A STUDY REPORT

ON

THE ADOPTION AND CONSTAINTS ANALYSIS AT THE PILOT PHASE OF THE SPECIAL PROGRAMME ON FOOD PRODUCTION IN MOROGORO, TANZANIA

Submitted to

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EXECUTIVE SUMMARY

This study sampled and interviewed 288 respondents in Kilombero and Morogoro districts of which 120 were farmers in the Kilimo/FAO SPFP project villages, 57 non participating farmers, and 11 extension agents in the same project. The aim was to establish the pattern and constraints encountered by farmers in adopting the recommended technologies and practices in the project villages.

Of the 120 SPFP project farmers, 111 (92 percent) showed that they cultivated an average of 1.9 acres of maize and 2.3 of rice. These farmers got an annual average yield of 12.8 bags of maize and 22.6 bags of paddy rice per acre. Of 120 respondents, 71 (59 percent) got an annual average mean of T.shs. 97,939 (US$ 106) from selling grain maize and 81 (59 percent) got T.Shs. 146,716 (US$ 240) from selling paddy rice. Most farmers in the SPFP project, 89 (74 percent) stated that if they had money they would buy inorganic fertilizers (e.g, urea, S.A) than use organic manure. Of the 119 SPFP farmers, 102 (86 percent) agreed that extension agents used farmer managed demonstrations plots to teach them about the recommended technologies and practices for increasing maize and rice yields. Similarly, most SPFP farmers, 88 (74 percent) said that project extension agents organized SPFP farmers' meetings to share their experiences about the recommended maize and rice technologies and practices.

Of the 119 SPFP project farmers, 100 (84 percent) stated that project extension agents supervised, encouraged and ensured that farmers used the recommended maize and rice technologies and practices to increase yields. Of the 119 project farmers, only 49 (41 percent) indicated that lack of money to buy farm inputs (fertilizers, improved seed, fungicides) hindered them from adopting the SPFP project recommended technologies and practices. Of the 119 farmers, 93 (73 percent) reported that they did not adopt the SPFP recommended technologies and practices because farm inputs were expensive. Most SPFP project farmers, 111 (93 percent) agreed that adopting the SPFP project recommended technologies and practices had increased their crop yields and income.

Most of the non SPFP project farmers, 53 (93 percent) said that most farmers in the SPFP project lacked money to buy farm inputs and this hindered them from adopting the maize and rice recommended technologies and practices. Similarly, most non SPFP farmers, 47 (82 percent) mentioned that another reason hindering the adoption of recommended technologies and practices among project participating farmers was lack of money to hire tractors for ploughing fields. Of the 57 non SPFP farmers, 39 (68 percent) and 52 (91 percent) said that low maize and paddy rice prices and prohibitive fertilizer prices hindered most SPFP farmers to fully adopt the recommended technologies and practices, respectively. Of the 57 non SPFP project farmers, 50 (88 percent) said that they would like to join the SPFP project groups to increase their crop yields.

Of the 11 extension agents interviewed, ten said that non adoption of the recommended technologies and practices was due to lack of money among farmers. Most agents, ten showed

that farmers would continue to use the recommended maize and rice technologies and practices even after the SPFP project support ended. Seven and six of the agents said that the price of farm inputs should be reduced, and that extension agents should insist on teaching farmers using result and method demonstration plots respectively.

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INTRODUCTION

Morogoro Region

Morogoro region covers an area of about 73,000 km^2 which is 8.2% of Tanzania mainland. The region has four districts: Kilombero, Kilosa, Morogoro, and Ulanga. The region has a total arable land of about 6 million hectares and of these about 2.5 million hectares are suitable for raising livestock. It is estimated that the total potential land for irrigation is about 400,000 hectares, but only 3% of the total land is under irrigation. The region cultivates about 290,000 hectares of food crops each year yielding about 560,000 tons of food. There are a total of 458 villages with a population of about 1.3 million people of which about 500,000 are smallholder farmers with an average farm size of 2 hectares. The region experiences bimodal rainfall. The short rains start in October to December while the long rains begin in mid-February to May. The average precipitation is between 600 mm to 1200 mm per annum.

The region has benefited from several agricultural projects and programmes. Their main aim has been to help smallholder farmers increase their agricultural yields. These programmes include NALERP, NALRP, SEP, GALUP, KILIMO/FAO and PNP. One of the recent project is the Special Programme on Food Production in Support of Food Security (SPFP). This project operates in two districts of Kilombero and Morogoro.

Context of Study Districts

Kilombero District

Kilombero district is part of the famous fertile valley of Kilombero. The valley lies at the foot of the Great Escarpment of East Africa in the Southern half of Tanzania some 320 km from the Indian Ocean. Kilombero district consists of the Udzungwa mountains and the Kilombero valley. The district has bimodal rainfall pattern of short rains (vuli) and the main rainy period (masika). The former begins in October to the end of November and the latter in March to June. The mean annual precipitation in the Kilombero valley is between 1000 to 2000 mm. The main cash crops include rice and maize, but other crops grown include cassava, cotton, cowpeas, cassava, pulses, and fruit trees. The district has a few livestock. The 1988 census showed that Kilombero district had 231,899 people (93,256 men and 138,643 women). The

statistics showed that 50% of the district population was under 17 years old and 6% above 55 years of age. The average household size was 5.8 persons.

Morogoro District

Morogoro district covers an area of 19,296 km^2 of which 19,230 km^2 is rural and the rest is urban (United Republic of Tanzania, 1988). The district is divided into nine wards: Kingolwira, Ngerengere, Matombo, Mgeta, Mkuyuni, Mlali, Mngazi, Mvomero and Turiani. The District can divided into three relief zones: the highlands (e.g., Uluguru and Nguu mountains), lowlands (Mlali, Matombo and Ngerengere), and the valleys (Wami, Ruvu, Ngerengere). The highlands lies between 1,400 and 2,033 metres above sea level and receive 6 months of rainfall of between 1000 to 1800 mm per annum. Here, farmers mainly grow vegetables, fruit trees and pulses. The lowlands and valleys receive little rainfall from 500 to slightly above 1000 mm per annum and farmers grow cassava mainly in the low lands and maize and rice. The 1988 Tanzania census shows that the district had a population of 463,760 people of which 117,509 lived in urban centres (United Republic of Tanzania, 1988). During this census the average household size was 5.3 in rural areas and 4.4 in urban areas.

Objectives of the Study

The main objective of this study was to undertake the adoption pattern and the constraints encountered by farmers in adopting the recommended technologies and practices in the pilot phase areas of the SPFP project.

Hence the specific objectives of this study were:

a) To analyze the adoption pattern of farmers of the recommended practices and technologies in the Pilot Phase areas of the SPFP.
b) To analyze the constraints of non-adoption of recommended practices and technologies faced by farmers in the Pilot Phase areas.
c) To analyze factors associated with adoption as well as the experienced constraints by farmers in Pilot Phase areas.

METHODOLOGY

Description of the Study Population

Population for this study consisted of three groups:women and men participating in the Kilimo/SFPF project, women and men not participating in the Kilimo/SPFP project and extension agents working in the Pilot areas of the SPFP.

Duration of the study

The study was carried out in April, 1997.

Reseach Design

The study used a cross-sectional survey in which data were collected at a single point in time. Observations were also made to complement quantitative data.

Instrument Preparation

Data for this study were collected using a structured questionnaire. The first version of the questionnaire was prepared in English. Later the questionnaire was sent to FAO Representative in Dar es Salaam, SPFP regional and district coordinators to check on its content and construct validity. Their opinions were incorporated to produce a second version that was in Kiswahili. Again, the questionnaire in Kiswahili was sent to the SPFP regional and district coordinators in Morogoro before pre-testing. The aim of this process was t ensure that questions were clear, specific and pertinent to the study objectives. The questionnaire for the SPFP participating farmers was later pre-tested in Wami-Dakawa involving 15 farmers. A final questionnaire was prepared taking into account the pre-test results.

Sampling Procedures

One hundred and twenty farmers participating in the Kilimo/SPFP pilot areas were sampled in ten villages within two districts (Kilombero, Morogoro) in Morogoro region. Both districts had 451 farmers participating in the Kilimo/SPFP pilot phase areas. Given this figure, therefore, a sampling ration 1:3 of interviewed farmers to other project farmers was achieved.

To triangulate the phenomena studied 57 non-SPFP participating farmers in the pilot phase villages were sampled. Also, the researcher interviewed 11 extension agents who worked in pilot phase villages. The researcher randomly sampled farmers using a table of random numbers with the exception of extension agents. The names of farmers participating in the project were obtained from the project head office in Morogoro. These names were used to identify a sampling frame and at determining a quota for each village.

The following procedure for sampling farmers in the field was followed. First, farmers participating in the Kilimo/SPFP project in each village were alphabetically ordered and each was assigned a number. Using a table of random numbers the farmer's name against a chronological number was sampled for interviewing. The researcher stopped randomly picking names of farmers after the quota for the village was attained. For farmer groups that had women and men, the numbers were listed separately and later sampled. Second, farmers whose names were sampled were interviewed using a structured questionnaire. This procedure also applied to Kilimo/SPFP non participating farmers.

Data Collection

The main data collection for this study was by using a structured interview schedule and personal interviews administered by the researcher and sometimes helped by the district coordinator for Morogoro and field extension agents. Each farmer was interviewed separately to avoid discussions on the questions asked. This procedure of data collection also applied to non-SPFP participating farmers.

Data Analysis

Data collected from 288 people were coded and analysed using the Statistical Package for Social Sciences (SSPSx) at Sokoine University of Agriculture. This analysis produced cross-tabulations, percentage frequencies, means and other statistics that are used to describe phenomena in this report.

RESULTS AND DISCUSSIONS

A. Participating Farmers

Background Information

The researcher sampled and interviewed 120 farmers in Kilombero and Morogoro districts participating in the Kilimo/SPFP project in the pilot phase villages. Of the 120 Kilimo/SPFP respondents, 55 were sampled in Kilombero and 65 in Morogoro districts, of 62 were males and 58 females (see Table 1). Sampling by gender in the two districts was statistically significant at $p<0.01$. This was because of the presence of many women groups in the project villages. Of the 120 interviewees, 98 (82 percent) were married and about half of them, 59 (49 percent) had finished primary school education (attended up to standard VII). And there was a statistically significant differences between the means at $p>0.03$. The average mean age of respondents was 40.7 years: in Morogoro rural was 44.3 while in Kilombero was 36.5 (see Table 2). There were statistically significant differences between the average means of SPFP project farmers in the two districts at $p<001$) (see Table 2).

Table 1: Distribution of Interviewed SPFP Project Farmers in Kilombero and Morogoro Districts (n=120).

District/Village		Females	Males
Kilombero District	**Vilage:**		
	Ichonde	7	-
	Kining'ina	6	3
	Kisawasawa	4	-
	Mang'ula	7	4
	Mbasa	12	6
	Michenga	1	6
Morogoro District	Hembeti	4	12
	Mkindo	6	5
	Mvomero	8	13
	Wami Dakawa	7	8
Total		**62**	**58**

Of the 120 interviewees, 58 (48 percent), 54 (45 percent), and 33 (28 percent), showed that they grew rice, maize and cassava, respectively. However, the differences of what farmers grew in the two districts were statistically significant at $p<0.01$ to 0001, respectively. Of the 120 interviewees, only 55 (46 percent) agreed that they had attended short courses that the SPFP project offered. Of these respondents, only 27 and 11 had attended SPFP short courses for one day and one week, respectively. Data shows that there were no statistical differences in the two districts of farmers' attendance to SPFP short courses. Clearly, this shows that there was poor attendances to SPFP short courses that project extension agents gave.

Persons in the Household

In the two districts, the number of persons in the SPFP project farmers' households did not vary widely. In all districts, the average mean of persons living in the household was 6.4 persons (see Table 2). Interviewees from Morogoro rural had 6.8 people in their households while those in Kilombero had 6.0. Of the 120 interviewees, 99 (82.5 percent) showed that they lived with at least 1.7 male adult persons in their households. The average mean for male adult persons in Morogoro rural was 1.8 and 1.5 for Kilombero. Most interviewees, 105 (90 percent) showed that they lived with female adult persons above 18 years of age in their households, and the average mean age for the two districts was 1.7 persons. The average mean of female adults in Kilombero rural households was 1.8 and in Morogoro was 1.6 persons (see Table 2). Of the 120 interviewees, 56 (47 percent) showed that they had male youths (below 18 years old) attending school. The average mean of male youths in the two districts was 1.8. However, Morogoro rural had the highest average mean of male youth of 2.0 compared to 1.6 of Kilombero youth. In the two districts, 65 respondents (54 percent) showed that they had female youth (below 18 years old) attending primary schools. The average mean for the two districts was 1.8 youth and average mean for Kilombero rural was 1.9 and 1.8 for Morogoro (see Table 2). Of the 120 respondents, only 21 (17 percent) showed that they lived with youth below 18 years of age who did not attend school. The average mean for the two districts was 1.7 youth, and Morogoro rural had the highest of 1.9 compared to 1.2 for Kilombero. Similarly, only 20 interviewees (17 percent) showed that they had female youth and the average mean for Kilombero rural was 1.4 and Morogoro 1.3 (see Table 2).

Table 2: Some Characteristics of SPFP Project Farmers in Kilombero and Morogoro Districts (n=120)

Variable	K'mbero[1]	Moro[2]	All dis[t3]	F Value	Signif[4]
Average mean age of respondents	36.5	44.3	40.7	11.95	.001*
Average mean of years attended school	3.8	3.3	3.6	3.2	.08
Average mean of persons per household	6.0	6.8	6.4	1.16	.28
Average mean of male adult persons per household	1.5	1.8	1.7	2.76	.10
Average mean of female adult persons per household	1.8	1.6	1.7	.58	.45
Average mean of male youth in school per household	1.6	2.0	1.8	1.60	.20
Average mean of female youth in school per household	1.9	1.8	1.8	.16	.69
Average mean of male youth not in school per household	1.3	1.9	1.7	1.06	.31
Average mean of female youth not in school per household	1.4	1.3	1.3	.32	.60
Average mean of male children not started school	1.7	1.5	1.6	.80	.38
Average mean of female children not started school	1.5	1.3	1.4	.66	.41

[1]Kilombero district, [2]Morogoro district [3]districts, [4]Significance level, [4]Significant at $p < .05$

However, half the respondents, 60 (50 percent) showed that they lived with male youth below 18 years old who had not started school. The average mean for the two districts was 1.6 youth, and Kilombero rural was 1.7 while Morogoro was 1.5 Less than half of the respondents, 49 (41 percent) showed that they lived with female youth who were below 18 years old (see Table 2). The average mean for the two districts was 1.4 youth. The average mean for Kilombero rural was 1.5 while for Morogoro rural was 1.3 youths. The researcher asked SPFP farmers whether their children helped them with farm work, but a SPFP project farmers, 15 (12 percent) said both female and male youths helped them.

Yields and Income From Crops

One aspect that appeared to affect the adoption of recommended technologies and practices by smallholder farmers was the number of plots one had. Of the 120 interviewees, 87 (72 percent) agreed that their fields were divided into small scattered plots. The mean differences between the two districts of this variable were statistically significant at $P < 0.01$) between the two districts. Of the 120 interviewees, 111 (92 percent) showed that they cultivated an average mean of 1.9 acres of maize. The average mean of acres in Morogoro rural was 2.2 and Kilombero rural was 1.4. The average mean differences of acres between the two districts were statistically significant at $p > 0.02$ (see Table 3).

Table 3: Respondents Cultivated Areas, Yields and Income From Maize and Rice For the 1995/96 Season (n=120)

Variable	K'mbero[1]	Moro[2]	All dis[t3]	F Value	Signif[4]
Average mean acres of maize cultivated per farmer	1.4	2.2	1.9	5.3	.02*
Average mean yield of maize in bags per farmer	9.0	15.9	12.8	6.9	.01*
Average mean of earnings from grain maize per farmer	76,873	113,354	97,939	1.1	.30
Average mean of acres of rice cultivated per farmer	2.8	1.9	2.3	4.7	.03*
Average mean of rice yields in bags per farmer	28.4	17.0	22.6	10.5	.002*
Average mean of earnings from paddy rice per farmer	167,731	125,175	146,716	1.5	.21

*Significant at $p < .05$

The annual average mean yield of maize in the two districts was 12.8 bags (a bag weighing 100 kgs). The average mean yield of maize in Morogoro rural was 15.9 bags while in Kilombero district was only 9.0 bags per acre (Table 3). The differences in the means of maize yield in the two districts were statistically significant at $p < 0.01$). Of 120 respondents, 71 (59 percent) showed that they got an income from selling grain maize in the 1995/96 season

and the annual average mean of an SPFP project farmer was T.Shs. 97,939 (US$ 160) (when 1 US$ = T.Shs. 610) (Table 3), The mean annual income in Morogoro rural was high, T. Shs. 113,353 (US$ 186) while Kilombero was 76,873 (US$ 126) (see Table 3).

Of the 129 interviewees, 107 (91 percent) showed that each cultivated an average mean of 2.3 acres of rice. This average mean of acres was high in Kilombero rural of 2.8 compared to 1.8 for Morogoro. The average mean differences of acres between the two districts were statistically significant at p. < 0.03 (see Table 3). The annual average mean yield of rice in the two districts was 22.6 bags (a bag weighing 70 kgs), In Kilombero rural, an SPFP farmer goat an average mean yield of 28 bags of paddy rice while those in Morogoro rural got 17.0 bags. The average mean differences of rice yields between the two districts were statistically significant at p. < 0.002 (see Table 3). Of the 120 respondents, 81 (68 percent) showed that they got an income from selling paddy rice. The annual average mean income that an SPFP project farmer got was T.Shs. 146,716 (US$ 240). In Kilombero rural a project farmer earned T.Shs. 167,731 (US$ 275) compared to T. Shs. 125,175 (US$ 205) for Morogoro. However, the annual average mean differences of income of farmers in the two districts were not statistically significant at p. < .05.

Source of Labour

The researcher asked farmers in the project their sources of labour for their fields. Of 118 respondents, only 35 (30 percent) said that their sources of labour was composed of household members (see Table 4). However, few interviewees, 28 (24 percent) showed that they hired labour to work in their fields. About half the respondents, 59 (50 percent agreed that their children helped them with farm work. Half of the interviewees said both female and male children helped them with farm work (see Table 4). Table 4 also shows that 89 (76 percent) of the farmers stated that if they had money they would buy inorganic fertilizers (e.g., urea, S.A).

Table 4: Respondents' Opinions in Percentages About Sources of Labour. Usefulness of FYM and Preference to Fertilizers (n=120)

Variable	Kilombero	Morogoro
Persons in the household work in the field	26	9
Hired labour to work in the fields	9	22
Children provide with field labour	25	26
Know the usefulness of Farm Y Manure to plants	29	38
Apply Farm Yard Manure in the field	7	5
If had money would buy Farm Yard Manure	18	8
If had money would buy inorganic fertilizers	52	22

Livestock and Reasons for Raising Them

In the two districts, few SPFP farmers raised livestock. Of 120 respondents, about half the farmers, 54 (45 percent) showed that they raised small ruminants and fowls. Of these interviewees, for instance, only three farmers raised 17 cattle, nine farmers raised 16 goats, and two farmers had 12 sheep. In Morogoro rural, two farmers each had six donkeys. In the two districts, most farmers, 89 (74 percent) raised chicken. Each SPFP farmer had an average mean of 16 chicken; farmers in Morogoro rural raised an average mean of 17 while that of Kilombero was 14 chicken. In the two districts, few farmers, 22 (18 percent) raised ducks; the mean average in Morogoro rural was 14.7 and 6.7 for Kilombero. Only four SPFP farmers raised 13 peasants. These small animals cannot produce enough farm yard manure to apply in 4.2 acres that on average a farmer in the two districts cultivated.

Of the 54 interviewees who had livestock, 43 (80 percent) showed that they raised livestock to increase their income. However, 27 (23 percent) said that they raised livestock to get meat. Few farmers, 6 (5 percent) said that they raised livestock to get manure to apply in their fields. This was shown in spite of most SPFP project farmers acknowledging the importance of applying farm yard manure in crops. Of the 120 respondents, 80 (67 percent) said that they knew the importance of applying farm yard manure in crops. Similarly, of the 120 interviewees, 119 (99 percent) showed that they did not use compost in their fields. However,

a few farmers, 54 (45 percent) who had livestock gave the following reasons (in descending order) for not applying farm yard manure in their fields. First, animals produced insignificant quantities of manure to apply in their fields. Second, there was the lack of transportation facilities of ;moving farm yard manure to the fields. Third, their fields were far away making the transportation of the farm yard manure difficult. Fourth, they lacked family labour to transport farm yard manure to the fields. Because of these reasons, most respondents, 88 (73 percent) showed that if they had enough ;money they would buy inorganic fertilizers and apply them in their fields (see Table 4). However, the remainder for the farmers who indicated using farm yard manure gave two main reasons: it replenished soil fertility and conserved the soil moisture.

Farmers' Opinions About Approaches Extension Agents Used to Impart Knowledge

Of the 119 interviewees, 102 (86 percent) agreed that extension agents used farmer managed demonstration plots to teach them about the recommended technologies and practices for increasing maize and rice yields. Farmers' opinions on using farmer managed demonstration plots in the two districts was statistically significant at $p > 0.01$ (see Table 5). However, less than half of the interviewees, 58 (49 percent) reported that project extension agents gave agricultural advice on recommended maize and rice technologies and practices in their homes. The differences of farmers' opinions means on giving advice in the homes in the two districts was statistically significant at $p > 0.0001$ (see Table 5).

Table 5: Farmers' Opinions About Approaches that Extension Agents Used to Impart Knowledge (n=120)

Variable	% of respond[1]	X^2	Signif
Agents taught farmers using demonstration plots	86	7.7	.01*
Agents advised farmers in their homes	49	14.5	.0001
Agents advised farmers in the fields	53	4.2	.04*
Agents used discussion groups	68	8.8	.01*
Agents encouraged to listen "Ukulima wa Kisasa"	31	2.3	.13
Agents handed out leaflets on recommended technologies	23	.012*	.9
Agents handed out FAO leaflets on rec. technologies	20	1.76	.18
Agents held public meetings	40	4.0	.04*

Half of the SPFP project farmers, 63 (53 percent) agreed that project extension agents gave advice on improved technologies and practices for maize and rice husbandry in the farmers' fields (see Table 5). The differences of means of farmers' opinions of this variable were statistically significant at $p > 0.03$. However, of the 119 respondents, only 47 (40 percent) agreed that project extension agents used public meetings to teach farmers about the recommended maize and rice technologies and practices. Of the 119 interviewees, 81 (68 percent) reported that project extension agents used group methods to teach the recommended maize and rice technologies and practices. The mean differences of farmers' opinions about using group discussions to impart knowledge were statistically significant at $p < 0.01$.

Farmers were also asked whether project extension agents gave them leaflets about the recommended maize and rice technologies and practices. Few farmers, 24 (20 percent) agreed that extension agents gave them leaflets that FAO had prepared on maize and rice husbandry (see Table 5). Similarly, few SPFP farmers, 37 (31 percent) said that they listened to the Ministry of Agriculture radio programme called "Ukulima wa Kisasa" which among others, sporadically talked about recommended maize and rice technologies and practices.

Approaches Agents Used for Farmers' Involvement

The researcher asked project farmers to point out ways that project extension agents used to hasten the adoption of the recommended maize and rice technologies and practices. Of the 119 project farmers, 81 (68 percent) reported that project extension agents called general farmers' meetings to teach them about the recommended maize and rice technologies and practices. Similarly, most SPFP farmers, 88 (73 percent) said that project extension agents organized SPFP farmers' meetings to share their experiences about the recommended maize and rice technologies and practices (see Table 6). Of the 119 interviewees, less than half of them, 51 (43 percent) showed that project extension agents used government and ruling party officials to exhort farmers to adopt the recommended maize and rice technologies and practices to increase crop yields (see Table 6). Similarly, few SPFP project farmers, 46 (39 percent) said that extension agents used public meetings to advise farmers to adopt the recommended maize and rice technologies and practices to increase yields.

Table 6: Farmers' Opinions About Approaches That Extension Agents Used to Enhance Farmers' Involvement in the Adoption of Technologies and Practices (n=120)

Variable	% of respond	X^2	Signif
Agents held farmers meetings	74	1.5	.21
Agents used government/party leaders to tell farmers	43	2.4	.12
Agents ensured farmers to try the technologies	76	6.3	.01*
Agents ensured farmers adopted the technologies	84	.09	.75

Of the 119 interviewees, 90 (76 percent) reported that project extension agents encouraged project farmers to try in their fields the recommended maize and rice technologies and practices to increase yields. The mean differences of the variable was statistically significant at $p > 0.01$ (see Table 6). About half the SPFP project farmers, 62 (52 percent) indicated that extension agents ensured that project farmers bought farm inputs, especially fertilizers and improved seeds to increase maize and rice yields. The differences of the two districts of this variable were statistically significant at $p < 0.0004$. Of the 119 project farmers, 100 (84 percent) stated that project extension agents supervised and ensured that farmers used the recommended maize and rice technologies and practices to increase yields.

The researcher also sought SPFP farmers' opinions about their attendance to project meetings. Of the 120 interviewees, only 21 (17 percent) reported that they had attended one Kilimo/SPFP project meeting in 1996. The remainder of farmers, 41 (34 percent) said that they had attended an average of three meetings in 1996. Farmers in the SPFP project were asked to say the level at which they had received the recommended maize and rice technologies and practices. Of the 113 respondents, about half, 58 (51 percent) said that they had moderately received information on improving maize and rice yields. Forty four (39 percent) reported that they had received information on improving maize and rice yields at a low degree. However, this was contrary to what farmers said about their involvement in the SPFP project groups for increasing their knowledge about improved technologies and practices of maize and rice. For instance, most farmers in the SPFP, 107 (89 percent) agreed that their involvement in the Kilimo/SPFP project had increased their knowledge about the improved maize and rice husbandry.

Problems For Not Adopting Innovations

The researcher asked farmers to give internal reasons that hindered them from adopting the improved maize and rice technologies and practices. Of 63 farmers who responded to the question, only 21 (33 percent) said that family problems hindered them from adopting the SPFP project recommended technologies and practices. Of the 119 respondents, only 49 (41 percent) indicated that lack of money to buy farm inputs (fertilizers, improved seed, fungicides) hindered them from adopting the SPFP project recommended technologies and practices (see Table 7). Of the total respondents, 25 (21 percent) said that labour constrained them from adopting the SPFP project recommendations in the fields. Also, only 25 (21 percent) interviewees said that they could not fully benefit from the recommended technologies and practices because their fields were small and scattered.

Table 7: SPFP Project Farmers' Responses in Percentages About Constraints to Adopting the Recommended Technologies and Practices (n=120)

Variable	% of respond	X^2	Signif
Lack of money to buy farm inputs	41	.07	.79
Lack of labour to work in the field	21	5.83	.02*
Fields are far away to use recommended technologies	15	2.7	.10
Lack of shops to buy farm inputs	35	4.7	.02*
Recommended farm inputs are expensive to buy	78	3.5	.06
Ext. agents not advising farmers adequately	11	.28	.60
Poor climatic conditions (e.g lack of rains)	61	10.7	.001

*Significant at $p < 05$

The researcher also asked farmers to give external reasons that hindered them from adopting the improved maize and rice technologies and practices. Of the 119 interviewees, 93 (78 percent reported that they did not adopt the SPFP project recommended technologies and practices because farm inputs were expensive (see Table 7). However, only 41 (34 percent) respondents said that lack of shops to buy farm inputs hindered their adoption of recommended maize and rice technologies and practices. Most farmers, 72 (61 percent) said that the unfavourable weather conditions for crops hindered them from adopting the recommended maize and rice technologies and practices (see Table 7). The mean differences of the two districts for this variable were statistically significant at $p < 0.01$. Most SPFP project farmers, 111 (93 percent) agreed that adopting the SPFP recommended technologies and practices for maize and rice increased their crop yields. Similarly, most interviewees, 106 (89 percent) agreed that the SPFP recommended technologies and practices for maize and rice had increased their income from crop sales. And most farmers, 115 (97 percent) disagreed that the recommended technologies and practices for maize and rice that extension agents advised them to follow were not suitable for small plots. On the other hand, 16 (13 percent) farmers reported that advice from project extension agents was not sufficient to convince them to adopt the recommended technologies and practices.

Benefits of the Kilimo/SPFP Project to Farmers

The researcher sought farmers' opinions about the usefulness of the Kilimo/SPFP project towards increasing crop yields. Of the 120 project farmers, 111 (93 percent) agreed that the project had increased their knowledge about the recommended maize and rice technologies and practices. The researcher also asked farmers if the adopted recommended maize and rice technologies and practices had caused them to incur extra financial costs. Of the 120 interviewees, 110 (90 percent) agreed that they had not incurred any financial losses for adopting recommended maize and rice technologies and practices. Most SPFP project farmers, 86 (72 percent) agreed that the newly formed farmers' credit services had not helped them increase their crop yields. Of the 119 respondents, 79 (66 percent) agreed that the newly formed farmers' credit societies would not continue after the SPFP project ended. Most interviewees, 85 (71 percent) stated that they had not deposited money in the newly SPFP project credit accounts. Of 120 project farmers, 107 (89 percent) said that Kilimo/SPFP project management and operations had increased their crop yields. Similarly, 102 (85 percent) respondents agreed that the Kilimo/SPFP project management and operations had increased their income from crop sales.

B. Responses of the Non SPFP Farmers' Responses

This section examines the opinions of non SPFP project participating farmers to understand the adoption pattern and the constraints encountered by farmers in adopting the recommended practices and technologies in the pilot phase areas of the SPFP project.

Background Information

In Kilombero and Morogoro rural districts 57 farmers who were not participating in the Kilimo/SPFP were sampled and interviewed. Twenty nine came from Kilombero and 28 from Morogoro districts. Of these, 21 were women and 36 men. The distribution of respondents based on gender was similar in all districts (see Table 8).

Table 8: Distribution of Interviewed non SPFP Project Farmers in Kilombero and Morogoro Districts (n=57)

District	Village	Females	Males
Kilombero district		-	3
	Ichonde	3	1
	Kisawasawa	3	5
	Mbasa	3	5
Morogoro district		5	6
	Hembeti	3	7
	Mkindo	2	6
	Mvomero	2	3
	Wami Dakawa		
Total		**21**	**36**

The average mean age of interviewees in the two districts was 38.6, but farmers in Morogoro rural were older (44) than those in Kilombero (33.3). The mean differences in ages between the two districts was small, statistically significant at $p < 0.001$. Of the 57 respondents, 45 (79 percent) were married and most of them, 50 (88 percent) had finished primary school education. Non SPFP project participating farmers had an average mean of 5.3 persons living in their households: 5.7 and 5.9 persons for Kilombero and Morogoro respectively.

Table 9:Some Characteristics of Non SPFP Project Farmers (n=57)

Variable	K'mbero	Moro	All dis	F Value	Signif
Average mean of acres of maize cultivated per farmer	1.4	2.2	1.9	5	.02*
Average mean maize yields in bags per farmer	9.0	15.8	12.8	7	.01*
Average mean of earnings from grain maize per farmer	76,873	113,354	97,939	1	.03*
Average mean of acres of rice cultivated per farmer	2.8	1.9	2.3	5	.03*
Average mean of rice yields in bags per farmer	28.4	17.0	22.6	11	.002*
Average mean of earnings from paddy rice per farmer	167,731	125,175	146,716	2	.21

*Significant at $p < .05$, [1]F-value

The average mean acreage that non SPFP project farmers farmed was 2.8, and those in Morogoro district had the highest of 3.0, and 2.7 for Kilombero (see Table 9). Most non SPFP project farmers had been farming on the average mean of 12.6 years, and those in Morogoro had farmed for 16.5 and 8.8 years for Kilombero. Of the 57 interviewees, 47 (82.5 percent) said that they had not received any form of training on agriculture or livestock husbandry. The mean differences of the non SPFP project farmers' opinions for not attending training between the two districts were statistically significant at $p < 0.04$ (see Table 9). Of 57 non SPFP project participating farmers, 50 (88 percent) showed that their average mean income from crop sales in the 1995/96 season was T.Shs. 184,220 (US$ 302). Farmers in Morogoro got the highest average mean income from crop sales of T.Shs. 186,739 (US$ 306) and that of Kilombero was 182,074 (US$ 299) (see Table 9). However, these differences of average mean income from crop sales were not statistically significant at $p > 0.05$. Of the 57 respondents, only 13 (23 percent) (10 from Morogoro, 3 from Kilombero) reported that they raised some form of livestock and sold the animals or their products.

The average mean income from livestock sales for the two districts in 1995/96 was T.Shs. 76,115 (US$ 125). Farmers in Morogoro had the highest income of T.shs. 92,500 (US$ 152), while those in Kilombero got only T.Shs. 21,500 (US$ 35). The combined average mean income per farmer for crop and livestock sales were T.Shs. 260,335 (US$ 427) (in all districts), T.Shs. 279,239 (US$ 458) (in Morogoro), and T.Shs. 203,574 (US$ 333) in Kilombero). Clearly, non SPFP farmers in Morogoro rural earned higher income from crop and livestock sales than their counterparts in Kilombero district.

Non SPFP Farmers' Opinions About SPFP Project Farmers

One of the aims for interviewing non SPFP farmers was to elicit their opinions about certain aspects concerning farmers participating in the project. Of the 57 respondents, 46 (81 percent) reported that farmers participating in SPFP used the recommended technologies and practices for growing maize and rice. The researcher also asked non SPFP project participating farmers to mention problems that farmers in the project faced in adopting the recommended technologies and practices. Most farmers, 53 (93 percent) said that most farmers in SPFP

lacked money to buy farm inputs and this hindered them from adopting the maize and rice recommended technologies and practices (see Table 10). Similarly, most non SPFP farmers, 47 (82 percent) mentioned that another reason hindering the adoption of recommended maize and rice technologies and practices among project participating was lack of money to hire tractors for ploughing fields (see Table 10).

The researcher also asked non SPFP project participating farmers about their views on the effect of crop prices on the adoption of the recommended technologies and practices (see Table 10). This variable was small, statistically significant at $p < 0.001$). Likewise, 52 (91 percent) non participating farmers said that low prices of paddy rice hindered most SPFP project farmers to fully adopt the recommended rice technologies and practices (see Table 10). All non SPFP project participating farmers agreed that the maize and rice recommended technologies and practices that SPFP project extension agents advised farmers increased the crop yields of farmers in the project. Non SPFP project participating farmers attributed this factor t enhancing the adoption of the recommended maize and rice technologies and practices.

Table 10: Opinions of non SPFP Farmers' About Constraints That SPFP Project Faced in Adopting Recommended Technologies and Practices (n=57)

Variable	% of respond	X^2	Signif
Lack of money to buy farm inputs	93	.001	.97
Lack of labour to work in the fields	40	22	.0001
Lack of money to hire tractors for ploughing	83	1.8	.18
Get low prices or grain maize	68	11	.001*
Get low prices of paddy rice	91	.18	.67
Lack of transportation facilities for FYM	37	.57	.47
Most farmers practice mixed cropping	37	2.2	.14
Fertilizers are expensive to buy	86	.003	.96
Extension agents not giving enough advice	12	4.3	.04
Poor climatic conditions (e.g lack of rains)	77	.15	.70
Lack of farmers' credit societies	63	.14	.70
Farmers not using all the recommendations	33	.04	.85

Lack of oxen to plough fields	25	.29	.59

*Significant at $p < .05$

Of the 57 interviewees, few, 21 (37 percent) reported that the lack of transportation facilities for farm yard manure, and practicing mixed cropping hindered SPFP farmers to adopt the recommended technologies and practices. Of the 57 interviewees, 49 (86 percent) said that another reason that prevented SPFP farmers from adopting the recommended technologies and practices was prohibitive fertilizer prices. This variable difference between the two districts means were statistically significant at $p > .03$ (see Table 10). Non participating farmers, 44 (77 percent) also stated that the unfavourable weather conditions (e.g. drought, rainfall) also hindered the adoption of the recommended technologies and practices. Another aspect that the researcher asked farmers' opinions was the role of farm credits for enhancing the adoption of technologies and practices. Of the 57 respondents, 36 (63 percent) said lack of farmer cooperative societies for selling farm inputs hindered the SPFP project farmers from adopting the improved technologies and practices.

Of the 57 interviewees, only 19 (33 percent) said that lack of adoption of recommended technologies and practices among the SPFP farmers was because many could not apply all technologies at once. However, few non SPFP project participating farmers, 23 (40 percent) said the lack of labour among SPFP project participating farmers also hindered their adoption of maize and rice recommended technologies and practices (see Table 10). This variable was statistically significant at ($p < 0.0001$). Similarly, few farmers, 14 (25 percent) said that the lack of oxen to plough fields hindered most SPFP project participating farmers to adopt recommended technologies and practices (see Table 10). Likewise, few non SPFP project farmers, 5 (9 percent) agreed tat the traditional ways of farming hindered the adoption of recommended technologies and practices among SPFP project farmers.

Ways of Increasing Adoption

The researcher also asked non SPFP farmers about ways that the project could use to increase the adoption of recommended maize and rice technologies and practices. Of the 57

interviewees, 38 (67 percent) said that the Ministry of Agriculture and Cooperatives (MAC) should increase field agriculture/livestock extension agents (see Table 10). Equally, 43 (75 percent) said that to increase the adoption of recommended technologies and practices, research stations should release new varieties of maize and rice. There was a statistically significant differences albeit a small one between the means for Kilombero and Morogoro farmers on their perceptions for researchers to release new varieties of maize and rice $p < .003$ (Table 11).

Table 11: Opinions of non SPFP Farmers About Ways to Enhance the Adoption of the SPFP Project Recommendations (n=57)

Variable	% of respond	X^2	Signif
Increase field extension agents	67	.88	.34
Research stations should release new crop varieties	75	9.0	.003*
Increase prices of grain maize and paddy rice	77	4.5	.03*
Establish shops/stores for selling farm inputs	86	.50	.48
Ext. agents should use demonstration plots in teaching	88	1.6	.21

*Significant at $p < 05$

Non participating farmers were also asked about the effect of crop price on the adoption of crop recommended technologies and practices. Of the 57 non SPFP farmers, 44 (77 percent) said that to accelerate the adoption of recommended technologies and practices, prices of grain maize and paddy rice should be increased. There was a statistically significant differences between the means for Kilombero and Morogoro farmers' opinions about increasing prices of grain maize and paddy rice at $p < .03$ (see Table 11). Most farmers, 49 (86 percent) also said that to raise the adoption of the recommended maize and rice technologies and practices shops for selling farm inputs (seed, fertilizers, insecticide, fungicide) should be established in the farmers' localities (see Table 11). Most non SPFP participating farmers, 50 (88 percent) agreed that to increase the adoption of the recommended maize and rice technologies and practices, field extension agents should teach farmers about these aspects using method and result demonstration plots.

Benefits of SPFP Farmers

The researcher asked non SPFP farmers about the benefits that SPFP Farmers benefited. Of the 57 interviewees, 55 (97 percent) said that SPFP farmers had increased their yields of grain maize and paddy rice and their income (Table 12). Similarly, most non SPFP project farmers, 55 (97 percent) agreed that most SPFP farmers had received more knowledge on maize and rice husbandry, and had adopted the recommended technologies and practices. Most farmers, 50 (88 percent) also said that they would like to join the SPFP project groups (Table 12). The differences of means between the two districts of this variable were statistically significant at $p < .04$.

Table 12:Opinions of non SPFP Farmers About Benefits That SPFP Project Farmers Got (n=57)

Variable	% of respond	X^2	Signif
Farmers in SPFP have increased their yields	96	2.14	.14
Farmers in SPFP have adopted the recommended technologies	90	3.1	.08
Farmers in SPFP know the usefulness of recommendations	97	2.1	.14
Would like to join SPFP groups	88	4.2	.04*

*Significant $p < .05$

Non SPFP project farmers were asked to point out the differences between them and those participating in the SPFP project. All respondents said that the approaches and methods that the SPFP project used were right for increasing the adoption of recommended maize and rice technologies and practices. However, when asked to give reasons for saying so, only 18 (32 percent) said that it was due to the high maize and rice yields that SPFP project farmers got. On the other hand, of the 57 interviewees, a small number, 13 (23 percent) said that SPFP project farmers used the recommended maize and rice technologies and practices in their fields. Of 57 interviewees, few, 10 (18 percent) mentioned that field extension agents should continue to form farmer groups to increase the adoption of recommended technologies and practices.

C. Responses of SPFP Project Field Extension Agents

The other aim of this study was to elicit extension agents' opinions in order to understand the adoption pattern and the constraints encountered by SPFP project farmers in adopting the recommended practices and technologies in the pilot phase areas. To achieve this the researcher purposively sampled and interviewed 11 field extension agents who worked in the SPFP villages. Their opinions are elaborated below after giving their background information.

Background Information

The interviewed field extension agents were purposively chosen in the villages in which SPFP project operated. They came from Hembeti, Ichonde, Kining'ina, Mbasa, Michenga, Kisawasawa, Mang'ula, Mvomero, and Wami Dakawa. Ten agents were males and only one was a female. Their ages ranged from 30 to 43 and the average mean age was 37 years. Ten of them had finished secondary school education "O" level, six had attained diploma and five certificate training in agriculture/livestock disciplines. Nine of them were married and most had worked for more than four years as extension agents. Nine extension agents reported that they had attended short courses lasting three months.

Agents' Opinions About Adoption Constraints

The researcher asked SPFP project extension agents to mention constraints that hindered SPFP project farmers in adopting the recommended maize and rice technologies and practices. Ten extension agents said that non adoption was due to lack of ;money among farmers, and four said that it was because of their low level of knowledge about modern agriculture and its benefits. Of 11 the interviewees, five said that the adoption of recommendations was also hindered because most farmers preferred their traditional ways of farming (e.g., not thinning, constructing bunds, weeding on time, using fertilizers, planting in rows). Only four agents said that SPFP project farmers did not follow and adopt the recommended maize and rice technologies and practices because of lack of farm input shops. Similarly, three extension agents reported that the other reason was that MAC did not adequately attend to farmers' needs (e.g., avail farm inputs). Six and three extension agents said that SPFP project farmers did not

follow and adopt the recommended technologies and practices because of low crop prices and small fields respectively.

Use of Technologies and Practices

In this section the researcher asked SPFP extension agents to give their views on the source and the effectiveness of the recommended technologies and practices. Of the 11 agents, ten agreed that between 1993 to 1996 the crop research stations had released new varieties of maize and rice. Five agents said that most farmers had followed and adopted the recommended maize and rice technologies and practices at a high level-ranging from 71 to 90 percent. Seven extension agents also said that most farmers were aware of the recommended technologies and practices even before the SPFP project came in their areas. Yet, all extension agents in the SPFP project agreed that most of their farmers had increased the yields and income of maize and rice because of following and adopting the recommended technologies and practices.

But, the answers varied widely when agents were asked to express in percentages the number of farmers who had adopted the recommended technologies and practices. For example, of 11 agents, five, four, and two said that farmers had adopted the recommended technologies and practices in the percentage ranges of below 1, 21 to 40, and 41 to 60, respectively. This discrepancy sheds doubts on the agents' opinions and their abilities in assessing and determining the rate of adoption of the recommended technologies and practices. Of the 11 agents, eight agreed that most SPFP project farmers preferred to learn the recommended maize and rice technologies and practices using result and method demonstration plots. Four agents said that field days for farmers could also increase their rate of adoption of the recommended technologies and practices. Of 11 agents, ten showed that farmers would continue to use the recommended maize and rice technologies and practices even after the SPFP project support ended. Agents gave the following reasons for continuing using the recommended technologies and practices. Nine and seven agents said that most farmers knew that using the recommended technologies and practices increased income and food, and that they got more money from

crop sales, respectively. Still, four said that farmers would continue to use the recommended technologies and practices because they had served money that accrued from crop earnings.

Field extension agents gave their reasons that made most farmers who knew about the recommended technologies and practices not to adopt them. Of the 11 agents, six and five said that the farm inputs were expensive for most farmers to buy, and were not available at the time when most needed. Still, five and four agents reported that most farmers did not get improved maize and rice seed, and crop prices were low for most farmers to buy farm inputs, respectively. The researcher asked extension agents to mention ways that the MAC could do to enhance farmers' adoption of maize and rice recommended technologies and practices. Of the 11 agents, nine extension agents said that farmers' adoption of recommendations could be enhanced if MAC offered regular short courses to field extension agents on new developments and to motivate them. To increase the adoption of the recommended technologies and practices, eight respondents said MAC should revive short courses for farmers in the Farmer Training Centres. Of 11 agents, seven and six said that prices of farm inputs should be reduced, and that extension agents should insist on teaching farmers using result and method demonstration plots. Only four agents showed that farmers should start their own savings and credit societies. Of 11 interviewees, only two stated that prices of grain maize and paddy rice should be increased, and MAC should increase extension agents.

D. Observations

The researcher's field observations falls into three categories: the conduct of field extension agents, farmers' willingness to participate in the SPFP project groups, and procurement and distribution of farm inputs.

a) Field extension agents had established rapport with SPFP farmers and this was seen in their interactions with them. Also, the farmer-managed result and method demonstration plots were well managed. But farmers in the nearby fields had not used the recommended technologies and practices. Observations also showed that SPFP project farmers seldom used the recommended technologies and practices in their "normal fields" other than the project

demonstration plots. There was a way in which most project farmers thought that the knowledge gained had only to be used in the demonstration SPFP project plots. For instance, discussions with some farmers in the project indicated that most had not planted their maize and rice in the normal fields using the recommended technologies and practices. This anomaly should be corrected for sustainable adoption and diffusion of knowledge.

b) SPFP farmers were highly motivated to follow the maize and rice recommended technologies and practices. Observations show that this was due to supplying farmers with farm inputs at a cost. However, most farmers expressed dissatisfaction with the delays in supplying farm inputs (e.g., fertilizers). This problem was serious in Kilombero district. There was good care of SPFP project result and method demonstration plots, but other farmers in the adjacent fields used the traditional methods of raising crops. For instance, some farmers had mixed maize and rice that were not planted in rows. At the time, if all farmers in the two districts had adopted the use of the recommended technologies and practices (e.g., fertilizers, seed), the authorities would have not copied with the demand. There was a lot of rhetoric in extension work that was not supported with tangibles, for instance, the lack and/or untimely supply of farm inputs.

c) The availability of farm inputs (e.g. fertilizers) was a problem to farmers. This problem was serious in Kilombero district because the "farm input stockist" had not procured and supplied the farm inputs early enough. Although procurement of farm inputs was not part of the terms of references of the researcher, a number of aspects need mentioning. The researcher informally interviewed the Kilombero district Farm Input Stockist. He revealed that MAC delayed to release funds from the Input Trust Fund for buying farm inputs and transport them in time to Kilombero. This was done inspite of the stockist persistent follow-ups. The stockist was bitter about the MAC bureaucratic red tape about the whole issue. The lack of fertilizers had demoralized a number of farmers I talked with and some considered pulling out of the project in the future. In

Kibasa village, for instance, a women group stalled the interview to know if we had brought them fertilizers for their maize and rice crop that were getting yellow.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study sampled and interviewed 288 people in Kilombero and Morogoro districts to understand the pattern and constraints encountered by farmers in adopting the recommended technologies and practices in the phase areas of the Kilimo/FAO SPFP project. Of the 288 people, 120 were farmers participating in the Kilimo/FAO SPFP project pilot phase villages, 57 were farmers not participating in the project and 11 field extension agents in the SPFP project villages.

Of the 120 SPFP project farmers, 111 (92 percent) showed that they cultivated an average of 1.9 acres of maize and 2.3 of rice. These farmers got an annual average yield of 12.8 bags of maize and 22.6 bags of paddy rice per acre. Of 120 respondents, 71 (59 percent) got an annual average mean of T.Shs. 97,939 (US$ 106) from selling grain maize and 81 (59 percent) got T.Shs. 146,716 (US$ 240) from selling paddy rice. About half of the SPFP farmers, 51 (42 percent) said that their children helped with farm work. Most farmers in the SPFP project, 89 (74 percent) stated that if they had money they would buy inorganic fertilizers (e.g., urea, S.A.) than use organic manure. This was said in spite of most farmers, 80 (67 percent) acknowledging that they knew the importance of applying farm yard manure in crops.

Of the 119 SPFP farmers, 102 (86 percent) agreed that extension agents used farmer managed demonstrations plots to teach them about the recommended technologies and practices for increasing maize and rice yields. Of the 119 project farmers, 81 (69 percent) reported that project extension agents used group methods to teach the recommended maize and rice technologies and practices to increase yields.

Of the 119 project farmers, only 49 (41 percent) indicated that lack of money to buy farm inputs (fertilizers, improved seed, fungicides) hindered them from adopting the SPFP project recommended technologies and practices. Of the 119 farmers, 93 (73 percent) reported that they did not adopt the SPFP recommended technologies and practices because farm inputs were expensive. Most SPFP project farmers, 111 (93 percent) agreed that adopting the SPFP project recommended technologies and practices for maize and rice had increased their crop yields. Similarly, most interviewees, 106 (89 percent) agreed that the SPFP project recommended technologies and practices for maize and rice had increased their income from crop sales.

Of the 57 non SPFP project participating farmers, the combined annual average mean income per farmer for livestock and crop sales was T. Shs. 260,335 (US$ 427). Of 57 non SPFP project respondents, 46 (81 percent) reported that farmers participating in the SPFP project used the recommended technologies and practices to grow maize and rice. Most of the non SPFP farmers, 53 (93 percent) said that most farmers in the SPFP project lacked money to buy farm inputs and this hindered them from adopting the maize and rice recommended technologies and practices. Similarly, most non SPFP farmers, 47 (82 percent) mentioned that another reason hindering the adoption of recommended technologies and practices among project participating farmers was lack of money to hire tractors for ploughing fields. Of the 57 non SPFP farmers, 39 (68 percent) and 52 (91 percent) said that low maize and paddy rice prices hindered most SPFP farmers to fully adopt the recommended technologies and practices, respectively. Most non SPFP farmers, 49 (86 percent) said that another reason that prevented SPFP farmers from adopting the recommended technologies and practices was prohibitive fertilizer prices.

Of the 57 non SPFP project farmers, 38 (67 percent) said that the Ministry of Agriculture and Cooperatives (MAC) should increase field agriculture/livestock extension agents. Most non SPFP project farmers, 44 (77 percent) also said that to accelerate the adoption of recommended technologies and practices, prices of grain maize and paddy rice should be increased. Almost all non SPFP project farmers, 55 (96 percent) agreed that most farmers in

the SPFP project had received more knowledge on maize and rice husbandry, and had adopted the recommended technologies and practices. Of the 57 non SPFP project farmers, 50 (88 percent) said that they would like to join the SPFP project groups to increase their crop yields.

Of the 11 extension agents interviewed, ten said that non adoption of the recommended technologies and practices was due to lack of money among farmers. Four of the extension agents said that it was because of the farmers' low level of knowledge about modern agriculture and its benefits. Of the 11 agents, ten agreed that between 1993 and 1996 the crop research stations had released new varieties of maize and rice. Most agents, ten showed that farmers would continue to use the recommended maize and rice technologies and practices even after the SPFP project support ended. Of the 11 agents, nine said that farmers adoption of the recommendations could be enhanced if MAC offered regular short courses to field extension agents on new developments and to motivate them. Seven and six of the agents said that the price of farm inputs should be reduced, and that extension agents should insist on teaching farmers using result and method demonstration plots respectively.

Recommendations

This study makes the following recommendations to enhance the adoption of recommended technologies and practices of maize and rice.

1. MAC/SPFP project should ensure that farm inputs (fertilizers, seed, fungicide) reach farmers on.
2. MAC/SPFP should strive to increase farmers' prices of grain maize and paddy rice by encouraging farmers to form village cooperative societies.
3. MAC/SPFP project should intensify the teaching of farmers in making compost to reduce their dependence on inorganic fertilizers whose prices are prohibitive. Inorganic fertilizers are also difficult to get in the villages in spite of their deleterious effects on the soils.
4. Village extension agents should teach project farmers to make ox-carts for transporting farm yard manure to the fields and other farm chores.
5. MAC/SPFP should intensify the use of farmer-managed method and result demonstration plots to enhance the adoption of recommended maize and rice technologies and practices.

Group approaches for teaching farmers should be encouraged for farmers to interact, discuss and share their farming experiences. Inter-village study should be started within the project for farmers to see others farmers successes or failures in crop production.

6. Extension agents should often organize village meetings to inform about the recommended technologies and practices. Government and ruling party officials should be invited t talk to farmers about the benefits of adopting the recommended technologies and practices. The spirit of organizing field days should be revived and extension agents should use the occasions to display recent technologies and practices that farmers can use to increase crops yields.
7. Field extension agents should deliberately organize short courses for farmers with a view to introduce or emphasize on certain useful technologies and practices for increased crop yields.
8. MAC/SPFP project should introduce the making of oxen or small hand-operated tractors to increase the acreage cultivated and make use of economic of scale.
9. MAC/SPFP project should improve the procurement, transportation, and distribution of farm inputs to farmers. MAC red tape should be eliminated so that the appointed Farm Input Stockists are availed with earmarked funds for them to harmoniously serve smallholder farmers who shoulder the economy of this country.

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FAO QUESTIONNAIRE

TITLE OF STUDY: ADOPTION AND CONSTRAINTS ANALYSIS AT THE PILOT PHASE OF THE SPECIAL PROGRAMME ON FOOD PRODUCTION IN TANZANIA

STUDY AREAS: Morogoro and Kilombero Districts

A. SPFP PROJECT FARMERS' QUESTIONNAIRE

Socioeconomic Variables

1. What is your gender? ..... Female:..... Male:.....

2. How old are you? ..... Years.

3. What is your marital status? Married, Single, Never married, Divorced, Widowed, others:.....

4. Please indicate your level of formal education?
   ..... No formal education
   ..... Attained Std I-IV
   ..... " Std V-VII
   ..... Post-primary (technical training)
   ..... Finished "O" level
   ..... Finished "A" level
   ..... Finished adult literacy
   ..... Above "A" level

5. Have you attended any formal training in agriculture/livestock? ..... Yes, ... No.

6. If answered yes in Question 5, how long was it? ..... days.
   ..... weeks, ... months, ... Years.

7. How many people live in your household? .....
   ..... Adults (over 18 years), ...Males, ... Females
   ..... Left school (under 18 years), ... Males, ... Females
   ..... Pre-schoolers, ... Males, ... Females

8 How many school going children do you have? .....
   ..... Males, ... Females

9. Who normally helps with farming activities?
   ..... 1) Own family members
   ..... 2) Hired labour
   ..... 3) Work group members

..... 4) Relatives
..... 5) Others (specify) .....

10. How many children have finished primary education?
..... Males, ... Females

11. How many children help with crop farming?
..... Males, ... Females

12. Do you practice crop farming? ..... Yes, ... No

13. If answered yes in question 12, what are your main crops?
(List them in order of priority). 1) ..... 2) ..... 3) .....
4) .....

14. Is your farm divided into separate fields? ..... Yes, ... No.
If Yes, give information to the following:
Field No. 1 ..... size, crop grown ....., yield ..... Bags
Field No. 2 ..... " , " ....., " ..... "
Field No. 3 ..... " , " ....., " ..... "
Field No. 4 ..... " , " ....., " ..... "

15. What is the distance of each fields from home?
Field 1 ..... km, Field 2 ..... km, Field 3 ..... km, Field 4 ..... Km

16. How big is the main household farm/field? ..... hectares

17. How long have you been farming? ..... years

18. How many hectares did you grow of the following crops in the 1995/96 season?

Maize:	.....	Hectares
Rice:	.....	"
Onions:	.....	"
Cowpeas:	.....	"
Sorghum:	.....	"
Cassava:	.....	Hectares
Pigeon Peas:	.....	"
Others, specify:	.....	....., ...

19. How many bags of 100 kgs each of the following crops did you get in the 1995/96 season?

Maize:	.....	bags (of 70 kgs)
Rice:	.....	"
Onions:	.....	"
Cowpeas:	.....	"

Sorghum: ..... "
Cassava: ..... "
Pigeon peas: ..... "
Others, specify ....., ..., ...

20. How much money did you earn in the 1995/96 season from selling the following crops?
Maize: ..... T.Shs.
Rice: ..... "
Onions: ..... "
Cowpeas: ..... "
Sorghum: ..... "
Cassava: ..... "
Pigeon peas: ..... "
Others, specify:....., ..., ...

21. Which of the following livestock do you raise? (Tick the appropriate ones)
Cattle: .....
Goats: .....
Sheep: .....
Oxen: .....
Donkeys: .....
Local chicken:.....
Ducks: .....
Pheasants: .....
Others, specify ....., ..., ...

22. Do you know the importance of applying farm yard manure to plants/crops? ..... Yes, ... No.

2. Please, name three main reasons for raising livestock
1) .....
2) .....
3) .....

3. Do you apply manure obtained from these livestock in your fields? ..... Yes, ... Yes, ... No.

4. If yes, how much do you apply? ..... Kgs/tons/tins

5. Do you apply compost made from plant residues? ..... Yes, ... No.

6. If yes, how much do you apply? ..... kgs/tons/tins.

7. If you raise livestock which of the four reasons prevented you from applying the manure in the fields?

a) Lack of enough manure produced by livestock to apply in the fields
b) Fields being to far away to carry the manure
c) Lack of enough family labour to carry the manure to the fields
d) Lack of manure transportation facilities to the fields

8. If you had enough money would you prefer to apply farm yard manure or chemical fertilizers in your fields? .....

9. State two reasons for your choice in question No. 29
a) .....
b) .....

10. How much money did you earn in the 1995/96 cropping season from the sale of animals and/or their products for the following:

Cattle:	.....	T.Shs.
Goats:	.....	"
Sheep:	.....	"
Oxen:	.....	"
Donkeys:	.....	"
Local chicken:	.....	"
Ducks:	.....	"
Pheasants:	.....	"

Others, specify:....., ..., ...

Extension/Training Work

32. Which of the following extension approaches have the project extension agents used for farmers to adopt the recommended technologies and practices? (Tick the appropriate one(s).

.....	a)	Conducted method demonstrations plots
.....	b)	Conducted result demonstration plots
.....	c)	Conducted farmer managed result demonstration plots
.....	d)	Agents visited farmers in their homes
.....	e)	Agents visited farmers in their fields
.....	f)	Organized group discussions
.....	g)	Listened to Ukulima wa Kisasa radio programmes
.....	h)	Used person to person communication
.....	i)	Issued leaflets about rice and maize agronomy
.....	j)	Issued FAO leaflets about rice and maize agronomy
.....	k)	Agents held public meetings
.....	l)	Others, specify:.....

33. What methods have the project extension agents used to ensure farmers' participation? (Tick the appropriate one(s).

..... a) Used public meetings to get farmers to participate
..... b) Called farmers meetings
..... c) Called meetings of farmers growing maize and rice
..... d) Used government officials and politicians to exhort farmers to participate in the SPFP project.

34. What activities have project extension agents used to ensure farmers' participation? (Tick the appropriate one(s).

..... a) Ensured that farmers practiced what they learned
..... b) Ensured that farmers bought the recommended packages of technologies
c) Ensured that farmers used the recommended technologies and practices in their fields

35. How many SPFP project group meetings did you attend per month? .....

36. How many SPFP project group meetings did you attend in 1996? .....

37. Has your participation in the SPFP project groups increased your knowledge of growing rice and maize? ..... Yes, ...

38. How would you rate the usefulness of the SPFP group meetings in imparting knowledge? ..... Very useful, ... useful, ... Less useful, ... Not useful

39. Which recommended technologies and practices advocated by the SPFP project did you adopt during the 1995/96 crop growing season?

.... a) Planted maize to recommended spacing
..... b) Planted the recommended variety of maize
..... c) Applied the right amount of fertilizers in maize
..... d) Maintained the right population of maize plants/ha
..... e) applied pesticides in maize to control stalk borers
..... f) Planted rice to recommend spacing
..... h) Planted the recommended variety of rice
..... i) Applied the right amount of fertilizers in rice
..... j) Maintained the right population of rice plants/ha

40. Has the KILIMO/FAO SPFP project been useful in making you adopt the recommended technologies and practices in growing rice and maize? ..... Yes, ... No.

Constraints to adopting the recommended technologies and practices

41. Which of the following aspects do you consider as constraints to adopting the SPFP project recommended technologies and practices?

..... a) Lack of money to buy the recommended fertilizers
..... b) Low prices of grain maize to break-even the cost of fertilizers and insecticides used.
..... c) Lack of markets for paddy rice
..... d) Low prices paid for paddy rice
..... e) Lack of markets for grain maize
..... f) Low prices paid for grain maize
..... g) Fields too small to apply fertilizers
..... h) Lack of labour to apply the recommended practices
..... I) Unreliable input supplies
..... j) Lack of transportation facilities of fertilizers to the fields
..... k) Lack of hiring tractors to plough fields
..... l) Using mixed cropping that prevents me from using certain fertilizers
..... m) Fertilizers to apply in rice too expensive
..... n) Fertilizers cannot be bought in small quantities
..... o) Pesticide to apply in rice too expensive
..... p) Insecticides to apply in maize too expensive
..... q) The recommended fertilizers not economical in small fields of maize
..... r) The recommended fertilizers not economical in small fields of paddy rice
..... s) Lack of store/centres to buy fertilizers
..... t) Lack of high yielding varieties of rice
..... u) Lack of high yielding varieties of maize
..... v) Lack of post-harvest technology for grain maize
..... w) Extension agents not advising farmers on the recommended practices and technologies
..... x) Lack of rains
..... y) Unfavourable other weather conditions
..... z) Inadequate credit facilities

42. How can the adoption of SPFP project recommended technologies and practices be improved?
..... a) Increase the number of extension agents
..... b) Fertilizers should be available when needed
..... c) Extension agents should visit regularly
..... d) Extension agents should teach farmers using method and result demonstration plots
..... e) Research stations should release improved varieties of crops for farmers to grow

43. How do you rate your adoption of the recommended technologies and practices advocated by the SPFP project?
..... Low, ... Medium, ... High

44. Are there any familial (internal) factors that have prevented you from adopting the SPFP project recommended technologies and practices? ..... Yes, ... No.

45. If answered Yes in Question 44, what are the factors?

..... a) Inadequate fiscal resources to buy fertilizers
..... b) Lack of labour to effectively apply the practices and technologies
..... c) Small fields to effectively break-even
..... d) Having scattered far away fields that cannot be easily reached
..... e) Having other crops to grow that compete for the recommended technologies and practices.
..... f) Recommended technologies and practices require more labour
..... g) Recommended technologies and practices do not increase my income

46. What are the external factors that have affected the adoption of SPFP project recommended technologies and practices?

..... a) Lack of shops/centres to buy the technologies
..... b) Recommended technologies are expensive to buy
..... c) Not knowing how to use most of the recommended technologies and practices
..... d) Extension agents not giving adequate information on how to use the recommended technologies and practices
..... e) Unfavourable weather conditions
..... f) Adopting the recommended technologies and practices does not pay
..... g) Recommended technologies and practices cannot be adopted in bits.

47. Has the SPFP project increased your awareness of using the recommended technologies and practices in maize/rice than what you knew before ..... Yes, ... No.

48. Have the recommended technologies and practices advocated by the SPFP project increased your household income? ..... Yes, ... No.

49. Have the recommended technologies and practices advocated by the SPFP project made you to incur losses? ..... Yes, ... No.

50. Has the savings and credit society advocated by the project been useful to you? ..... Yes, ... No.

51. Do you think that the savings and credit society will continue to serve farmers after the project ends? ..... Yes ..... No.

52. Have you been able to save money with the created savings and credit society? ..... Yes, ... No.

B. QUESTIONNAIRE FOR EXTENSION AGENTS

1. What is your gender? ..... Female, ... Male

2. What is your marital status? ..... Married, ... Single, ... Never married, ... Widowed, ... Divorced.

3. What is your highest level of formal education?
.....

4. What level of agriculture/livestock training did you attain? ..... Below certificate, ... Certificate, ... Diploma, ... Degree

5. How long was your agriculture/livestock training
..... Months ..... Years

6. How long have you worked with Ministry of Agriculture and Cooperatives (MAC)? ..... Months, ... years.

7. How long have you worked as an agric/livestock extension agent in this area?
..... Months, ... Years.

8. Have you attended any short training course? ..... Yes, ... No.

9. If answered Yes in question 8, name the title of the course ..... and duration .....

Constraints to adopting the recommended technologies and practices

10. What problems hinder farmers' adoption of the SPFP project recommended technologies and practices?
    - ..... a) Lack of money to buy the recommended technologies
    - ..... b) Low level of farmers' formal education to understand the benefits of the technologies and practices
    - ..... c) Most farmers preferring to use traditional ways of farming
    - ..... d) Lack of shops/centres that sell some of the recommended technologies
    - ..... e) MAC is not paying attention to farmers' needs
    - ..... f) Technologies and practices recommended are costly
    - ..... g) Farmers having small fields on which to use the recommended technologies and practices
    - ..... h) Low prices paid for crops that farmers use the recommended technologies and practices
    - ..... i) Recommended technologies and practices do not increase yields compared to traditional practices
    - ..... j) Farmers having other profitable crops to work on
    - ..... Others, specify .....

11. Have the crop research stations released any recommended technologies and practices for rice and maize for the past three years (1993 - 1996)? ..... Yes, ... No.

12. If answered Yes to question 11, name three technologies and practices.
    1) .....
    2) .....
    3) .....

13. Based on your observations how do you rate farmers' degree of adoption of the SPFP project recommended technologies and practices? .....11-30%, ... 31-50%, ... 51-70%, ... 71-90%, ...91-100%.

14. Have most farmers in the project increased their yields of maize and/or rice because of using the SPFP project recommended technologies and practices? ..... Yes, ... No.

15. If answered No in Question 14, give three reasons for not increasing the crop yields?
    a) .....
    b) .....
    c) .....

16. Have farmers in the SPFP project increased their income gains because of using the recommended technologies and practices? ..... Yes, ... No.

17. What percentage of farmers participating in the SPFP project have adopted the recommended technologies and practices? ..... Less than 10%, ... 11-30%, ... 31-50%, ... 51-70%. .....71-90%. ..... 91-100%.

18. Have some non-participating farmers in the SPFP project also adopted the recommended technologies and practices? ..... Yes, ... No.

19. If answered YES in Question 18, what is the percentage of those farmers? ..... Less than 1%, ... 1-20%, ... 21-40%, ... 41-60%, ... 61-90%.

20. Do most farmers prefer to come to the method and result demonstration plots for the adoption of recommended technologies and practices over other extension approaches? ..... Yes, ... No.

21. What other extension approaches did you use to increase the adoption of recommended technologies and practices advocated by the SPFP project?
    a) .....
    b) .....
    c) .....

22. Will most farmers continue to use the SPFP project recommended technologies and practices after the project ends? ..... Yes, ... No.

23. If answered Yes in Question 22, give three reasons for your answer
    a) .....
    b) .....
    c) .....

24. Were most farmers aware of maize and rice technologies and practices that the SPFP project is recommending now? ..... Yes, ... No.

25. If answered Yes in Question 24, give three reasons as to why they did not use them?
    a) .....
    b) .....
    c) .....

26. Mention four areas that in the future MAC should do to increase farmers' adoption of maize and rice recommended technologies and practices?
    a) .....
    b) .....
    c) .....
    d) .....

C. QUESTIONNAIRE FOR NON-SPFP PROJECT PARTICIPATING FARMERS

1. What is your gender? ..... Female, Male .....

2. How old are you? ..... Years

3. What is your marital status? ..... Married, ... Single, ... Never married, ... Widowed, ... Divorced

4. What is your highest level of formal education? .....

5. How many people live in your household?.....

6. How big is your farm? ..... acres

7. How long have you farmed? ..... Years

8. Have you had any formal training in agriculture/livestock? ..... Yes, ... No

9. If answered Yes in Question 8, how long was it? ..... days, ... months, ... years.

10. How much income did you earn from crop sales in the 1995/96 season? ..... T.Shs.

11. How much income did you earn from livestock sales in the 1995/96 season? .....T.Shs.

Constraints to adopting the recommended technologies and practices

12. Have most farmers in the SPFP project adopted the advocated maize and rice recommended technologies and practices? ..... Yes, ... No.

13. What problems do most farmers in the SPFP project face in adopting the maize and rice recommended technologies and practices?
    - ..... a) Lack of money to buy the technologies
    - ..... b) Lack of labour to apply the recommended technologies and practices
    - ..... c) Low prices of grain maize and paddy rice
    - ..... d) Using the recommended technologies and practices does not increase crop yields
    - ..... e) Lack of labour to apply fertilizers
    - ..... f) Lack of reliable sources for agricultural inputs
    - ..... g) Lack of transportation facilities for the fertilizers
    - ..... h) Most farmers use mixed cropping that prevent the

use of recommended practices and technologies

..... i) Fertilizers are expensive to buy

..... j) Using fertilizers is not economical in small fields

..... k) Extension agents are not adequately advising farmers on the recommended practices and technologies

..... l) Poor weather conditions

..... m) Lack of primary societies to sell inputs

..... n) Recommended technologies and practices are not compatible with traditional farming practices

14. What should be done to increase the adoption of maize and rice recommended technologies and practices?

a) Employ more extension agents
b) Researchers should release more improved technologies and practices
c) The govt should increase the price of paddy rice and Grain maize
d) The govt. should establish grain marketing channels
e) Have centres for selling fertilizers and other farm inputs
f) Increase the number of method and result demonstration plots

15. Have farmers in the SPFP project increased their paddy rice and grain maize yields? ..... Yes, ... No.

16. Are farmers in the SPFP project more aware of the importance of using the maize and rice recommended technologies and practices? ..... Yes, ... No.

17. Would you want to join the SPFP project group? ..... Yes, ... No.

18. Are farmers in the SPFP project groups more knowledgeable in applying the maize and rice recommend technologies and practices? ..... Yes, ... No.

19. Are there any noticeable differences between you and farmers in the SPFP project in growing maize and rice? ..... Yes, ... No.

20. If answered Yes in Question 19, mention four differences.

a) .....
b) .....
c) .....
d) .....

21. Are the KILIMO/FAO SPFP project extension approaches the best for accelerating the adoption of crop recommended technologies and practices for increasing crop yields? .....Yes, ... No.

22. If answered Yes in Question 21, give three reasons:
    a) .....
    b) .....
    c) .....

23. If answered No. in Question 22, give three reasons:
    a) .....
    b) .....
    c) .....

24. Have the extension agents in this village been effective in advising most farmers to adopt the maize and rice recommended technologies and practices that the SPFP project advocates? ..... Yes, ... No.

25. Have the non-participating farmers in the SPFP project villages also adopted the recommended technologies and practices? ..... Yes, ... No.

26. Mention three things that extension agents ought to do to increase farmers' adoption of maize and rice recommended technologies and practices.
    a) .....
    b) .....
    c) .....