their expectations for improving occupational performance and status (with a moderate effect size), and 4) their cognitive interest (with a moderate effect size). Completers and non-completers did not differ in their perception of participation in FFS as a means for stimulation and escape (i.e., both completers and non-completers disagreed with the idea that FFS provided an escape from the routines of daily life.)

A second finding was that completers agreed more than did non-completers with the statements regarding social reasons for participation. The conclusion is that social reasons for participation are more important to completers than they are for non-completers. An implication exists that completers are more driven by social reasons to participate in FFS than were non-completers.

Therefore, it is recommended that FFSs facilitators emphasize the social aspects of FFS. For example, the extension officers should ensure that participants invite their friends and family to participate with them in FFS. As noted in Research Objective 1, having a large number of friends participate in FFS is a statistically significant predictor of completion. Having a large number of family members, however, is not a statistically significant predictor of completion. The FFS facilitators should encourage participants to first invite their friends, and second, their family members.

Another recommendation considers the difference in completers' ($M=2.63$, $SD=1.12$) and non-completers' ($M=1.73$, $SD=.59$) responses to the statement, "I joined FFS to belong to a group." The FFS facilitators would do well not to neglect the "group dynamic activities," an essential component of the weekly FFS meeting (Gallagher, 2002). The group dynamic activities are designed to build group cohesion. Considering that completers are drawn to FFS because they wanted to belong to a group, the group dynamic activities should be duly emphasized.

A third key finding is that completers agreed more than did the non-completers with the statements regarding their concern for other people and the environment. The conclusion is that completers possessed a greater concern for their surroundings than did non-completers. An implication exists that those individuals with less concern for the environment are more likely to not complete the FFS program because they do not understand the negative impacts of pesticides on eco-systems and their potentially positive role by adopting IPM farming methods.

Therefore, it is recommended that the FFS facilitators emphasize, particularly during the first few FFS weekly meetings, the potentially negative impacts of agriculture in general on the environment, and especially the use of pesticides on local agro-ecological systems. The goal is that the participants who expressed less concern for other people and the environment (i.e., likely to be non-completers) would be convinced of their responsibility to safeguard the local agro-ecosystem and human health. This effort may be achieved through the use of educational materials and/or testimonials from other farmers (i.e., near peers). Of these two approaches, the influence of near peers, especially local opinion leaders, is most effective to convince individuals in the persuasion and decision stages of the innovation-decision process (Rogers, 2003).

A second recommendation is that at the beginning of a FFS educational cycle, the FFS facilitators have the participants complete a questionnaire regarding their motivations for participation. The questionnaire would test the constructs presented in research objective two. The information gathered through the questionnaire would enable the FFS facilitators to more effectively target participants who enter FFS according to their beliefs and perceptions regarding the environment, farming practices, and other critical issues for FFS. If a pencil-and-paper questionnaire is not a viable option due to low literacy rates, the FFS facilitators could use the rapid rural appraisal (RRA) data-collection methodology.

A fourth key finding was that completers agreed more than did the non-completers with the statements regarding their expectations for improving their occupational performance and status. The conclusion is that completers had higher

expectations than did non-completers that participation in a FFS would improve their occupational performance and status. An implication exists that those individuals (i.e., non-completers) who at the beginning of FFS possessed little hope that the training received would improve their farming skills, income, and standing in the community were more likely to not complete the educational program.

It is recommended that FFS facilitators emphasize from the beginning of the educational cycle the ways in which IPM may improve farmers' agricultural production, and as a result, improve their standing in the community. In addition, it is recommended that the FFS facilitators bring program completers from previous FFSs, especially the local opinion leaders, to share their experiences. Visits by former FFS completers would be most effective toward the beginning of the educational cycle, as perceptions about the utility of IPM for improving production and the benefits to the environment are taking shape early in the educational cycle.

A fifth key finding is that completers agreed more than did non-completers with the statements regarding their cognitive interest as a motivation for participation in FFS. For instance, completers and non-completers differed on the statements, "I like learning just to know more" and "I enjoy learning new things." The conclusion is that cognitive interest is a motivation to participate for the FFS completers much more so than it is for the non-completers. An implication exists that the individuals (i.e., non-completers) who at the beginning of FFS gain less enjoyment from learning for the sake of learning, are more likely to not complete the FFS program.

Again, it is recommended that the FFS facilitators use a questionnaire, either of a pencil-and-paper variety or a rapid rural appraisal (RRA), to be able to distinguish who is and is not motivated to participate in FFS due to a sense of cognitive interest. With this information, the FFS facilitators may target their distinct audiences, thus increasing the participants' awareness of the usefulness of that which is to be learned. This task may be accomplished through an iterative process of reminding the participants that what they learn in FFS will help them confront the challenges they face daily: how to better manage their crops for increased agricultural productivity while safeguarding human health and the environment. According to Knowles (2005), the principle of andragogy indicates that learners desire to know why they need to learn something before attempting to learn it.

Objective 3: Farming Practices

To determine whether there were differences in the perceptions of completers and non-completers regarding 1) the use of pesticides in farming, 2) the financial factors involved in the adoption of IPM, and 3) the compatibility of IPM with the social setting in Trinidad and Tobago, a multi-pronged approach was implemented. First, two independent samples *t*-tests were run to determine whether there were significant differences in *completers'* and *non-completers'* perceptions at the beginning and end of the FFS. Second, two paired samples *t*-tests were run to determine whether there were significant differences in completers' and non-completers' perceptions at the *beginning* and *end* of the FFS.

The Use of Pesticides in Farming

As a result of this study, it was found that at the beginning of FFS, completers and non-completers differed significantly in their perceptions of the use of pesticides in farming (with a moderate practical significance). The finding was that at the beginning of FFS, completers agreed more strongly than did non-completers with the statements concerning the use of pesticides in farming. The conclusion is that before the educational programming (i.e., FFS), completers possessed a greater belief than did non-completers that pesticides negatively affect people and the environment. The implication is that individuals (i.e., non-completers) who did not hold strong beliefs concerning the negative impacts of pesticides on the environment are more likely to not complete the FFS.

At the end of FFS, however, there was not a significant difference between completers and non-completers on their views concerning the use of pesticides in farming. At the beginning of the FFSs, there was a statistically significant difference in the completers' and non-completers' views on the use of pesticide, but by the end of FFS, there was not a statistically significant difference in the completers' and non-completers' perceptions. The conclusion is that FFS completers' decreased their agreement with the statements on the use of pesticides in farming. This is an unexpected result, considering that one would expect FFS to increase the completers' perception that pesticides are harmful to the agro-ecosystem. This issue is further addressed in the following discussion on the pre/post test (i.e., paired-samples t-test).

A paired sample t-test was conducted to compare the completers' and non-completers' perceptions at the beginning and end of FFS with regards to the use of pesticides in farming at the beginning and end of FFS. Program completers displayed a significant decrease from the beginning ($M=3.17$, $SD=.47$) to the end ($M=2.83$, $SD=.58$) of FFS in their perceptions of the use of pesticides in farming. The magnitude of the difference was large (eta squared).

There are two possible conclusions: first, at the beginning of FFS, completers overestimated their opinions and, their actual opinions regarding the use of pesticide were revealed on the post-test. A second, and more plausible conclusion, is that as a result of their involvement in FFS, the completers became less concerned about the negative aspects of pesticide upon human health and the environment. For example, completers' agreement level marked a decrease from the beginning ($M=3.39$, $SD=.73$) and end ($M=3.13$, $SD=.52$) of FFS with the statement, "I believe that farmers' decisions affect people, animals, plants, and land." In addition, completers decreased their agreement level from the beginning ($M=2.50$, $SD=.87$) and end ($M=2.04$, $SD=.85$) of FFS on the statement, "Pollution from agricultural chemicals is a serious problem on my farm." This certainly was an unexpected finding.

A potential explanation for why the completers underwent such a dramatic change is based upon something the researcher heard about on a couple of occasions while in Trinidad, though he never saw it firsthand. In May 2007, the researcher visited five FFSs over the course of five days. In two of those FFSs, the FFS facilitator mentioned that a representative from an agro-shop had either visited the FFS the week

before or would visit with them the following week. The purpose of the visits was to discuss with the farmers (at the invitation of the FFS facilitators) the inputs and services offered by the agro-shop. It may be implied that the agro-shop representative dissuaded the farmers, including the completers, from believing the message regarding the use of pesticides and IPM that MALMR sought to transmit to the farmers.

In the pre/post test, non-completers did not increase their agreement with the statements concerning the use of pesticides in farming. Moreover, at the end of FFS, completers posted the lowest mean score of the three groups: completers ($M=2.83$, $SD=.58$), non-completers ($M=2.87$, $SD=.18$), and non-participants ($M=3.18$, $SD=.54$). An implication exists that the FFSs were ineffective in convincing the completers and non-completers that pesticides negatively impact the local agro-ecosystem. It is therefore recommended that MALMR assess the elements of the FFS program which address the impacts of pesticides on the environment and the methods used to convey that message.

The Financial Factors Involved in the Adoption of IPM

At the beginning of FFS, completers and non-completers did not differ in their perceptions of the financial factors involved in the adoption of IPM. By the end of the FFS program, there was a statistically significant difference in the perceptions of completers and non-completers with regard to the financial factors involved in the adoption of IPM. The conclusion is that completers were significantly more likely than non-completers to be willing to take on the financial risks involved in the adoption of IPM on their farms. The implication is that the non-completers were unwilling to take

on financial risk in order to adopt IPM on their farms and were uncertain of the financial benefits to adopting IPM. Non-completers need more convincing evidence of the financial payoff to adopting IPM methods. This finding corresponds to Dolly's (2005) observation that "if the school can show the possibilities to cut production cost while producing a product which consumers demand at premium prices," it will positively impact participation. Implicit in Dolly's statement is that farmers' adoption of IPM is dependent on the purchase and consumption preferences of the consumer. For this reason, the set of questions on the compatibility of IPM in the context of Trinidad were asked.

Compatibility of IPM in the Social Setting

At the beginning of FFS, completers and non-completers did not differ in their perceptions regarding the compatibility of IPM within the social setting. By the end of FFS, completers' held statistically significant higher scores than non-completers' concerning the belief that IPM is compatible with the setting of Trinidad and Tobago. The conclusion is that completers believed more strongly than did non-completers that IPM is compatible with agricultural practices and the market in Trinidad and Tobago. The implication is that the individuals who held a weak belief concerning the compatibility of IPM with the setting are more likely to not complete the FFS program.

The following recommendation applies to both the financial factors involved in the adoption of IPM and the compatibility of IPM in the social setting. It is recommended that MALMR conduct a study aimed at demonstrating that the farming methods taught in FFS, namely IPM, 1) can indeed cut farmers' production costs and 2)

that customers in Trinidad and Tobago want and are willing to pay for fruits and vegetables and fruits with less pesticide used in its growth cycle, or perhaps even consumers' willingness to purchase pesticide-free (i.e., organic) vegetables and fruits. The compatibility of IPM with the social setting is likely to be determined by whether there is an adequate market for IPM-produced fruits and vegetables. Then, it is critical that MALMR disseminate the findings of the study as a central component of the FFS training.

Objective 4: Priority Ranking of Sources of Information

The finding is that in a pre/post test, completers' priority rankings of their sources of information about farming did not change. Completers' most highly value the information received from MALMR, then the agro-shops, and finally, the other farmers. The conclusion is that for completers, their participation in FFS confirmed their belief that information from MALMR is trustworthy and valuable.

At the beginning of FFS, the respondents who at the end of the program were classified as non-completers, ranked MALMR as the most important source of information about farming practices and agro-shops as the second most important source (Table 27). At the end of FFS, however, non-completers ranked the agro-shops as the most important source of information. The finding was that in a pre/post test, non-completers' priority rankings of their sources of information changed. The conclusion is that non-completers' opinions of MALMR as a source of information about farming decreased. An implication exists that at the end of FFS, MALMR became less important

to the non-completers as a source of information.

One must approach this finding with caution, however. The small number of non-completer respondents ($n=15$) places limits on what we can conclude from this finding. At first glance, the pre-post test for program non-completers indicated that they changed their opinion over the course of the program. A more nuanced approach recognizes that non-completers did not undergo a meaningful change. At the beginning of FFS, five of fifteen non-completers indicated that MALMR was their most important source of information for farming while four of fifteen indicated that the agro-shops were their most important source of information. At the end of FFS, six of fifteen indicated that the agro-shops were their most important source of information while three of fifteen indicated that MALMR was their most important source of information. This means that it is possible that only one person changed their vote from the first to the second assessment, thus greatly minimizing the perception that there had been a meaningful change in the completers' perceptions.

Consequently, three conclusions can be drawn. First, whereas completers were likely to seek information from MALMR, the non-completers were more divided between the agro-shops and MALMR. Second, completers' and non-completers' participation in FFS did little to change their perceptions about their most important sources of information for farming. Third, it was likely that the small number of non-completers ($n=15$) constrained the potential for determining whether non-completers underwent any changes in their beliefs about their sources of information as a result of their involvement in FFS.

Non-participants ranked agro-shops as their most important source of information about farming. The conclusion is that for non-participants, MALMR did not rank very highly as a source of information. An implication exists that non-participants were more likely to seek information about farming from the agro-shops; they were unlikely to seek out extension officers of MALMR or other MALMR entities for information about farming.

Therefore, it is recommended that MALMR strengthen mechanisms for increased visibility among agricultural producers who have not had previous contact with the ministry. Dolly (personal communication, January 2006) reported that those who participated in the earliest FFSs in Trinidad and Tobago were individuals who had frequent contacts with the extension officers. He argued that for FFS to be a viable option as method of conducting agricultural extension in Trinidad and Tobago, farmers with little to no contact with the extension officers would have to be targeted. This study shows that MALMR was successfully reaching farmers with no previous contacts with the agricultural extension services. Completers (68%) and non-completers (60%) indicated that their involvement in FFS was their first time to participate in any agricultural extension program. This is a resounding success for MALMR. There are many more farmers who have yet to participate or have contact with the extension service; more than two-thirds (71%) of non-participants indicated that they had not participated in any agricultural extension programs.

It is recommended that MALMR increase their visibility among farmers with little to no previous contact. This may be accomplished by increasing the number of

FFSs around the country in addition to other agricultural education programming. It is advised that MALMR conduct a needs analysis of small-scale farmers and develop programs according to the needs analysis. This may increase the view of FFS non-completers and non-participants of MALMR as a valuable source of information of farming.

Objective 5: Deterrents to Participation

Dolly (2005) reported non-participants' purported reasons for not attending FFS. First, non-participants cited an unwillingness to give up their time, particularly considering the time commitment of weekly meeting times of four hours each week during the months of cultivation. Second, they believed that they did not need the training. Third, they claimed that they were unaware of the educational programming being offered.

This researcher explored the relationships between participation status in FFS and the perceptions of the life situation factors, institutional factors, and dispositional factors that inhibited participation and/or completion of FFS. The institutional factors were categorized by convenience factors, process and application factors, climate factors, and outcome factors. Within this study, Cross's term, "dispositional factors," is referred to as "personal preferences."

As a result of this study, a significant relationship was established between participation status and five of the six constructs: 1) institutional factors (convenience), 2) institutional factors (process and application), 3) institutional factors (outcomes), 4)

institutional factors (climate), and 5) personal preferences. With the exception of the personal preferences (moderate), all of the significant relationships held large practical significance (eta squared). The post hoc tests reveal that in each of the significantly different relationships, it is the completers who differed from the non-completers and non-participants.

One finding is that completers, non-completers, and non-participants did not differ in their degree of agreement with the statements concerning the life situation factors. The conclusion is that completers, non-completers, and non-participants held similar perceptions regarding the situational barriers that may have influenced participation decisions. The implication is that completers, non-completers, and non-participants did not view the life situation factors as presented in the construct as being deterrents to their participation in FFS. For example, completers ($M=1.71$, $SD=.73$), non-completers ($M=1.73$, $SD=.70$), and non-participants ($M=1.50$, $SD=.69$) disagreed with the statement, “A health problem kept me from participating in FFS.” In addition, completers ($M=2.89$, $SD=.91$), non-completers ($M=2.73$, $SD=.70$), and non-participants ($M=2.55$, $SD=.83$) agreed with the statement, “A friend or family member encouraged me to participate in FFS.”

Despite this finding, its reliability is uncertain. The construct’s alpha level was quite low. This may be accounted for due to the researcher not having followed all of the constructs in Morstain and Smart’s factor analysis. The researcher combined Morstain and Smart’s two categories of “social relationships” and “external expectations” into the single category “life situation factors.” In future research of this

kind, the questions on the construct should be divided according to the two constructs laid out by Morstain and Smart in order to increase the reliability of the scale. In addition, the statement “I saw FFS as a chance to learn how to improve my income” should be transferred to the construct “Institutional factors: Process and Application.”

A second finding was that completers agreed much more strongly than did non-completers or non-participants with the statements regarding the schedule and meeting place convenience factors. The conclusion is that completers were more likely to believe that the FFS was scheduled at a convenient location and time for them to attend the FFS. The implication is that the individuals who were dissatisfied with the convenience factors, for example, the weekly schedule and meeting place, were more likely to not complete the FFS program (i.e., non-completers) or not enroll at all (i.e., non-participants). Completers believed that MALMR offered the FFS program at a high degree of convenience for participants, whereas non-completers and non-participants believed that MALMR did not make it convenient for individuals to participate. It is recommended that MALMR conduct needs assessments before conducting an FFS in a geographic area in order to determine a location and meeting time that suits as many potential participants as possible.

A third finding was that completers agreed much more strongly than did non-completers and non-participants with the statements regarding the process and application elements of the institutional factors. The conclusion is that completers believed that FFS was relevant to their needs whereas the non-completers and non-participants did not. An implication exists that non-completers and non-participants

desisted from participating in FFS because they did not believe it to meet their needs. It is recommended that MALMR conduct periodic assessments, whether they are formal (pencil and paper) or informal (casual conversation) of the FFS participants' perceptions with regards to the relevance of the topics and practices covered in FFS to their farming situations encountered on their own farms. Farmers must feel that their real problems on their farms are being addressed. This is necessary in order for farmers to maintain interest in the program.

A fourth finding was that completers agreed much more strongly than did non-completers and non-participants with the statements concerning their expectations of the outcomes of FFS. The conclusion is that completers held more positive beliefs than did non-completers and non-participants concerning their expectations of the outcomes of FFS. Completers possessed a higher satisfaction with the outcomes of FFS than did non-completers; in fact, completers scored every statement on the construct *Outcomes* higher than did the non-completers. An implication exists that the non-completers desisted and the non-participants hesitated to join FFS because they believed that FFS would not yield positive outcomes for them (or others).

It is recommended, therefore, that 1) MALMR institute the practice of having one or two program completers from previous FFSs attend the first few meetings of a newly-formed FFS group. This would allow new FFS farmers to hear personal testimonials from fellow farmers about their successes in implementing new, more environmentally-friendly farming methods. It is also recommended that FFS facilitators

implement a monitoring system to aid in assuring the satisfaction of the participants at each meeting.

A fifth finding was that completers agreed much more strongly than did non-completers and non-participants with the statements regarding their learning preferences. The conclusion is that completers are different from non-completers and non-participants with regards to their learning environment preferences and their perceptions of what MALMR has to offer them. For example, completers are more inclined to enjoy learning with a group of people than by themselves and non-completers and non-participants were more likely to enjoy learning by themselves than with a group of people. An implication exists that non-completers are likely to withdraw from FFS and non-participants are likely to not join FFS because the learning exercises are based on group-action. More specifically, the AESA, the special topic, and the group-dynamic activities, which form the core of all FFS activities, are group-based activities.

It is recommended that MALMR find ways to incorporate more independent activities within the FFS weekly programs. This may encourage the participation of those individuals who prefer to learn independently from their peers, such as those classified by this study as non-completers and non-participants.

A sixth finding was that completers agreed more strongly than non-completers with the statements regarding the educational climate in FFS. The conclusion is that completers believed more strongly than did non-completers that there was an environment conducive to learning in the FFS. An implication exists that the non-completers stopped attending FFS because they believed that the FFS lacked an adequate

environment in which they could best learn. Again, it is recommended that the FFS facilitators implement a system for monitoring and evaluation that would allow them to determine the participants' perceptions of the learning environment, the applicability of the topics and practices in FFS to their farming situation, and other issues.

Objective 6: Competitions

One of the topics that was approached during the feasibility study in October 2006 was the concept of using competitions, whether within the FFSs or between the various FFSs, as a means for increasing the popularity of FFS for those already involved, and to attract non-participants to join the program. It was recognized at that time that the likelihood existed that there would be little, if any, literature on the use of competitions within FFS. In addition, it is possible that competitions have never been used within FFSs to spur learning and the program's popularity among farmers. Regardless, the researcher decided to explore the concept of whether competitions may be a vehicle for increasing the popularity of FFS in Trinidad and Tobago.

An ANOVA was conducted to explore the relationship between participation status and the perception whether competitions would be a viable means for increasing the popularity of FFS. There was a statistically significant difference between completers, non-completers, and non-participants regarding competitions. The magnitude of the differences in the means is very large ($\eta^2 = .24$). A post hoc test showed that non-participants were dissimilar from non-completers and completers.

Non-participants disagreed with the statements regarding the use of competitions to increase the popularity of FFS while the completers and non-completers agreed with the statements. The implication is that the completers and non-completers view competitions favorably whereas non-participants are likely to view them unfavorably. Non-participants are unlikely to perceive competitions as a reason to join a FFS. Completers and non-completers viewed competitions more favorably and thus may be interested in competitions as an activity.

If MALMR were to implement competitions within or between FFSs that use a winners-and-losers approach, it is recommended that they proceed with caution in the planning and implementation stages as completers posted a higher preference for competitions than did non-completers. In addition, if MALMR were to use competitions to increase the popularity of FFS, they should not expect non-participants to be drawn to FFS as a result of the competitions. Taking these factors into consideration, it is recommended that MALMR give careful consideration to the use of competitions in FFSs (if the competitions use a winners-and-losers approach) until more research is conducted on the perceptions of completers, non-completers, and non-participants on the issue.

Given the completers' and non-completers' positive response to competitions, it is highly recommended that MALMR establish as a regular part of its curriculum a system to recognize the achievements of the participating farmers. A graduation ceremony at the end of the educational cycle is already firmly institutionalized as a component of the FFSs. Local communities are invited to participate in the ceremony.

These are important first steps. It is recommended that MALMR either include in the graduation ceremony or as a separate ceremony, a service that recognizes a specific achievement or accomplishment of each and every FFS participant. Inexpensive ribbons (or some other tangible object) could be given as an award. This approach will create a great deal of goodwill among the participating farmers, help retain the farmers who expressed their doubts regarding FFS, and increase the receptivity of non-participating farmers to join future FFS programs.

Recommendations for Future Research

1. It is recommended that future studies of this type have a larger sample size, particularly concerning the program non-completers.
2. Farmer Field Schools are increasingly being used by the extension services in the Caribbean. It is recommended that future studies focus on the factors of participation in FFSs in order Caribbean island nations.
3. The study evaluated FFS completers, non-completers, and non-participants during one FFS educational cycle, which parallels a cropping cycle. This time period may be insufficient for the questionnaire respondents to gain a well-balanced perspective on FFS. While this study takes a snap-shot approach, it is recommended that a follow up study capture the respondents' perceptions at a later date.
4. Future researchers should ensure that a complete pilot study is conducted.

5. Future researchers should conduct a factor analysis of the questionnaires provided in Appendices 2, 3, and 4.
6. The reliability of the scale could be improved by including more statements/questions on each measure and removing the statements/questions that do not fit the construct. For instance, on the two questionnaires *Completers and Non-Completers* and *Non-Participants*, the researcher's factor, "social reasons", encompassed the two factors found by Morstain and Smart (1974), social relationships and external expectations. In future studies on the factors of participation in FFS, the questionnaires should follow the factors laid out by Morstain and Smart.
7. The personal characteristics questions should have included the question: Do you own the land that you farm or do you rent it?
8. How do the five FFSs in this study (Transfer Village, La Trinidad, Grand Fond, Cemetery Trace, and Platanite) differ in regards to...?
 - a. Personal characteristics
 - b. Motivations for participation in FFS
 - c. Perceptions of selected farming practices
 - d. Priority rankings of their sources of information about farming practices
 - e. Deterrents to participation
 - f. Perceptions of competitions
9. Why did the FFS completers post the lowest mean score of the three groups (completers ($M=2.83$, $SD=.58$), non-completers ($M=2.87$, $SD=.18$), and non-

participants ($M=3.18$, $SD=.54$) on the construct regarding the use of pesticides in farming? A possible explanation is that FFS was ineffective in convincing them that pesticides overuse and misapplication was a serious problem. Is this really the case? This finding undermines the intent of the AESA approach: to discontinue dependency on pesticides as the primary pest-control measure. It is recommended that research on the other FFSs in Trinidad and Tobago be conducted to determine the impacts of FFS on farmers' perceptions of the use of pesticides in farming.

10. Agriculture is a male-dominated sector in Trinidad and Tobago. Men are the decision-makers on the farm while women assist in the production and commercialization. In similar fashion, the number of men vastly outnumbered women in FFSs. In other regions of the world, FFS planners have sought to increase the participation of women in the FFSs so that they could voice their opinions with greater knowledge of agro-ecosystems and best practices. It is recommended that future research determine the methods and practices by which women may be encouraged to join FFSs in larger numbers.
11. One of the findings of the study was that non-completers were not convinced of the financial payoff for adopting IPM methods. In other words, they are uncertain that there is a cost-savings on pesticide and that consumers are willing to pay higher prices for IPM-produced vegetables. Dolly's (2005) observation remains valid: FFS must show that farmers can cut production cost while producing a product for which consumers will pay a premium price. It is

recommended that MALMR (if it has not already done so) conduct a cost-benefit analysis of the market in Trinidad and Tobago, ranging from the producer's inputs to the consumer's wallet. Implicit in Dolly's statement is that farmers' adoption of IPM is dependent on the purchase and consumption preferences of the consumer. As a result of this study we know that FFS completers believe that consumers will purchase IPM-vegetables at a premium price. What is unknown is whether consumers feel the same way.

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APPENDIX 1

CONSENT FORM

The factors in completion, non-completion, and non-participation in Farmer Field School in Trinidad and Tobago

You have been asked to participate in a research study on the factors in completion, non-completion, and non-participation in Farmer Field Schools (FFS). You were selected because you are either a member of an FFS group or are familiar with the FFS program. A total of 75-100 people have been asked to participate. The purpose of this study is to gain a greater understanding of the reasons why people decide to participate in FFS, the factors leading to completion and non-completion, and to determine individuals' perceptions regarding pesticide-free farming. Samuel Goff, the primary investigator, will use the information collected toward the completion of a Doctor of Philosophy dissertation at Texas A&M University.

If you are not an FFS participant, you will be asked to complete a questionnaire one time. If you are an FFS participant, you will be asked to complete a questionnaire at the beginning of the program (April 2007) and another questionnaire at the end of the program (June 2007). The questionnaires take about 30 minutes to complete. The risks involved in participating are no more than would normally be expected on a daily basis. The benefit of participation is that an increased awareness of the patterns of completion, dropout, and non-participation may be useful for MALMR for employing strategies that impair or eliminate the factors leading to non-completion and non-participation in FFS.

You will receive no monetary compensation. To minimize any risk to you for your participation in this study, your responses will be coded and a pseudonym will be given to you. This study is confidential. The records of this study will be kept private. No identifiers linking you to the study will be included in any sort of report that might be published. Written records will be stored securely and only Samuel Goff will have access to the records.

Your decision whether or not to participate will not affect your current or future relations with the Ministry of Agriculture, Land, and Marine Resources (MALMR), the University of the West Indies, or Texas A&M University. If you decide to participate, you are free to refuse to answer any of the questions. You may withdraw at any time without your relations with the any of the above named institutions being affected. You may contact Samuel Goff (sgoff@aged.tamu.edu).

This research study has been reviewed by the Institutional Review Board-Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the institutional Review Board through Ms. Melissa McIlhaney, IRB Program Coordinator, Office of Research Compliance at 979-845-8585 (mcilhaney@tamu.edu).

Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in the study.

Signature: _____ Date: _____
 Investigator's signature _____ Date: _____

II. Say whether you strongly disagree, disagree, agree or strongly agree with the following statements about agricultural practices.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
Perceptions on the use of pesticides in farming			
I believe that farmers' decisions affect people, animals, plants and land			1 2 3 4
Pesticides are a serious problem for people, animals, plants and land			1 2 3 4
Pesticides are a serious threat to human health			1 2 3 4
Pollution from agricultural chemicals is a serious problem on my farm			1 2 3 4
Loss of crops due to insects and disease is a serious problem			1 2 3 4
My use of pesticides affect people, animals, plants and land			1 2 3 4
Financial factors			
Making money from farming is my most important concern			1 2 3 4
I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land			1 2 3 4
I worry about how to keep my farm productive over the long term			1 2 3 4
Compatibility of integrated pest management with social setting			
Farmers will accept farming with less poisonous pesticides			1 2 3 4
Consumers want pesticide-free produce			1 2 3 4
Consumers will pay higher prices for pesticide-free produce			1 2 3 4

III. General information

How many of your family _____ friends _____ have participated in an FFS?
 Did your family and friends support your decision to participate in FFS-IPM? Yes No
 If FFS-IPM did not exist, would you have sought educational programming on pest and crop management from a source other than MALMR? Yes No If yes, where? _____
 What is your gender? Female Male
 What is your age? _____
 What is your current marital status? Single Married Separated/Divorced Widowed
 What was the last class level you completed? Std 1-3 Std 4-5 Std 6
 Form 1-3 Form 4-5 Form 6 other _____
 What is the size of your farm? _____
 How long have you lived in your community? _____
 How many years have you farmed? _____
 What percentage of your annual income was derived from agriculture? _____
 Have you participated in any agricultural extension programs before FFS? Yes No
 If yes, in which program did you participate? _____
 Where do you most often get information on farming? (Rank order)1. _____
 2. _____ 3. _____

Is there anything else about your FFS experience you would like to share? You may use the back of this page. Thank you for your contributions to this study.

APPENDIX 3

Completers and non-completers

I. You have participated in this Farmer Field School. I need to know the factors that contributed to your completion or non-completion of the program. Say whether you strongly disagree, disagree, agree or strongly agree with the following statements.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
Life Situation Factors			
I saw FFS as a chance to learn how to improve my income			1 2 3 4
Responsibilities at work/farming kept me from participating in the FFS			1 2 3 4
A friend or family member encouraged me to participate in FFS			1 2 3 4
A health problem kept me from participating in FFS			1 2 3 4
I joined FFS because the agricultural officer suggested it to me			1 2 3 4
I saw FFS as a chance to improve my farming practices			1 2 3 4
Responsibilities at home kept me from participating in FFS			1 2 3 4
The agricultural officer encouraged me to participate in FFS			1 2 3 4
Institutional Factors			
<u>Convenience</u>			
FFS was scheduled at a convenient time			1 2 3 4
I am satisfied with the length of the FFS meetings			1 2 3 4
I am happy with the frequency of the FFS meetings			1 2 3 4
FFS was offered at a convenient location			1 2 3 4
FFS was offered in a safe place			1 2 3 4
FFS was offered in an acceptable location			
<u>Process and application</u>			
Topics covered in FFS were important to my farming situation			1 2 3 4
The practices promoted in FFS are relevant to my farming situation			1 2 3 4
I have suggested to farmers in my community that they participate in FFS			1 2 3 4
My real problems are not addressed so I do not want to participate in FFS			1 2 3 4
<u>Climate</u>			
FFS program activities were well planned			1 2 3 4
I could freely voice my opinions during FFS meetings			1 2 3 4
The FFS facilitator asked the students what they wanted to learn			1 2 3 4
My FFS group usually accomplished our daily agenda			1 2 3 4
<u>Outcomes</u>			
I am happy with the quality of the FFS program			1 2 3 4
After FFS, I want to participate in other MALMR programs			1 2 3 4
FFS helped me improve the decisions I make on the farm			1 2 3 4
FFS gave me new skills to help me cope with life			1 2 3 4
FFS participants are using IPM on their farms			1 2 3 4

I am aware of the benefits of FFS 1 2 3 4

Personal preferences

I like learning by myself more than with a group of people 1 2 3 4

I enjoy learning new things 1 2 3 4

I need to learn new farming skills 1 2 3 4

I like learning with a group of people rather than by myself 1 2 3 4

I am able to apply what I learned in FFS on my farm 1 2 3 4

I find that the teaching methods used in FFS are too childish 1 2 3 4

I know enough about farming and do not need the FFS 1 2 3 4

The ministry does not have anything to offer me 1 2 3 4

I only came to the FFS to support the officer 1 2 3 4

Rank (1-3) the reasons why some participants did not complete FFS.

(1= The most important reason; 2= The median reason; 3= The least important reason)

_____ Challenges of life, such as work pressures, hindered them

_____ The educational programs offered did not apply to real life

_____ Adults generally do not want to continue their education

II. Say whether you strongly disagree, disagree, agree or strongly agree with the following statements about agricultural practices.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Perceptions on the use of pesticides in farming

I believe that farmers' decisions affect the people, animals, plants and land 1 2 3 4

Pesticides are a serious problem for people, animals, plants and land 1 2 3 4

Agricultural pesticides are a serious threat to human health 1 2 3 4

Pollution from agricultural chemicals is a serious problem on my farm 1 2 3 4

Loss of crops due to insects and disease is a serious problem 1 2 3 4

My use of pesticides affect people, animals, plants and land 1 2 3 4

Financial factors

Making money from agriculture is my most important concern 1 2 3 4

I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land 1 2 3 4

I worry about how to keep my farm productive over the long term 1 2 3 4

Compatibility of integrated pest management with social setting

Farmers will accept farming with less poisonous pesticides 1 2 3 4

Consumers want pesticide-free produce 1 2 3 4

Consumers will pay higher prices for pesticide-free produce 1 2 3 4

IPM practices are better than the way I farmed before FFS 1 2 3 4

Consumers are more likely to buy FFS participants' produce if

participants could display MALMR-issued certificates certifying the produce as “IPM practices produce”	1	2	3	4
MALMR-issued certificates guaranteeing FFS participants’ produce as “IPM practices produce” will increase sales	1	2	3	4
Integrated pest management fits in well with our way of agriculture	1	2	3	4

Competitions as a way to increase popularity of FFS

I like participating in competitions	1	2	3	4
An FFS-sponsored competition <u>between</u> several FFSs will increase learning	1	2	3	4
An FFS-sponsored competition <u>within</u> FFSs will increase learning	1	2	3	4
An FFS-sponsored vegetable-growing competition for FFS participants will increase the popularity of FFS in my community	1	2	3	4

III. General information

How many of your family _____ friends _____ have participated in an FFS?

Did your family and friends support your decision to participate in FFS-IPM? Yes No

If FFS-IPM did not exist, would you have sought educational programming on pest and crop management from a source other than MALMR? Yes No

Where? _____

What is your gender? Female Male

What is your age? _____

What is your current marital status? Single Married Separated/Divorced Widowed

What was the last class level you completed? Std 1-3 Std 4-5 Std 6
Form 1-3 Form 4-5 Form 6 other _____

What is the size of your farm? _____

How long have you lived in your community? _____

How many years have you farmed? _____

What percentage of your annual income was derived from agriculture? _____

Have you participated in any agricultural extension programs before FFS? Yes No

If yes, in which program did you participate? _____

Where do you most often get information on farming?
(1= Get information from this source most often, etc.)

1. _____

2. _____

3. _____

Is there anything else about your FFS experience you would like to share? You may use the back of this page.

Thank you for your contributions to this study.

APPENDIX 4

Non-participants

Are you aware of the training programs offered by MALMR?	Yes	No
Are you familiar with the FFS-IPM program carried out by MALMR?	Yes	No
Have you ever participated in FFS-IPM?	Yes	No
How many of your ____ family ____ friends have participated in an FFS?		

I. You have not participated in the Farmer Field School. I need to know how important were the following statements in your decision to not participate in FFS. Say whether you strongly disagree, disagree, agree or strongly agree with the following statements.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
Life Situation Factors			
I saw FFS as a chance to learn how to improve my income	1	2	3 4
Responsibilities at work/farming kept me from participating in the FFS	1	2	3 4
A friend or family member encouraged me to participate in FFS	1	2	3 4
A health problem kept me from participating in FFS	1	2	3 4
Responsibilities at home kept me from participating in FFS	1	2	3 4
The agricultural officer encouraged me to participate in FFS	1	2	3 4
The farmers presently in the group influenced my decision not to join FFS	1	2	3 4
Institutional Factors			
<u>Convenience</u>			
FFS was scheduled at a inconvenient time	1	2	3 4
I am not satisfied with the length of the FFS meetings	1	2	3 4
I am not happy with the frequency of the FFS meetings	1	2	3 4
FFS was offered at a inconvenient location	1	2	3 4
FFS was offered in an unsafe place	1	2	3 4
FFS was offered in an unacceptable location	1	2	3 4
<u>Process and application</u>			
Topics covered in FFS were not important to my farming situation	1	2	3 4
The practices promoted in FFS are not relevant to my farming situation	1	2	3 4
I have suggested to farmers that they do not participate in FFS	1	2	3 4
My real problems are not addressed so I do not want to participate in FFS	1	2	3 4
<u>Outcomes</u>			
I want to participate in FFS sometime in the future	1	2	3 4
I expect that the FFS program will be of high quality	1	2	3 4
I want to participate in other MALMR programs	1	2	3 4
I expect that FFS participants are using IPM on their farms	1	2	3 4
I am interested in joining FFS	1	2	3 4
I am aware of the benefits of FFS	1	2	3 4

Personal Preferences

I like learning by myself more than with a group of people	1	2	3	4
I enjoy learning new things	1	2	3	4
I need to learn new farming skills	1	2	3	4
I like learning with a group of people rather than by myself	1	2	3	4
I find that the teaching methods used in FFS are too childish	1	2	3	4
I know enough about farming and do not need the FFS	1	2	3	4
The ministry does not have anything to offer me	1	2	3	4
I may only come to the FFS to support the officer	1	2	3	4

Rank (1-3) the reasons why other adults do not participate in educational programs.

(1= The most important reason; 2= The median reason; 3= The least important reason)

- _____ Challenges of life, such as work pressures, hinder them
- _____ The educational programs offered do not apply to real life
- _____ Adults generally do not want to continue their education

II. Say whether you strongly disagree, disagree, agree or strongly agree with the following statements about agricultural practices.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Perceptions on the use of pesticides in farming

I believe that farmers' decisions affect people, animals, plants and land	1	2	3	4
Pesticides are a serious problem for people, animals, plants and land	1	2	3	4
Pesticides are a serious threat to human health	1	2	3	4
Pollution from agricultural chemicals is a serious problem on my farm	1	2	3	4
Loss of crops due to insects and disease is a serious problem	1	2	3	4
My use of pesticides affect people, animals, plants and land	1	2	3	4

Financial factors

Making money from agriculture is my most important concern	1	2	3	4
I am willing to make less money this year and more money in the future to try new farming methods that protect people, animals, plants and land	1	2	3	4
I worry about how to keep my farm productive over the long term	1	2	3	4

Compatibility of integrated pest management with social setting

Farmers will accept farming with less poisonous pesticides	1	2	3	4
Consumers want pesticide-free produce	1	2	3	4
Consumers will pay higher prices for pesticide-free produce	1	2	3	4
IPM practices are not better than the way I farmed before FFS	1	2	3	4
Consumers are more likely to buy FFS participants' produce if				

participants could display MALMR-issued certificates certifying the produce as “IPM practices produce”	1	2	3	4
MALMR-issued certificates guaranteeing FFS participants’ produce as “IPM practices produce” will increase sales	1	2	3	4
IPM does not fit in well with our way of agriculture	1	2	3	4

Competitions as a way to increase the popularity of FFS

I like competitions	1	2	3	4
A vegetable-growing competition will encourage me to join FFS	1	2	3	4

III. General information

How many of your family _____ friends _____ have participated in an FFS?
 Did your family and friends support your decision to not participate in FFS-IPM? Yes No
 If FFS-IPM did not exist, would you have sought educational programming on pest and crop management from a source other than MALMR? Yes No
 Where? _____
 What is your gender? Female Male
 What is your age? _____
 What is your current marital status? Single Married Separated/Divorced Widowed
 What was the last class level you completed? Std 1-3 Std 4-5 Std 6
 Form 1-3 Form 4-5 Form 6 other _____
 What is the size of your farm? _____
 How long have you lived in your community? _____
 How many years have you farmed? _____
 What percentage of your annual income was derived from agriculture? _____
 Have you participated in any agricultural extension programs before FFS? Yes No
 If yes, in which program did you participate? _____
 Where do you most often get information on farming?
 1. _____
 2. _____
 3. _____

Is there anything else about your FFS experience you would like to share? You may use the back of this page.

Thank you for your contributions to this study.

VITA

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BIOGRAPHICAL INFORMATION

Born on December 17, 1973 in Caracas, Venezuela to William and Emilee Goff

EDUCATION

Doctor of Philosophy, Agricultural Education (2008)
Texas A&M University
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Master of Science, Agricultural Education (2006)
Texas A&M University
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Bachelor of Arts, Psychology and History (1996)
Baylor University
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PROFESSIONAL EXPERIENCE

Departmental Graduate Assistant
Department of Agricultural Leadership, Education, and
Communications
Texas A&M University (2004-2008)

Agricultural Cooperatives Project Coordinator
International Mission Board
Zambezia Province, Mozambique (2001-2003)

HONORS AND AWARDS

Department of Agricultural Leadership, Education, and
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