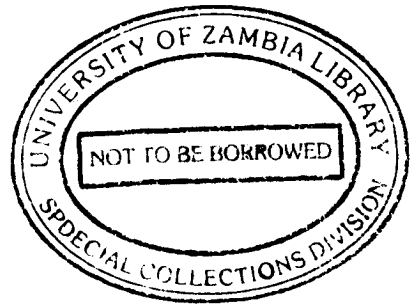


**FACTORS AFFECTING ADOPTION OF IMPROVED GROUNDNUT SEED
AMONG SMALL SCALE FARMERS IN CHIPATA, ZAMBIA.**

11 F
Agriculture,
2005
Tembo.

A thesis Presented to the Department of Agriculture Economics and Extension of the
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By
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LIST OF ABBREVIATIONS

FAO	-	Food Agriculture Organisation
GDP	-	Gross Domestic Product
MAFF	-	Ministry of Agriculture Food and Fisheries.
MACO	-	Ministry of agriculture food and fisheries
SPSS	-	Statistical Package for Social Sciences
WB	-	World Bank

ABSTRACT

FACTORS AFFECTING ADOPTION OF IMPROVED GROUNDNUT SEED AMONG SMALL SCALE FARMERS IN CHIPATA, ZAMBIA.

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University of Zambia, 2005.

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Mr. M. Likulunga.

Improved seeds are one of the most important technologies for improving agriculture production and thus contributing to growth in agriculture. However adoption of improved groundnut varieties has been extremely limited in Zambia. Despite the availability of new varieties nearly the entire groundnut crop in Zambia is produced under farmer-retained seed. Information pertaining to low adoption of improved groundnut- seed has been lacking as much as development of new varieties. Indigenous groundnut seeds are late maturing and are very low yielding.

The study was conducted in Chipata District in the Eastern Province since the area is an important groundnut producer in Zambia. Both secondary and primary data has been used in the report Primary data was elicited through the use of structured questionnaire and informal interviews with extension officers and Sources of secondary data were included from the ministry of agriculture.

Probit regression analysis was performed using SPSS to determine the influence of farmers Age, Sex; marital status, Education, Price and household head, Profit and extension services in adoption groundnut varieties. Probit model was used in view of the discontinuous of the dependent variable that is a dummy. The coefficients of the variables give the direction of the interpretation while the marginal effects calculated at the variables means provide actual probability of being an adopter and give the economic interpretation because Probit model is non linear.

The coefficients of age, household head, price of input and sex where negative. This implies that there is a negative correlation with the probability of adopting the improved seeds. Any Increase in the marginal effects will decrease the probability of adopting the technology by the calculated marginal effects. The coefficients for education, marital status, profit, extension services had a positive relationship with the adoption of the new technology. Any increase in the coefficients will increase the probability of adopting the technology by the marginal effects at their sample means. Only age, education, extension and profit where significant (t-calculated was greater than t-table) at ten percent confidence interval

Based on these findings, it is recommended that there should be an increase in the extension services provided to farmers by minimising the ratio between extension officers and farmers. Government should also improve the education sector to offer an opportunity to most rural people to have access to education, as this will improve the understanding of the importance of using improved technologies. The road network should also be improved for easy access to inputs like improved seeds by farmers.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The agriculture sector is the key to the development of the Zambian economy and it contributes about 22% to the Gross Domestic Product (GDP) and provides livelihood for more than 50% of the population (WB 1995). About 67% of the working population in the country is employed in this sector implying that the sector presents by far the most opportunity for income generation and employment.

Zambia has an immense agricultural potential but only 20% of the arable land is under cultivation despite the abundance of good soils, good water resources and large small-scale farmers. One of the key factors to realising the agricultural potential is seed security. Seed security is the mother of food and makes a big difference to the household food security (FAO1999). Seed security means having access to appropriate seed of good quality at the right time in right quantities so as to meet production demands in a sustainable way.

Improving smallholder access to new crop varieties has long been recognised as a critical step for increasing agricultural productivity. Adoption of improved varieties that resist pests and draught can often achieve good yields even when farmers are unable to adopt new costly inputs such as chemicals and fertiliser (Muliokela 2000). Over the past years substantial resources have been invested in crop breeding programmes at international and nation research centres serving Africa and hundreds of new varieties have been released. However except for a few commodities, sustained adoption of improved varieties has been very limited. (Muliokela 2000).

Groundnut is one of the crops that are mostly grown in eastern province. Before independence and post independence era, the share of groundnut in total marketing contribution has been 60-80 % (clement 2000). Above all Chipata districts consists of above 80% of small-scale farmers and lies in agro ecological region ii that fevers production of groundnuts.

1.2 PROBLEM STATEMENT

Despite the availability of new varieties nearly all (80%) Of the groundnut crop in Zambia is produced under farmer-retained seed. Indigenous groundnut seeds are late maturing and are very low yielding. This leads to low levels of production, which in turn has created greater dependence on the importation of the groundnut seeds. (Babu1994). Improved groundnut seeds are high yielding, mature early and are tolerate certain diseases particularly early leaf spot. Information pertaining to low adoption of groundnut-improved seed has been lacking as much as development of new varieties. MAFF (2000) have observed that farmers have problems adopting improved groundnut seeds. Chipata and eastern province in general has low rates of adoption of improved seeds (groundnut)

In view of this a problem exists which warrants an analysis of factors that affect the adoption of improved groundnut seed in Zambia

1.3 GENERAL OBJECTIVE

To determine factors that influences the adoption of improved groundnut seeds in chipata district.

1.4 SPECIFIC OBJECTIVES

To determine the extent these factors influence the adoption of improved groundnut seeds.

1.5 RATIONALE

Groundnut seed is one of the most important legume crop grown in Zambia in terms of the production area under cultivation (Chiyembekeza et al 1998). The crop provides important source of food and income to small-scale farmers and until the mid 1990s was key export crop (Babu1994). However production and export of the crop has steadily declined as a result of declining area under production and reduced yields (Freeman et at 1999). The study will establish information on constraints and factors influencing farmers' adoption decision of improved groundnut seeds and it will provide useful insights and feedback to researchers and policy makers.

1.6 ORGANISATION OF THE THESIS

This thesis opens with chapter one that introduces the topic analysis of factors that affect adoption of improved groundnut seeds. It introduces the key terminologies that the thesis covered it further define the statement of the problem, the objectives of the problem and the rationale of the study. Chapter two covers the literature review that looks at what others have done in the related topic (adoption of improved technology). Then chapter three is methods and procedures that describe the study area, method of data collection and analysis. Chapter four is findings. It describes the social demographic characteristic of the sample and the study findings. Finally chapter five is the conclusions and the recommendations of the study findings.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter look at what others have done relating to the subject under review. It also gives the strength and weaknesses that are similar to the subject. This includes the researches done in Zambia and in other countries.

The main source of the rural population is agricultural production. Agriculture production requires farmers to have access to resources e.g. seeds. Seed has been recognised as one of the most important catalyst that can contribute positively to the achievement of food security and it forms a vital link in the transfer of agriculture technology.

According to (Brahim et al 1995; Ahmed et al 2000) low adoption of improved varieties of sorghum are probably influenced by poorly developed commercial and /or public seed systems and low usage of fertilisers and other inputs in areas where the crop is grown Ahmed et al (2000). However a review of on farm trial data showing higher yields but low acceptability among farmers point to other factors as well (White and Chapman, 1996) the persistently low rates of adoption of improved varieties of sorghum in Africa point to a potential need for modification in approaches employed in the improvement of the crop.

From Herdt and Capule (1983) previously analysed the persistent use of traditional varieties of rice inspite of the availability of improved varieties they determine that in some areas the discount for improved varieties began to be introduced with quality character preferred by farmers they are adopted rapidly. Likewise for scientist who analysed sorghum quality characteristics have become increasingly capable of predicting the acceptability of improved varieties based on the quality of the food products they produce. Fieldel and Aboubcar (1998).

According to Shapiro (1977) in his research household, labour, time as well as cash resources are basic constraints resulting in decision about technology behaviour has produced different policy prescription concerning the most appropriate approach to increasing tradition farm productivity and the most appropriate approach to increasing tradition farm productivity and the role of improved technology in this case.

According to Freeman, Vander merwe, P. Chiyebekeza (2002) have reported that farmers stop growing the new groundnut varieties because of socio, economic, trial related and agro economical factors that may or may not be specific to variety. Socio economic factors particularly consumption of the seed stock were most frequently cited the most important reason for farmers having stopped growing the new varieties and siamasonta (1993) review that farmers use one new varieties of groundnut in chipata in eastern and are willing to grow more varieties.

According to Shapiro (2000) small-scale farmers generally operating on the edge of survival can ill afford to take risks of adopting new technology even if they correctly perceive the likely benefits? There should be mechanism to encourage farmers to adopt new technologies. Further more rather than pushing improved technology alone. Policy should be designed also to reduce risk facing the tradition farmers.

According to Rodgers there are basically five phases of technology adoption process and these are: awareness, interest, evaluation, trial and conviction. On adopting a new technology, a farmer has to look at the five criteria and these are: profitability, acceptability, complexity, congruity and divisibility. These criteria will give him/her a better satisfaction of his own needs e.g. Food security in the household or increase in family in

When adopting a new technology, profitability remains the key criteria, the one which indicates the market benefit arising to both the economy and the farmer. It is measured by the increment in the net value of marketed output realized from the change i.e. technology. Clearly, an increase in marketed out put will realize high profits and this will attract the farmer to adopt a new technology. Acceptability score for a new technology is based on the “cost” of any change, measured by the loss of utilities derived from other products sacrificed by the resource allocation required to allow the change. The higher the cost of a new technology the least the utility the farmer will derive and therefore will offer more resistance to adopt the new technology.

Complexity of a technology measures the amount of disturbance it creates in the management routine of the farmer e.g. the reorientation he must make in his usual sequences of field operation over the season. It is scored by counting the number of days shifted in each planning time period between crops or between different planning time periods. The higher the complexity of a new technology, the higher the farmer will resist to adopt the new technology. Congruity is how closely

the new technology is compared to an existing practice. The higher the congruity in a technology the least the resistance to its adoption. Divisibility refers to the scale at which a technology can be introduced. If a technology has less clashes with the farmers other programmes or activities, it will attract adoption of that technology.

In summary, if an individual perceive an innovation having greater relative advantage, compatibility, trial ability, operability and less complex the innovation will be adopted more rapidly than other innovation.

From the literature reviewed it shows that not much research has been done to document the factors that affect the adoption of improved groundnut seeds. Much research has been done on the production and marketing of the groundnuts and little has been done on the adoption constraints of improved seeds of groundnuts among small-scale farmers.

CHAPTER 3

METHODS AND PROCEDURES

3.1 INTRODUCTION

This chapter presents the method on how the data was collected and analysed. It first describes the characteristics of the study area that gives geographical characteristics of the area and reason for picking the area for survey, the method used in analysing data to attain the objectives of the study. The sampling size and technique that was used is also described on how the sample was collected. Furthermore the chapter describes the model that was used to analyse data.

3.2 STUDY AREA

The study was conducted in Chipata district in the eastern province since the area is an important groundnut producer in Zambia. Before independence and post independence era, the share of groundnut in total marketing contribution has been 60-80 % (clement 2000). Above all Chipata districts consists of above 80% of small-scale farmers and lies in agro ecological region ii that favors production of groundnut. The average rainfall in the area is about 1000mm per year with about 85% falling in four months, December-march. Land tenure system is mostly tradition, with most farmers acquiring land through inheritance. Average cropped land area ranges between 1.1 and 1.6 ha for hoe cultivators, and 2.3-4.3 ha for ox cultivators. The main crops including maize, sunflower, peanuts, cotton and vegetables are cultivated in small fields usually less than 2ha. Farm sizes average about 4ha with half of the farm under fallow (Perterson et al. 1999). Some households also engage in agro-pastoral farming. The province is largely rural with about 91% of the population living in the rural area. The major ethnic groups are Ngoni, Chewas, Nsengas and Tumbukas.

3.3 DATA COLLECTION

Both qualitative and quantitative methods of collecting data were used. The primary data was elicited through the use of structured questionnaire And informal interviews with extension staff and researchers was conducted. This was done to get an in depth insight of the subject under review. Sources of secondary data were included from ministry of agriculture food and fisheries in Lusaka and Chipata.

3.4 SAMPLING SIZE AND SAMPLING TECHNIQUE

The kind of sample that was used is simple random sampling; where each element has an equal and non-zero chance of being included in the sample. A Sample of about 60 respondents was randomly picked.10 villages were randomly picked and In Each village 10 small-scale farmers were randomly selected using village registers. A sampling unit was a household.

3.5 DATA LIMITATIONS

The major limitation of this study was that most farmers where found in places which are an accessible and the key informants were difficult to find in their offices.

3.6 DATA ANALYSIS

To get an overview of the Geographic characteristics, cross tabulations and frequencies were calculated. Probit regression analysis was performed using SPSS to assess the influence of farmer Age, Sex; marital status, Education, Price and household head, Profit and extension in adoption of improved groundnut seeds. The coefficients of the variables give the direction of the interpretation while the marginal effects calculated at the variables means provide actual probability of being an adopter. These variables were hypothesised to determine farmer's adoption of improved seeds. The following assumptions were made :(1) Education is a potentially an important determinant of adoption of improved groundnut seeds. (2) Older farmers would adopt the new technology than young farmers due to increased luck of resources. (3) Price of the input seeds is a very important determinant of adoption of improved seed. It determines someone's capability to adopt. (4) The expected relationship between household head and the adoption of improved groundnut seeds is positive. (5) Extension services improve ones access to information on the use of improved seed.

3.6 REGRESSION MODEL USED IN THE ANALYSIS

To analyse the extent to which the factors influence adoption of improved groundnut seeds, probit model was used in view of the discontinuous of the dependent. In probit models the dependent variables is dummy (i.e. a dichotomous variable which takes a value of 0 and 1) 0 for non-adopter 1 for adopters. The following model was used.

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \delta_1 D_1 + \delta_2 D_2 + \delta_3 D_3 + e_i$$

Where

Y_1 = the Dependent variable adoption where 1 takes adopter and 0 otherwise

X_1 = Age of the farmer

X_2 = Sex of the farmer one for male and two for female.

X_3 = Head of house hold i.e. male or female. One who provides income to the household?

X_4 = Profit of growing improved seed.

X_5 = Price of the input seeds.

D_1 = Level of education dummy takes 1 those attended at least primary school and 0 other wise

D_2 = Marital status dummy takes 1 those married and 0 otherwise

D_3 = Extension services takes 1 those who have access and 0 otherwise

Table 2 Description of the variables used in the probit model

Variable	Variable notation	Description
Y₁	Dependent variable adoption. Adopter and non adopter	A farmer an adopter if uses improved seeds for more than two years.
X₁	Age of the farmer	Age in years of birth.
X₂	Household head sex	Head of house one who provides income to the family.
X₃	Price of the seeds	
X₄	Profit of growing improved seeds	
X₅	Education dummy 1	If the farmer attended at least primary school takes 1 and zero otherwise
X₆	Marital status dummy2	Married takes one and zero otherwise.
X₇	Extension servicesdummy3	Takes 1 those who have access to extension services and zero otherwise
X₈	SEX	Sex of the farmer

CHAPTER 4 STUDY FINDINGS

4.1 INTRODUCTION

This chapter presents the findings of the research and it starts by describing the social demographic features of farmers, this includes the average age, the level of education and the sample interviewed. It further gives data on the parameter estimates of the model and the marginal effects, which gives the economic interpretation of the parameters. It then explains the coefficients of the parameter estimates and the interpretation of the marginal effects for each factor.

4.2 DEMOGRAPHIC CHARACTERISTICS OF THE FARMERS.

The sample interviewed contained 36 females and 18 males small scale farmers and the average age of the main sample was 35.31yrs with a range of 20-60yrs. (table1). Further more 69% of the sample at least have had attended primary school even though most of them never finished primary school. From the main sample only 31.7% were using improved seeds (adopters).

Table 1 Selected Demographic Characteristics of Farmers

Attribute	Adopter	Non adopter
Age		
Average age	35.31yrs	
Range	20-60 years	
Education level		
Attended primary	69%	31%
Never attended school	28%	72.1%
Head of household		
Male	31%	69%
Female	63.34%	36.5%

Source: Own Survey Data

4.3 RESULTS OF PROBIT MODEL

The table below shows the results after running the probit regression model in SPSS. It gives the parameter estimates of each parameter. Using parameter estimates, Marginal effects are calculated at each sample means of the parameters. The t-values calculated from SPSS are compared with t-table to determine the significance each parameter (factor).

Table 3
Table of Parameter Estimates and Marginal Effects

PARAMETER	PARAMETER ESTIMATE	MARGINAL EFFECTS
Constant	-2.2528 (-2.68761)***	
Age	-0.0184 (1.48890)**	-0.014
Head of household	0.24668 (0.73353)	0.188
Sex	-0.1773 (-0.7176)	-0.016
Education	0.23580 (1.86558)**	0.199
Marital status	0.11533 (-0.02741)	0.098
Extension	0.58591 (1.8862)**	0.496
Price	-0.10307 (-0.43017)	-0.087
Profit	0.3537 (1.6945)**	0.299

Pearson Goodness-of- fit chi square=79.425 DF= 44 P=0.001

Notes: The t- ratios are in the brackets;

***Significance: at 1% level. **Significance at 5% level. *Significance at 10% level.

Source: Own Survey Data

4.4 INTERPRETATION OF THE PROBIT MODEL

The coefficient on the age is negative and it significant at 10% confidence interval. This implies that there is a negative correlation between the age of the farmer and the probability of adopting of improved seed. This suggest that the older the farmer gets the less the probability of adopting the improved seed. The marginal effect unit increase of age (1 year) at sample mean will cause a decrease in the probability of being an adopter by 1.4%. Holding all other variables constant at sample means. Similarly at the means of data the relationship between adoption and householdhead is negative. If household head is male the probability of adopting the technology reduces by 18.8 and the coefficient of sex is negative. This means there is a negative relationship between sex of the farmer and the probability of adopting improved seed. At sample means the male probability of adopting the technology reduces by 1.6% as compared to female farmers. Similarly at the sample means of data if education increases by one year the probability of adopting improved seeds increases by 17.3%. The coefficient has expected relationship and is statistically significant at 10% confidence level. Therefore it can be said that the higher the years of schooling the higher the probability of adopting the improved seed. This suggests that as someone gets more educated he becomes more knowledgeable about the importance of improved seeds (technology). There was positive link between marital status and improved seeds. This means at sample means the married farmers probability of adopting the improved seed increases by 8.5% as compared to the unmarried. At sample means holding other variables constant .The coefficient of extension services is positive and it is significant at 10% confidence interval. The probability of adopting the technology increases by 43% once some gets access to the extension services unlike somebody who has no access. Extension services helps in the dissemination of skills, knowledge and attitudes to farmers. Price of the in put seed has a negative relationship as expected. This implies that a unity increase in price of input reduces the probability of adopting the technology by 8.7%. Holding all other variables constant. The marginal effect of a unity increase in profit is 0.26.This implies that at the mean, if profit increases by one unit the probability of adopting the technology increases by 26%. Holding other variables constant.

CHAPTER 5

CONCLUSSION AND RECOMMENDATION

5.1 INTRODUCTION

This the last chapter that presents the conclusion and recommendations of the research findings based on the model used in the analysis. The conclusions are given only to the parameters that are significant. Then recommendations are made based on the conclusion.

5.2 CONCLUSSION

The findings from the study show that age of the farmer is significantly positively related to the adoption of improved seeds. This means that young farmers are more risk averse as compared to older farmers. Furthermore an extension service is an important factor which influences adoption of improved groundnut seeds. The findings show that extension services are significantly positively related to adoption of improved seeds. Extension imparts skills, knowledge attitude toward adoption of improved seed. This means the more the farmer has access to extension the higher the probability of adopting the improved seeds. The study has shown that the level education has a significant coefficient at ten percent confidence level. This means it's a factor in influencing someone's decision in adoption of new technology.

5.2 RECOMMENDATION

From the conclusion it can be recommended that there should be an increase in the extension services provided to farmers that is by reducing the ratio between extension officers and farmers. This will improve on the efficiency of the dissemination of the skills, knowledge and attitudes on the adoption of improved technology of seeds. Furthermore government should improve the education sector to offer an opportunity to most rural people to have access to education, as this will improve the understanding of the importance of using improved technologies among small-scale farmers in the goal to reduce poverty and increase development. The road sector should be greatly improved in rural remote areas to increase accessibility of the improved groundnut seeds. This in turn will increase the profit margin of their groundnut production and other crops

FURTHER RESAECHECH

The studies reveal that adoption does not have a simple direct relationship with technological characteristics but rather it is a matrix of several hierarchies of other factors. These factors include availability of institution support and services, information linkages and networks and the socio-economic constraints and incentives that farmers face. There is however a need to identify the relative influence of household specific variables (household size), village –wide and community-level factors (e.g., presence of government organisations) and systemic variables (e.g., land tenure system, institutional and agricultural policies) on adoption of improved seeds in general.

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APPENDICES

APPENDIX 1 QUESTIONNAIRE

SECTION A PERSONAL DETAILS

- 1) SEX: (i) Male
(ii) Female
- 2) How old are you (i)
- 3) Head of Household (i) Male
(ii) Female
- 4) Marital Status: (i) Single
(ii) Married
(iii) Widowed
(iv) Widower
- 5) What is your level of education (1) primary?
(II) Secondary
(III) Tertiary
(IV) Never attended any education

SECTION B

- 6) What type of groundnut seeds do you grow?
(I) Local variety
(ii) Hybrid seed
- 7) Give reasons for the answer above

- 8) When did you start growing groundnut (improved/local) last year
2yrs or above
- 9) Is the farmer an adopter or not
(I) Adopter (II) Non-Adopter
- 10) Where do you obtain seeds?

- (I) Purchased
- (ii) Retained

11) How far do you obtain your seeds?

- (i) 1-2km
- (ii) 3km and above

12) Are the seeds that you need Accessible?

- (i) Yes
- (ii) No

SECTION C

13) Among the varieties of groundnut seeds below, which one do you know?

- (i) Chalimbana
- (ii) MAS- 2
- (iii) MGV- 4
- (iv) Makulu red
- (v) Champion
- (vi) Chipego
- (vii) Natal common
- (viii) Comet
- (ix) Luena

14) Among the varieties above, how many do you grow?

- (I) 1
- (ii) 2 - 4
- (iii) 5 and above

15) Give reasons for not growing the other varieties

SECTION D

16) Are you able to get information on the availability of seeds?

(i) YES

(ii) NO

17) If yes where?

(i) Extension officer

(ii) NGO's

(iii) Others

18) Do you obtain any agriculture extension services? (I) YES (II) NO

19) If YES: What type of extension services: specify

(i) Improved varieties (groundnut)

(ii) Any other specify

SECTION E

20) What current price do you pay for the improved seeds? 1kg.....

21) At what price do you sell the produce.....

21) How many varieties of Groundnuts do you know?

22) What is the major reason for the answer above? (I) Affordable price

(ii) Good yield

(iii) Any other specify

23) What can you comment on the prices of groundnut seeds?

(i) High

(ii) Low

(ii) Fare

24) From the prices given, are you able to make profits

(i) YES

(ii) NO

25) Which one gives more Profit?

(i) Local Variety

(ii) Hybrid Seed

26) What is your average yield on a one Hectare field?

