

**IMPROVING AGRICULTURAL PRODUCTION IN GHANA; A CASE
STUDY OF EXTENSION EDUCATION FOR MIGRANT FARMERS IN
AWUDOME COMMUNITIES IN THE VOLTA REGION.**

BY



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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
AWARD OF MASTER OF ARTS DEGREE IN ADULT EDUCATION.**

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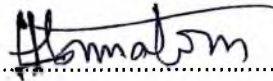
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DECLARATION

I hereby declare that except for references to other people's work which have been duly cited, this work is the result of my own original research and that this dissertation has neither in whole or in part been presented for degree elsewhere.

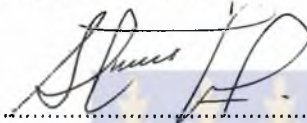
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DEDICATION

This work is dedicated to my parents whose toil, dedication and immense efforts have laid the foundation of my life and education.

To my wife and children, for their patience and endurance for my long stay of absence.



ABSTRACT

This paper reports on means of improving agricultural production in Ghana, with a case study of extension education for migrant farmers in Awudome Communities.

The study covered:

- the extent to which they are aware of the innovations introduced by extension programmes;
- the extent to which they are using innovations introduced;
- some constraints the farmers face in adopting innovations; and
the corrective measures that can be taken in order to improve extension programmes.

An attempt was made to find out the extent to which migrant farmers were making use of improved practices and inputs in their farming activities in order to improve agricultural productivity and sustainable use of natural resources.

The research was conducted using simple survey research method of the descriptive type and the interview and questionnaire were used in data collection. The study sample was selected using both systematic and simple random sampling techniques from five migrant settlements in the Awudome Traditional area.

The research findings have shown that:

- all the respondents were subsistence farmers who practised shifting cultivation. They were mainly food crop producers with fragmented plots;
most of them acquired the land on which they farmed by share-cropping or rent;
- they used simple hand tools such as cutlass and hoe and depended heavily on family labour;
a large proportion of the farmers planted unimproved varieties of seed haphazardly, and never used any agro-chemicals;

- a high proportion of the farmers were not aware of the existence of extension programmes; and
- most of the farmers were not aware or have never learnt to use high yielding varieties of seeds, agro-chemicals or improved practices such as planting in line or spacing.

However, an interview conducted for extension agents showed that they worked with contact farmers who were to extend the knowledge gained to other farmers. Even though the rate of adoption of improved practices and inputs was high among these contact farmers, a large majority of the other farmers seemed not to be getting the information, and were thus not using these practices and inputs.

The major constraints to adoption of innovations by migrant farmers were: financial constraints and lack of knowledge on the existence and use of agricultural innovations. Rainfall variability, lack of credit facilities, seasonality of farm work and high cost of farm inputs, also came out as further constraints on adoption of technology.

Based on these findings, extension programmes could be improved for a sustained and increased production by:

- using farmers groups in communicating innovations rather than individual contacts;
- in communicating extension messages to the rural audience, the mass media are promising as adjuncts to, not as a substitute for face-to-face extension, and the local language should be the medium for communicating extension messages; also, oral or visual forms of communication may be more useful than written extension materials.
- operating “unified” extension system as opposed to crop-specific services;
- increase attention of research on food crops, inter-cropping and natural resource management;
- improved seeds and agro-chemicals of the right type and packaged in appropriate small bags or containers and other inputs must be available everywhere.

- Including advice regarding the management of soil and water conservation at farm level in extension messages.

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Above all, I thank the Almighty God for His Goodness and Mercies, which endure forever.

The final responsibility for any errors and inaccuracies in this work, however, is solely mine.

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LIST OF ABBREVIATIONS

AEA		Agricultural Extension Agent
AEO	-	Agricultural Extension Officer
FAO	-	Food and Agricultural Organisation
GDP	-	Gross Domestic Product
Ha	-	Hectare
IFAD	-	International Fund for Agricultural Development
JSS		Junior Secondary School
MOFA	-	Ministry of Food and Agriculture
NGO		Non-Governmental Organisation
OFAT	-	On-Farm Adaptive Trials
PBCM&E	-	Planning Budgeting Co-ordination Monitoring and Evaluation
RRA		Rapid Rural Appraisal
SMS		Subject Matter Specialist
T&V		Training and Visit
UNDP		United Nations Development Programme
UNICEF		United Nations Information and Children's Education Fund
VEW		Village Extension Workers
%	-	Percentage
P.		Page

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study:

AFRICA is perhaps the continent that is changing most rapidly at present. The net rate of 3.2% per annum population increase in sub-Saharan African is now one of the highest the world has ever known, (Harrison, 1987).

It is well known that, since the late 1960s, food production in Africa has failed to keep up with the growth of population. In 1983 – 85 and again in 1991 – 92 drought and famine brought Africa to the world's attention. Harrison summed up the situation.

In March 1985, the peak of the crisis, it was estimated that 30 million people were hit by drought. Ten million of them were forced to abandon their homes in search of food. Up to 24 countries were simultaneously affected, in a vast scythe stretching from Mauritania across the Sahel to Somalia, down East Africa to Mozambique, and back across to the West Coast in Angola.

Although normal rains in the following years allowed many people to resume their usual lives, the underlying problems that had been brought to a head by the drought did not go away.

He indicates that at least 33 out of 38 tropical African countries underwent this decline in food production. FAO statistics indicate that millions of people in Africa are suffering from severe malnutrition. Malnourished people are particularly susceptible to the many diseases and parasite that are prevalent in Africa. Children, being the most vulnerable, suffer most – one of every eight dies from a combination of disease and malnutrition before its fifth birthday, and many more are physically and mentally impaired (UNICEF, 1983). It is well known that many of the world's poorest countries are in Africa. The

World Bank (1995) reported that, in 1993, no fewer than 30 African countries had average annual incomes per person below US\$700.00. The overall continent-wide average income per person was US\$330.00. These figures are quite low when compared with an average per capita of US\$23,090.00 in the high-income countries.

Most of the people of Africa depend directly on the land for their living. Although Africa's cities are growing at 5.3% per year, the fastest rate in the world, 71% of the people still lived in the rural areas in 1980. Nearly all these people depended for their livelihood on smallholdings of less than 10ha (Harrison 1987).

In the past, most of Africa was not densely populated, so cultivators were able to use the land extensively. They could choose the most fertile land, grow their crops for a few years and, when the soil fertility and crop yields declined, move to more fertile land. These farming systems, often described as "shifting cultivation" or "slash and burn" systems, were able to provide sufficient food and other products to satisfy the cultivators' needs in most seasons while maintaining soil fertility over the long run. Therefore, they were sustainable farming system in those conditions.

As the population in a particular area increased, more of the land had to be cultivated for longer periods to satisfy the peoples' needs. The danger came when the number of people depending on a particular area of land (the population pressure) became too great for the carrying capacity of that land using existing technology.

In Africa, although small holder farming systems are changing and adapting to increasing population pressures, in most areas they are not changing fast enough. According to Andrew Ker (1995), the cultivator's response to declining soil fertility often appears to be the attempt to enlarge the cultivated area, even though a shortage of fallow land may

mean that the fallow period must be shortened. The result is that soil fertility is further reduced and the vegetative cover on the soil surface is degraded, allowing erosion to accelerate so that soil fertility declines progressively and erosion damage increases. Destruction of forest or woodlands is often part of this process, which is unsustainable. Eventually, the soil productivity may decline to a low level or even to near zero. If this happens, the traditional shifting cultivator's path may be followed and the worn-out land abandoned and more fertile land elsewhere selected.

Alternatively, if the cultivator cannot find more fertile land, the farming practices may be intensified by increasing the use of manures and fertilizers, by growing additional crops on the same land and practising simple soil conservation and other techniques that conserve and build up soil fertility. According to Ker, the main responses of most cultivators seem to lie in the former directions, and the rate of change toward intensification appears to be too slow to provide the needs of the increasing populations. This, according to him, is the most crucial problem for the future of Africa.

Rural development essentially means economic and social development in rural areas. It involves the gradual improvement of subsistence agriculture and the rise of living levels in traditional rural societies. This is because West African economies are predominantly rural in settlement and the vast majority of the labour force is engaged in agriculture, where productivity is in general, extremely low. Most farmers still plant only a few varieties of crops and are unaware of high yield seed varieties, fertilizers and pesticides and of modern scientific advice on spacing, planting dates and crop rotation (Kumar, 1979).

In Ghana, traditional small-scale farmers produce most food crops (cereals, roots, tubers and vegetables) and cash crops (cocoa, coffee, pineapple). They produce for household

consumption and the market and their operations are characterised by limited (negligible) capital base, low level inputs consisting mainly of hand tools, and unimproved seeds from the previous harvest. Land is generally abundant and access to land is not a major constraint except in isolated locations. However, household farms are usually less than a hectare in size (Asuming-Brempong, 1994). The rural environment is often seen as depressing in comparison with that of the towns. Farmers still live in a state of illiteracy and unawareness and are thus inhibited from taking risks or adopting potentially profitable innovations. Social amenities are generally at a low level in the rural areas when compared with the urban areas and this provides an incentive for migration to the cities.

There are several unusual characteristics of smallholder agriculture. According to Carruthers and Rodriguez, (1992), agriculture is a biological process subject to various risks of weather, pest and disease which can affect the supply of the product in an unpredictable fashion. Also agricultural products have consumer demand patterns, which can turn even good production years into financial disasters because of the resulting glut. The biological nature of production also results in a large time-gap, often months or even years, between the expenditure of effort or cash and the returns. These constraints are further complicated by the marked seasonality of agricultural production. The small-scale of most farming operations often coupled with a lack of access to educational resources, gives farmers little economic power as individuals and little opportunity to seek such remedial measures as do exist.

The economics of smallholder farming are undergoing a rapid change and there is an increase demand for cash from farming activities for production and consumption items.

This results in new challenges to the traditional rationale and the old system optima. This requires the adjustment of existing resources to find new optima. However, in order to make substantial gains, the input of new technologies may be required, which in turn may alter-even radically-current methods and systems. In this way, innovation and technology change continue to be the driving force behind agricultural development.

One of the justification for public support of agricultural research and extension, as pointed out by Carruthers and Rodriguez, (1992), is to push research beyond the point which the farmer can risk. However, they argued that knowledge alone of the existence of appropriate technology would not be sufficient to ensure adoption. Attitudes towards it may need to be changed, and those convinced of its value need financial resources to acquire it. Local testing of the appropriateness of equipment is essential and should be done by smallholder farmers.

1.2 Migrant Farmers:

These are people from other parts of the country and neighbouring countries who do not have enough land for farming. They originally migrate to new areas either as labourers or as guests of fellow tribesmen already established there. These migrant settlers are mainly farmers who exploit the natural resources around them by deforestation for cultivation, for fuel-wood, for grazing and for timber.

Migrant farmers are generally sharecroppers and shifting cultivators. According to Jordan (1995), sharecroppers, are poor landless farmers who are allowed to farm a piece of land belonging to someone else and, in return, had to give part of the crop they harvest to the land owner as rent. As shifting cultivators, migrant farmers do not own the land they cultivate, they always live in fear that the landowners might chase them away

or reclaim the land. Thus, they have no incentive to carry out land conservation techniques, which would lead to sustainability of production.

Douglas, (1989), states that, migrant farmers do not deliberately set out to degrade their land resources, they are often obliged to pursue land use practices, irrespective of whether or not they can be sustained, that best meet their family's immediate needs for food, fuel, shelter and cash, as well as to meet their social and cultural obligations to the community in which they live. When land owned cannot support the family, these smallholders often sell their own labour to buy food, as a result, they have less time to allocate to their own farms, and early weeding is delayed, significantly reducing yield. The cycle of food shortage then repeats itself next season.

Kumar, (1979) states that the most important factors inhibiting agricultural progress are lack of education and want of incentives and thus a lack of desire to produce more. This to him, called for the provision of an organisation to bring about change in human behaviour. The method adopted to teach the people the ways of doing things are those of extension education.

Cerneia, Coutler and Russell (1983) suggest that the training of extension workers should focus not only on the technical message to be transferred but also on learning more about "their farmers" and "their farming systems" especially about farmers' behaviour and the reason they do things the way they do. They stated further that, face-to-face contact between agents and village level workers is particularly important when agricultural communities are heavily involved in subsistence agriculture and when large numbers of farmers are illiterate or unfamiliar with current technologies.

1.3 Statement of the Problem:

Governments may be overwhelmed by multitude of problems, all needing attention at the same time, and they may have considerable difficulty in having much effect on rural life, however, their allocation of resources sometimes seems questionable. Instead of attempting to guard, conserve and build up what is their main productive physical resource, the land, they sometimes almost seem to encourage its exploitation, either by unwise policies such as allowing large-scale mechanised land clearing or deforestation or by almost total neglect of simple soil-conservation and improvement measures.

Although governments often pay lip service to increasing agricultural production, and employ large bureaucracies in their agricultural services, many of their policies and resources allocations usually seem mainly directed toward the needs of the wealthier section of the urban population rather than the rural poor.

Agricultural extension education has been in operation for a long time in Ghana as a way of helping rural small-scale farmers change their attitudes and adopt improved technologies in combating the problems of growth in rural production. The mid portions of the Volta Region have many migrant settlers from Dzodze, Avenor, and Akatsi in the South of the Volta Region and Ando in neighbouring Togo. They constitute about one third of the population of Awudome. Their main occupation is farming.

This study, thus intends to find answers to the question: To what extent have agricultural extension education influenced the practices and methods of farming by migrant farmers in Awudome communities?

1.4 Purpose of the Study:

The purpose of this study is to find out the effectiveness of agricultural extension on the practices and methods of migrant farmers within the Awudome communities towards improved production.

1.5 Objectives for the Study:

The study was to find out:

the level of awareness created by extension programmes on agricultural innovations.

- the extent to which migrant farmers are using innovations introduced by the programmes.

The study tried to find out the extent to which migrant farmers are adopting improved agricultural practices such as:

new varieties of crops.

cultural practices.

use of fertilizers, pesticide and other farm inputs.

1.6 Research Questions:

The basic consideration of this research was to find answers to the following questions:

1. To what extent are the migrant farmers aware of the innovations introduced by extension agents?
2. To what extent are the migrant farmers using the innovations introduced by the programmes?

3. To what extent is the change in practices and methods of farming by migrant farmers influencing their production?
4. What are some of the constraints migrant farmers face in adopting innovations?
5. What corrective actions need to be taken in order to improve extension programmes?

1.7 Significance of the Study:

The study was to find out how migrant farmers are being educated through extension services to use improved agricultural practices and methods of farming to raise their level of production and sustainable agricultural productivity in Ghana.

Furthermore, the study was to identify any malfunctioning or setbacks in agricultural extension education programmes and offer suggestions for the improvement of extension services. Additionally, to help, in the planning and designing of other extension programmes in the future.

1.8 Limitations of the Study:

Migrant settlers are scattered all over the mid portions of the Volta Region, especially, Ho and Kpando districts, but the researcher was not able to cover all of them due to the limited time within which the research was conducted. The researcher thus chose Awudome traditional area where they are most concentrated. Only migrant settlers who are engaged in farming were interviewed.

There was a problem reaching the selected villages because they are located in remote areas and the roads to these villages were not motorable, hence, a motorcycle was the means used to reach them.

The villagers would also not give answers to questions from a stranger, so the service of a guide (an opinion leader) in the areas was used.

The farmers were also only available for interview on Sunday afternoons and on Wednesdays when they do not go to the farm. This made it difficult in the collection of data.

The study was intended to find the extent of extension education for migrant farmers.

1.9 Organisation of the Study:

The study is organised into seven chapters.

Chapter one constitutes a general introduction in which the background of the study, the statement of the problem, purpose of the study, the objectives for the study, research questions, significance of the study and the limitations of the study were stated.

Chapter two contains the structural and organisational functions of Agricultural Extension Services and includes an introduction, the mission of Ministry of Food and Agriculture and the Directorate, Agricultural Extension Services.

Chapter three focuses on the review of related literature.

Chapter four contains the methodology of the study, which includes, the research design, study area, sampling design, data collection techniques and method of data analysis.

Chapter five contains the presentation and analysis of data.

Chapter six contains the discussion of research findings and

Chapter seven contains the summary, conclusion and recommendation of the research.

CHAPTER TWO

AGRICULTURAL EXTENSION SERVICES

2.1 Introduction:

The new organisational and functional structure of the Ministry of Food and Agriculture (MOFA) at the National, Regional and District levels is in response to the implementation of government's decentralization programme and the desire by the ministry to rationalize the use of its human and material resources towards the attainment of the goals of the Agricultural sector as envisaged in the Vision 2020 programme.

The Government's decentralization policy aims to transfer functional power, means and competence to the District Assemblies from the Central Government, Ministries and Departments (MOFA, 1998). This was based on the assumption that:

- a) development is that which responds to people's problems and represents their goals, objectives and priorities;
- b) development is a shared responsibility between the Central Government, Local Governments, parastatals, Non-governmental organisations (NGOs) and the people, who being the ultimate beneficiaries of development, must be closely linked to activities for achieving the desired goals.

2.2 The Mission of MOFA:

The study tried to find out, the mission of Ministry of Food and Agriculture (MOFA).

MOFA exists to provide sustainable agricultural growth and development that would:

- ensure food security;
- higher employment and incomes in rural areas;
- balanced regional growth;

- greater contribution of the sector to GDP, foreign exchange earnings and government revenue, while
- paying greater attention to issues concerning the environment, women and the youth.

2.3 Directorate, Agricultural Extension Services:

The re-organised MOFA has a Chief Director and Directors heading the various line and technical directorates. As the MOFA (1998) report points out, there are four line directorates and seven technical directorates.

Agricultural Extension Services is one of the seven technical directorates and its objectives are:

- a) To initiate and formulate relevant policies/programmes for an efficient and effective agricultural extension delivery in Ghana;
- b) To give technical backstopping to the regions and districts;
- c) To co-ordinate, monitor and evaluate extension programmes in collaboration with the directorate of Planning Budgeting Co-ordination Monitoring and Evaluation (PBCM & E); and
- d) To advice the Chief Director on all matters relating to agricultural extension.

Subject Matter Specialists (SMS) are to ensure that technology developed by research is appropriate to the ecozone and addresses farmers' specific problems in the most cost-effective manner. Their responsibilities are:

- a) To compile all relevant technical information in the area of specialization to facilitate and guide technological support to farmers;

- b) In collaboration with researchers, District Development Officers, AEAs and farmers, to set up relevant on-farm adaptive trials (OFAT) as foci for participatory learning;
- c) To collate and analyse OFAT data in collaboration with researchers to determine their appropriateness in terms of technicality and effectiveness;
- d) To assist AEAs to demonstrate proven results of OFAT to farmers;
- e) To conduct in their subject matter areas, training of the AEAs during monthly training seasons within the districts assigned them;
- f) To spend time on the field with farmers, contact groups and AEAs with District Development Officers and District Director of Food and Agriculture in order to assess farmers' practices, farmers/AEAs training needs in their subject matter areas;
- g) To participate in bi-monthly technical review meetings with researchers to assess research findings and farmers reactions from the field and thereby being trained and exposed to research and farmer/AEA needs;
- h) To play a role in the formulation, production, recommendations and serve as focus of link between extension and research.



The objective of Agricultural Extension Agent (AEA) is to advise farmers in the adoption and application of appropriate technological know-how with the purposes of increasing their production, income and well being under sustainable environmental conditions. His responsibilities are to:

- a) Compile base-line geo-climatic, socio-cultural and economic (including agriculture) data on the area of operation;
- b) Identify or establish contact with farmer groups for purposes of achieving wider coverage in crops, livestock, fisheries and related activities or services;
- c) Prepare route maps and visit schedules in collaboration with the Development Officers;
- d) Assist farmers in the diagnosis of farm and farming related problems and advice on solutions to such problems;
- e) Participate with researchers and SMSs in the establishment of on-farm adaptive trials and collect relevant data for analysis of SMS or researchers;
- f) Assist farmers in the establishment of mini-demonstrations, arrange field days with contact groups and assess the results with farmers and SMS;
- g) Participate with SMS and supervisors in the identification, prioritisation and implementation of extension themes;
- h) Identify and forecast, crop, livestock and fish pests and diseases and advise on means of control with the assistance of the relevant SMS;
- i) Assist farmers in farm management education and practice in order to have a cost effective farming enterprise;
- j) Promote vigorously gender awareness and analysis in the development of all programmes;

- k) Participate with the Department of Co-operatives, NGOs, in order to exchange views and collectively assist in the agricultural development in the locality;
- l) Assist farmers with information on availability of farm inputs, credit support and marketing;
- m) Undertake data collection at farm level, such as crop cutting, for purposes of productivity estimation, monitoring and evaluation;
- n) Undertake any other duties that may be assigned.

CHAPTER THREE

REVIEW OF RELATED LITERATURE

3.1 Farming Systems:

Over 70% of the people of Africa live in rural area, and almost all of them depend directly on their smallholdings for a living. Although many people are moving to the cities, apparently mainly because they hope for a better standard of living there, it is common knowledge that even in the cities many people still try to cultivate small plots to obtain some of their food. Thus, it is clear that farming is by far the largest economic enterprise in Africa (Ker, 1995). Farmers have to adapt their farming to their natural environment. To succeed, they must work with nature and not against it. They must also adapt their system to infrastructural factors, such as land-tenure arrangements, and the availability of inputs such as water, power, fertilizers, pesticides, labour, advice, and information. External economic factors such as location, availability of roads, communications, markets, prices, credit, produce subsidies, and other features affect the attractiveness and profitability of different farming system. Internal factors such as farm size, the available labour force, resources that would be invested, and fixed improvements are other obvious determinants. Finally, personal choice and preferences may influence the system (Mac Arthur cited in Ruthenberg, 1971).

3.1.1 Farmer-Managed Ecosystems:

Farm can be considered as ecosystems managed by a farmer. Agriculture therefore is concerned with farmer-managed ecosystems. In his classic work on tropical farming systems, Ruthenberg, (1971) points out that a farm is both an ecosystem and an independent unit of economic activity, and it is but one system, albeit an important one, among many rural systems. He further suggests that:

Farmers use land which originally was part of a natural system, and most ecological systems untouched by man show a “Zonal” type of vegetation which is typical for the given natural condition and which is close to a “steady state”. Natural systems, however, are unproductive in terms of human objectives. The basic principle of farming is to change the natural system into one, which produces more of the goods desired by man. The man-made system is an artificial construction, which requires continuous economic inputs obtained from the environment to maintain its output level.

Farming thus implies the abolition of an unproductive “steady state” in favour of a man-created, more productive but unstable “state”, and much of the farm input (tillage, fertilizers, weeding, etc.) is nothing but an effort to prevent the new state from declining towards an unproductive low-level steady state. (P.21 – 22)

3.1.2 Farming System – Intensification:

Ruthenberg (1980) traced the process of intensification of tropical farming systems, resulting from increasing population pressure on the land, as passing from shifting systems through fallow systems to permanent upland systems, sometimes with perennial crops and irrigation.

Boserup cited in Ker (1995) pointed out that each state in this process required more labour to produce the same amount of output with a given level of technology. Thus there was a direct incentive to practice extensive rather than intensive farming as long as sufficient land was available. Only when land became limited because of population pressure would farmers intensify their production and even then they would continue to use techniques adapted to more extensive systems as long as possible, until forced by starvation to adopt more labour-intensive techniques such as manuring and soil conservation, and adopt or invent labour-saving technologies such as the plough.

The intention of intensive agriculture is to increase yield and, thus, support higher population densities. The approach according to Rivera (1991) is to develop cultivation techniques that are productive, sustainable and ecologically sound.

Techniques used to achieve these requirements, he said, included polycropping and intercropping, rotations, mixed planting of trees and crops, plants breeding for tolerance to pest and infertile soils, use of legumes for nitrogen fixation, mulch farming, no tillage or reduced tillage cultivation, plant fallows and cover crops.

3.1.3 Land Use:

In their major contribution to the understanding of African smallholder land use and farming systems, Allan, with Trapnell and their colleagues, working in Zambia, stated their basic concept. Allan (1965) pointed out that the shifting cultivator worldwide has always needed a detailed knowledge and understanding of the environment to survive:

The cultivator can rate the fertility of a piece of land and its suitability for one or other of his crops by the vegetation which covers it, and by the physical characteristics of the soil, and he can assess the "staying power" of a soil, the number of seasons for which it can be cropped with satisfactory results, and the number of seasons for which it must be rested before such results can be obtained again. His indicator of initial fertility is the climax vegetation, and his index of returning fertility is the succession of vegetational phases that follow cultivation.

In many cases his knowledge is precise and remarkably complete. He has a vocabulary of hundreds of names of trees, grasses and other plants, and he identifies particular vegetation associations by specific terms. This fund of ecological knowledge is the basis of "shifting cultivation." (p.23)

Allan found that the Cultivation Factor, which he defined as the area cultivated per head of population, varied very little between distinct and widely separated farming systems in Zambia. The average cultivated area per person was almost the same in these different

systems, varying from 0.41 to 0.45 ha. On soils of lower fertility, larger area of 0.68 – 0.73 ha had to be cultivated to obtain sufficient food.

In West Africa, the average food-crop area per person in the rain forests of the Congo, Ghana, and Liberia appeared to be about 0.18ha, whereas in overpopulated areas of northern Ghana where ox-ploughs were used, the area varied from 0.27 to 0.72 ha.

According to Allan, the data quoted on other African farming systems later show that the vast majority of African farmers cultivate 0.2 – 0.4 ha of subsistence food crops per person. Allan described any additional production from the average of 0.4 ha cultivated per person as the “normal surplus”.

Because crop yields were frequently well below one tonne per hectare (1 t/ha), this “normal surplus” was essential to allow some storage of grain against one or more poor harvests. Where crops are grown for sale, an additional 0.2 – 0.4 ha/person may also be cultivated, particularly when simple mechanization such as the ox-plough is used. Then the upper limit seems to be an average of about 0.8 ha/person. With an average family size of about 5 - 6 people, this gives a cultivated area per family of about 1 - 5 ha.

These over all average figures conceal considerable local variation. In Malawi, for example, with a relatively dense population, the average holding size was 1.16 ha, with a mean population per holding of 4.5 people, giving an average area per person of 0.26 ha. However, 48.6% of the resident population lived on holdings smaller than 1.0 ha, 43.8% on holdings of 1.0 – 3.0 ha, and only 7.6% on holdings over 3.0 ha (Kydd 1989). Although accurate statistics over wide areas are difficult to obtain, Harrison (1987) suggests that 66% of all holdings are smaller than 2 ha and nearly 96% cover less than 10 ha.

3.1.4 Livestock:

Livestock ownership is variable, but a high proportion of farmers keep a few goats or sheep, perhaps averaging about 2-6 animals / Farm, and some poultry. A similar average number of cattle are owned by a smaller proportion of farmers, depending on the incidence of trypanosomiasis and other factors. Livestock are not usually integrated into farming systems, being mainly grazed on communal grazing lands often by herdsmen from a different tribe. They may graze stubbles and other crop residues after harvest. Cultivators sometimes provide incentives to herdsmen to herd their cattle on the stubble to manure the land (Ker, 1995).

Livestock throughout Africa are generally kept on an extensive basis. In addition to providing some meat, milk, and hides, they often seem to be valued mainly as a way of saving money or as an insurance policy – a “bank on the hoof.” When livestock populations increase above the carrying capacity of the land, the result is overgrazing and destruction of the pastures. These pastures belong to everyone and yet no one is responsible for them. However, some farmers do their best to supplement dry-season grazing by the use of forage such as groundnut tops, cereal straw, and lopping from many trees.

3.1.5 Farming System - Physical Environment:

In many traditional shifting-cultivation systems, farmers have developed ways of keeping a cover on the soil for as long as possible, either with natural vegetation, weeds, or crops. Mixed cropping with fast-growing crops such as beans or cowpeas is also commonly practiced, and these not only give an early crop, but also help to cover the

soil. With increasing pressure on the land, however, these methods often become less effective.

In some areas, such as the parts of northern Nigeria that have long been densely populated, the farmers who own livestock have developed their own methods of permanent agriculture by the use of manure, including latrine manure, compound sweepings, and cattle dung partly from their own cattle and partly from Fulani pastoralists who were paid to graze their cattle on the stubbles after harvest (Hill, 1972 in Ker 1995).

Although these examples indicate that the value of manure is widely known, its use is comparatively rare in Africa. Only in those areas where the shifting cultivation system has broken down because of population pressure will farmers normally start using manure systematically.

There is some evidence that, on certain soil types, the combination of fairly small quantities of manure with small amounts of chemical fertilizers can have synergistic effect – apparently greater than either used alone and this practice could save labour for heavy manuring and money for heavy fertilizer application.

In general, farmers who are near subsistence level cannot afford to buy much fertilizer, and many of them may have never learned to use it.

According to Ker, mechanisation is only valued by farmers in so far as they perceive that it reduces their constraints, including drudgery, and increases their land or labour productivity, or both as well as profit margins. On the other hand, there are many examples of farmers' enthusiasm for tractor ploughing, and their willingness to pay quite large sums of money for this operation.

3.1.6 Farming Systems – Social Aspects:

Eicher and Baker (1987) have reviewed the frustrations of research and extension workers caused by farmers who did not accept apparently improved technologies. These they contend were a result of two reasons. First, many of the technologies did not fit the farmers' needs and second the improvements did not provide sufficient incentives to farmers to change. They also argued that, almost no research results had been found that indicate minimum levels of the incentives that were required to induce farmers to accept innovations.

African farming systems have usually provided the minimum level of subsistence food production needed for survival in most years. Until comparatively recently, in those areas where communication and transport facilities were virtually non-existent, there was little advantage in producing a surplus for sale or exchange outside the community because there were so many difficulties in transporting and marketing it. Some insurance against the risk of crop failure was provided by storing grain for a few years or by planting more cassava than was needed immediately. Security within the community was built up by small reciprocal gifts of food and by fulfilling other traditional obligations.

3.1.7 Farming Systems – Constraints:

Traditionally, when population pressure over much of Africa was comparatively low, most African societies practiced various types of communal land tenure. As pressure on the land and modernization increase, and land becomes a scarce resource, land-use tends to become more individualistic, and borrowing or renting the use of land become widespread. Eventually, land is bought or sold like any other commodity. In some societies with heavy population pressure, fragmentation became widespread and severe – fragmentation is the term used to describe farms that consist of several small, widely

separated pieces of land. In general, farming efficiency seems to decline on severely fragmented farms.

Mellor (1984)) pointed out that smallholder labour productivity in Africa appears to be lower than in Asia. A major problem reported is the marked seasonality of farm work. Norman cited in Ker (1995) emphasised the weeding bottleneck as a particularly severe one in many farming systems. The critical timing of land preparation and planting and harvesting of certain crops may become a bottleneck.

Shortage of capital is a constraint in savannah farming systems. According to Ker (1995), traditional subsistence cultivators invest little capital in their farms. Their possessions include a few hand tools, homemade houses and granaries, and some livestock. With increasing modernization and production for the market, gradually more inputs such as fertilizers, crop-protection chemicals and machinery may be purchased, but capital investment in the form of fencing, water supplies tend to remain minimal for all but the wealthiest farmers. In many areas, the poorer farmers may be so short of money that they are forced to sell a substantial proportion of crops such as groundnuts soon after harvest, when prices are often low, to obtain cash, and then to buy food or seed when they become short later in the season at much higher prices. In general, farmers are more willing to apply inputs such as fertilizers or insecticides if they are provided on credit, the cost being deducted when the crop is sold.

Although the decision-making process in extended families is complicated, there is an increased tendency for the traditional large families to break up and separate into nuclear families. Although these smaller families may have greater freedom to innovate, they are

often limited by resource constraints. Management levels often seem to depend heavily on the past experience of the farmers.

However, although most small holders probably try to optimise their use of the limited resources available to them, within the limitations of their environment and background, poverty, risk, and other severe constraints do appear to slow down small holders' adoption of some new technologies (Ker, 1995).



3.2 The Concept of Extension:

Sikhondze (1999: 254) considered extension in terms of improving the living standard of rural people, increasing agricultural production and eventually national progress through education by bringing knowledge and help that will enable farmers to produce more, improve their economic and social welfare, and provide opportunities for development of rural people's capabilities, leadership, and social life through education.

According to Swason and Claar (1984), extension is an on-going process of getting useful information to people and then assisting those people to acquire the necessary knowledge, skills, and attitudes to utilize effectively this information or technology. Kumar (1979) on his part sees extension education as enabling rural people to improve their level of living by aided self-help education.

Agricultural extension is an educational process with a dual goal: it brings information and technology to farmers and teaches them how to use them to improve their productivity and it enables farmers to specify their own needs and provide feedback on the effectiveness of extension in meeting them. Through this two-way communication between farmer and extension agent, extension service can provide effective transfer of

relevant information and technology to farmers (Pickering 1983 cited in Saito and Weidermann 1990 p.1).

To Sikhondze (1999) extension is oriented toward an objective, work according to principles, is based on theories, perform functions, takes various forms, selects methodological approaches, uses suitable tools and is practiced with specialist approach.

Kumar (1979) cited Dahama who enumerated the principles of extension education, which he said, were similar to the principles of adult learning. These were:

Extension should be based on the felt-needs and enlighten the desire of the people.

It should be according to the local conditions of the people.

Extension work starts with people as they were; it worked in harmony with their nature and understood their problems as they saw them.

There is democratic procedure in the function and execution of the programme.

- The programme should start with the simplest problems of farmers, leaving difficult ones for the future.

The programme should be made in consultation with rural people through their leaders and organizations.

Extension work went with the level of understanding and skills of people and was adjusted on the basis of feedback from them.

Markings (1967) claims the aim of extension was to impart knowledge and demonstrate the skills which the individual would seek to apply for improving his own productive

process. In his view, the logical steps in extension were to assist the individual to better his position by improving techniques, while he continued to do what he did before, using the same resources, to introduce innovations including new crops, making use of new resources to which the producer had gained access, and to stimulate group activity to undertake tasks outside the range of individual accomplishment.

3.3 The Role of Agricultural Extension:

The world demand for food is increasing rapidly, especially in less industrialised countries whose population growth has been rapid. Therefore the world faces the major challenge of increasing food production in these countries rapidly enough to avoid serious shortages (Van Den Ban and Hawkins, 1988).

Further increased production in their view will have to come mainly from increased yields per hectare and per animal rather than from increased land use, as in the past. They mentioned agricultural extension in combination with agricultural training as the major policy instrument to be used to obtain these higher yields.

Van Den Ban and Hawkins (1988 p. 292) however, identified some problems, which decreased the effectiveness of these organizations, including:

1. Appropriate technology was not available to extend to the farmers.
2. There were no effective linkages between extension organisations and agricultural research institutions.
3. Field-level personnel lacked practical training in agricultural technology.
4. Extension personnel lacked training in extension methods and communication skills.

5. Field-level extension personnel lacked adequate transport facilities to reach farmers effectively.
6. Extension personnel lacked essential teaching and communication equipment.
7. Due to organisational problems extension personnel had many other tasks besides extension work.
8. Extension personnel lacked essential teaching aids, bulletins, and demonstration materials among others.

The agricultural extension agents is to help farmers form sound opinions and to make good decisions by communicating with them and providing them with information they need. They also have a major task in helping farmers come to terms with reality. This gives them control over their own lives. The agent can also help farmers with their decision-making on their pathway towards knowledge as well as on their pathway towards choice.

In the view of Van Den Ban and Hawkins (1988 p. 295 - 297), the extension organisations and agents should keep the following in mind when helping farmers form sound opinions and to make effective decisions.

1. They must clarify in their own minds the circumstances under which they may influence farmers and those under which they must influence them.
2. Farmers' trust in their agents is an essential condition for good extension.
3. An individual's action is constrained by his environment.

4. An agent who wishes to help a farmer must try to see everything from the farmer's point of view, his problems, his goals, his knowledge and his use of language.
5. It is much better for a farmer to find his own solution to a problem than for an extension agent to find it for him.
6. Everyone's behaviour is strongly influenced by positive reinforcement of his own past experience, as well as by norms of the group he belongs to or would like to join.
7. All members of a group are unlikely to adopt innovations simultaneously.
8. Effective communication is extremely difficult without feedback about how the receiver interprets the source's message.
9. Extension agents can make systematic use of information gained from evaluation of extension programmes, how they have been implemented, their effects and the reasons why the results are as they are.
10. Agricultural agents should also understand aspects of:
 - a. crop and livestock production
 - b. farming as a business
 - c. agricultural development process
 - d. rural society

3.4 The Role of Extension in Economic and Agricultural Development:

The economies of most developing countries are based on agriculture. Most of the available resources consist of land and people. Capital is in limited supply and must be generated through development of agriculture or procured from more advanced

countries, either through credits or foreign investment. Governments of most developing countries prefer to hold foreign investment to a minimum while generating capital through the development of their own resources. Thus, agricultural development becomes a prime factor in economic development (Maunder, 1973).

According to Leagan cited in Maunder (1973), studies indicate that economic growth cannot be explained alone in terms of capital accumulation and growth of the labour force, but rather, lies in investment in the development of human resources through extension. It is also known that economically less developed countries have a higher ratio of illiterates in the total population than more advanced countries and that the rural population has a higher rate of illiterates than urban population.

Any sharp and continuing acceleration of agricultural productivity requires the breaking away from traditional attitude toward change. This, Maunder argued, can be achieved only with the aid of mass education. Thus, the development of human resources through education offers not only one of the greatest possibilities for economic development but is a prerequisite to the application of the technology required to increase agricultural productivity.

Agricultural extension is only one, although a very important form of education. Rapidly advancing agricultural technology requires continuing education for rural adults regardless of their level of formal education. This need must be filled through some form of adult education, usually in the form of agricultural extension.

Mosher, (1973) argues that governments have based their hopes for agricultural development upon their extension or community development programme while neglecting to supply the facilities or incentives for production. In some cases

governments have assigned to their extension services responsibilities not compatible with the basic educational role. In some instances the extension services were not well enough staffed or financed to assign additional personnel to these non-education functions. Consequently, either the educational programme or operational activities or both were only partially effective.

3.5 The Training and Visit System of Extension:

In Ghana, agricultural extension has been an active feature of agricultural development. It was part of the activities of church missionaries and foreign owned companies interested in production for export. Ghana has experimented with various approaches to agricultural extension. Gakpetor (1998) enumerated some examples of these as: UGFCC – United Ghana Farmers Co-operative Council – 1960s; "Focus and concentrate" – a government initiated pilot project in the late 1960s; the programmes initiated under the World Bank assisted Upper Region Agricultural Development Project (URADEP) 1984, Volta Regional Agricultural Development Project (VORADEP) 1982 – 1988 and Agricultural Services Rehabilitation Project (ASRP); The Global 2000 - since 1986; CIDA, Canadian International Development Agency assisted grains and Legumes Development Project on-going since 1981. There have been regional rural development projects, which had substantial extension programmes. Examples are the UNDP/FAO assisted Integrated Agricultural Development Programme at Mampong Ashanti, 1986 – 1989, the G.T.Z assisted Ghanaian-German Agricultural Development Project on-going since the early 1970s and the IFAD assisted Ghana, small-holder Rehabilitation and Development Programme – on-going since 1988 both in the Northern Region.

The training and visit (T&V) system has been one of the most significant extension organisational developments in recent years. The International Bank for Reconstruction

and Development – The World Bank, has invested in this system since 1975 (Van Den Ban and Hawkins, 1988).

The system, they said, tried to achieve changes in production technologies used by the majority of farmers through assistance from well-trained village extension workers (VEWs) who had close links with agricultural research.

The T&V system has a hierarchical organisation with one VEW for about 800 farmers. In turn, 8 VEWs are supervised by an AEO, and 8 AEOs are supervised by a Provincial Extension Officer, who is assisted by three to five Subject Matter Specialists (SMS).

According to Van Den Ban and Hawkins, it is impossible for a VEW to meet all his farmers regularly. Hence, about 80 contact farmers are selected and visited every two weeks on a fixed day, preferably in their fields where other farmers can attend and join the discussion or demonstration of improved practices.

They identified some key features of T&V extensions:

1. A professional staff with a sound knowledge of agricultural research, farmers' experience and factors limiting the productivity in agriculture.
2. There is one extension service for all aspects of agriculture.
3. The service is responsible only for extension. All other tasks required for agricultural and rural development, such as distribution of fertilizers and other inputs are performed by other organisations. The extension service should co-operate closely with these organisations.
4. There is a single line of technical and administrative command.

5. The service concentrates its efforts on the main prospects for increasing agricultural production in the existing situation.
6. The service is oriented entirely to farmers' field problems.
7. There is a regular and continuous training of the whole staff to ensure every member performs well.
8. Extension and research are closely linked to ensure agricultural research performs its main task of solving farmers' production problems.
9. Research findings are tested in trials on farmers' fields before they are recommended to farmers.
10. The quality and efficiency of the extension service are monitored and evaluated continuously to stimulate improvement (p. 279 and 281).

Extension staff training receives substantial attention in the T&V system because well-trained extension agents are the basis for an effective and professional extension service. In this training extension agents learn:

1. to identify relevant production technology needed by farmers;
2. diagnostic skills; and
3. appropriate communication techniques.

Every two weeks the VEWs receive one day of training by the SMS. This should be based on analyses of the VEW's experiences in the past two weeks.

Training as is reported, is usually given to groups of two or three AEOs, with their VEWs. Each AEO also meets with his VEWs every two weeks to discuss organisational and administrative matters. Every month the SMS meet with research workers to discuss agricultural production problems for the next month. These meetings also serve as training for the SMS.

Van Den Ban and Hawkins (1988) asserted that contact farmers were crucial part of the T&V system. They were expected to help other farmers in their group and to transmit knowledge learned from the VEW to them. Contact farmers were supposed to be representative of farmers in their village, but often they had larger farms, are better educated and had more leadership positions in the village. Hence their problems and their resources differed from many other farmers in their group. They also hesitate to help farmers who later compete with them for land or in the market. Despite these criticisms, there were clearly many opportunities for contact farmers to help diffuse new ideas.

Venkatesan (1994) reported that a recently concluded evaluation of the impact of T&V extension in Kenya and Burkina Faso, undertaken by Prof. Evenson of Yale University, indicated that T&V had been successful in Africa by promoting the development and propagation of relevant technologies to farmers.

The Kenya study examined the impact of T&V extension on the basis of data from a random sample of Kenyan farmers. It showed that 66% of the sample farmers, deriving their main income from agriculture, reported receiving extension advice since the introduction of T&V. The majority of these recipients according to the report rated this advice as being applicable, and indicated that they had never been advised by extension before T&V was introduced.

In Burkina Faso, based on a random sample of some 3,600 farmers drawn from all 12 regions the evaluation showed that the introduction of T&V had increased the adoption of improved practices. It showed that while farmers have benefited, those belonging to T&V contact groups had benefited more, reaping crop yields 25% to 30% higher than the others (Venkatesan, 1994).

3.6 Diffusion and Adoption of Innovations:

3.6.1 The Concepts of Diffusion and Adoption:

Diffusion was defined by Rogers, (1983 p.5) as “the process by which an innovation is communicated through certain channels over time among the members of a social system. In his opinion, this type of communication is special, in that the messages are concerned with new ideas.

He also defined communication as a process in which participants create and share information with one another in order to reach a mutual understanding.

Diffusion is a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system. When new ideas are invented, diffused, and adopted or rejected, leading to certain consequences, social change occurs.

Rogers (1983) said some authors restricted the term “diffusion” to the spontaneous unplanned spread of new ideas, and used the concept of “dissemination” for diffusion that is directed and managed.

An innovation is an idea, method or object which is regarded as new by an individual, but which is not always the result of recent research (Van Den Ban 1988). Adam's (1982) also sees it as new ideas, methods, practices or techniques, which provide the means of achieving, sustained increases in farm productivity and income.

According to Rogers, (1983), innovations have five characteristics from the farmers point of view, which affect their rate of adoption:

Relative advantage, which is the degree to which an innovation is recognised as better than the idea or object it is intended to replace;

Compatibility, the degree to which the farmer perceives an innovation to be consistent with his values, his management objectives, the level and technology and the stage of farm development;

Complexity, the degree to which an innovation is understood and can be used by farmers;

Triability, if a farmer can try out an innovation without committing too much money; and

- Observability, the degree to which results of an innovation are visible to farmers.

Adoption is not a sudden event, but a process. Farmers do not accept innovations immediately. They need time to think over before making a decision. There are several schemes for explaining the adoption process. According to Adams, (1982) and Van Den Ban, (1988), a popular one involves:

“Awareness”: first hear about the innovation;

- “Interest”: seek further information about it;

“Evaluation”: weighing the advantages and disadvantages of using it;

“Trial”: test the innovation on a small scale for yourself; and

- "Adoption": apply the innovation on a large scale in preference to old methods.

Rogers (1983), proposed a different set of stages:

"Knowledge": when the individual learns of the existence of the innovation and gains some understanding of its function;

"Persuasion": when the individual forms a favourable or unfavourable opinion of innovation;

"Decision": when the individual engages in activities which lead to a choice between adoption and rejection; and

- "Confirmation": when the individual makes a final decision to accept or abandon the innovation.

It is understandable that not everyone adopts innovations at the same rate. Some people accept new ideas years before others.

People are often divided into five categories according to their rate of adoption; these are: Innovators, early adopters, early majority, late majority and laggards.

The adoption of innovations is influenced strongly by members of social groups. Van Den Ban (1988) asserts that farmers are keen observers of how other farmers work. They spend much time discussing their farm experiences with their friends and neighbours. Some of these successful or progressive farmers are willing to share their experiences with other farmers. In this way they become opinion leaders in the village. These opinion leaders have considerable influence on the way in which people in their village think and farm.

An opinion leader will fulfil several of the following functions in his group with regard to innovations:

- passes on information from outside the group;

- interpretes outside information on the basis of his own opinions and experience;

- sets an example for others to follow;

- 'legitimizes' or rejects changes that others want to carry out. This is to say, he gives his approval or disapproval to these changes; and

- is influential in changing group norms.

A farmer will talk most frequently with other farmers who are similar to him in social status, farm size, education, age, etc. Many innovations can only diffuse effectively among farmers who are more or less homogeneous in resource and social status.

Rural people have often been described as rejecting ideas and information deemed by the innovation bearers to be beneficial to rural dwellers. According to Obinne and Ozowa (1997), authorities in development communication have ventured to adduce reasons, which include poor or lack of understanding of the cultural circumstances of the people before new ideas are introduced for acceptance. Titola (1990) reports that most of the technical solutions proposed to address the problems of agriculture in least developed countries have not been successful because they had not considered society's unique resource issues such as energy availability, ecosystem fragility and the skills, preferences and knowledge base of the society.

Njoku (1991) asserts that the level of technology adoption by farmers is generally low. He cited Abalu (1981), who attributed the reluctance to innate psychological characteristics of small holders; inappropriateness of recommended practices, and limited access of small holders to credit, technical knowledge; and the material means of production.

The greatest constraint to technology adoption according to Njoku (1991) is small holders' perception that new technologies are complex. He claims the high cost of labour, insecticides, and herbicides also constrains technology adoption. He indicated that the level of technology adoption on smallholder farm was influenced by the farmer's age, literacy rate, access to material inputs of a technology, and food security. He identified additional constraints as institutional factors related to tenurial status, cooperative membership, access to credit and intensity of extension service.

Floquet (1993) is of the opinion that in rural area, serious communication problems arise between experts and local inhabitants, in particular, where the farmers are not organised in any kind of group. The researchers and advisors often ignore the farmers' know-how and the way it is passed on in the traditional society. Floquet argues that so many development projects have failed because too little time is invested in and too little importance attached to informing the target group. Similarly, extension workers are themselves not thoroughly familiar with the contents and objectives of their projects. They may also have only cursory knowledge of the environment to which they have been assigned. The suggestion, according to Obinne and Ozowo (1997) is to adapt the teaching programme to the traditional activities of the farmers, to their culture, their environment, their needs and their timetable.

To maximise and bolster the potential change, the local language is the best medium for communicating indigenous technical knowledge. Most extension agents are not literate in the local language of their areas of operation, and this creates the problem of mutual comprehension with the rural people. If agricultural innovation is to make any meaningful impact on rural dwellers, there is the need to build communication infrastructure that is more attuned to the information needs and cultural assumptions of rural population.

Traditional media should be used to complement modern means of communication such as the electronic and print media. This is because “traditional media are very basic for development motivation and participation.”

Awa (1990) said if appropriate agricultural information dissemination models and fresh directions to quicken the pace of adoption, if agricultural innovation are to be crafted, and if the traditional and modernity are to be effectively fused, then a blend of traditional and modern means of communication is an imperative for agricultural communication to rural people.

3.7.1 Concept Themes:

Sustainable agriculture integrates three main goals – environmental health, economic profitability, and social and economic equity. As Feenstra and Campbell (1997) put it, a variety of philosophies, policies and practices have contributed to these goals.

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of the future generations to meet their own needs (Feenstra and Campbell 1997; The World Commission on Environment and Development (1987) cited in Jordan, 1995).

3.7.2 Farming and Natural Resources:

When the production of food and fibre degrades the natural resource base, the ability of future generations to produce and flourish decreases.

Several steps should be taken to develop drought-resistant farming systems even in “normal” years, including both policy and management actions. According to Feenstra and Campbell, this can be done by:

1. improving water conservation and storage measures;
2. providing incentives for selection of drought-tolerant crop species;
3. using reduced-volume irrigation systems;
4. managing crops to reduce water loss, or
5. not planting at all.

Many agricultural activities affect air quality. These include smoke from agricultural burning, dust from tillage, traffic and harvest, pesticide drift from spraying and nitrous oxide emissions from the use of nitrogen fertilizer. Options to improve air quality include incorporating crop residue into the soil, using appropriate levels of tillage, and planting wind breaks, cover crops or strips of native perennial grasses to reduce dust.

Soil erosion is a serious threat to our continued ability to produce adequate food. Practices developed to keep soil in place, include reducing or eliminating tillage, managing irrigation to reduce runoff, and keeping the soil covered with plants or mulch.

3.7.3 Plant Production Practices:

Sustainable production practices involve a variety of approaches. Specific strategies must take into account topography, soil characteristics, climate, pests, local availability of

inputs and the individual growers goals. Feenstra and Campbell (1997) pointed out principles that can be applied to help growers select appropriate management practices.

Preventive strategies, according to them, if adopted early, can reduce inputs and help establish a sustainable production system. When possible, pest-resistant crops should be selected which are tolerant to existing soil or site conditions. When site selection is an option, factors such as soil type and depth, previous crop history, and location should be taken into account before planting.

Diversified farms, Feenstra and Campbell assert, are more economically and ecologically resilient. They said by growing a variety of crops, farmers spread economic risks and are less susceptible to the radical fluctuations associated with changes in supply and demand.

They also argued that, optimum diversity may be obtained by integrating both crops and livestock in the same farming operation. This according to them has several advantages. It reduces soil erosion and enhances soil quality; livestock manure in turn, contributes to soil fertility; livestock can buffer the negative impacts of low rainfall periods by consuming crop residue that in "plant only" systems would have been considered crop failures and feeding and marketing are flexible in animal production systems.

A common philosophy among sustainable agriculture practitioners is that, a "healthy" soil is a key component of sustainability, that is, a healthy soil will produce healthy crop plants that have optimum vigour and are less susceptible to pests.

In sustainable systems, the methods to protect and enhance the productivity of the soil include using cover crops; compost and/or manure, reducing tillage, avoiding traffic on

wet soils, and maintaining soil cover with plants and/or mulches (Feenstra and Campbell 1997).

Sustainable farmers maximise reliance on natural renewable and on-farm inputs. Sustainable approaches are those that are least toxic and least energy intensive, and yet maintain productivity and profitability.



3.7.4 Animal Production Practices:

With the growing specialization of livestock and crop producers, many of the principles outlined in crop production apply to both groups. Feenstra and Campbell (1997) listed some of the specific points that livestock producers need to address:

- Management selection

- Animal nutrition

- Reproduction

- Herd health

- Grazing management, and

- Confined livestock production

3.7.5 The Economic, Social and Political Context:

In addition to strategies for preserving natural resources and changing production practices, sustainable agriculture requires a commitment to changing public policies, economic institutions, and values.

The “food system”, according to Feenstra and Campbell (1997), extends far beyond the farm and involves the interaction of individuals and institutions with contrasting and often competing goals. This individuals and institutions include farmers, researchers, input suppliers, farm workers, unions, farms advisors, processors, retailers, consumers and

policy-makers. Relationships among these actors shift over time as new technologies spawn economic, social and political changes. In the view of Feenstra and Campbell, areas of concern where change is most needed include the following:

1. Food and agriculture policy. New policies are needed to simultaneously promote environmental health, economic profitability, and social and economic equity.
2. Land use. Existing farmland conversion to urban use patterns often discourage farmers from adopting sustainable practice and a long-term perspective on the value of land.
3. Labour. To be more sustainable over the long-term, labour must be acknowledged and supplied by government policies and carefully considered when assessing the impacts of new technologies and practices.
4. Rural Community Development. Economic development policies are needed that encourage more diversified agricultural production on family farms as a foundation for healthy economies in rural communities.
5. Consumers and the Food System. Consumers can play a critical role in creating a sustainable food system. The challenge now is to find strategies that broaden consumer perspectives so that environmental quality, resource use, and social equity issues are also considered.

Other improvement themes in the development of sustainable forms of cropland agriculture include the use of indigenous knowledge of local farmers and the role of tree

crops in farm systems. Knowledge of traditional farming techniques has proven to be valuable in providing ideas for sustainable agriculture on wider scales. According to Altieri and Merrick, Oldfield and Alcorn cited in Rivera (1991), traditional forms of agriculture are often adapted to local conditions but may contain features that can be transferred to other areas. They can act to conserve crop genetic resources in the form of local cultivars.

3.8 Agricultural Research:

In the past, agricultural research in Africa was heavily weighted on the side of cash-crop research based on research stations. When populations were still fairly small, and population pressure on the land was low in most areas, overall food production problems were not particularly severe (Ker, 1995). The widespread fallow-farming systems, mainly based on shifting cultivation, were reasonably stable. Local food shortages as a result of the failure of the rains or of pest or disease outbreaks did occur from time to time, but food deficit could be corrected by transport of surpluses from other more productive areas. Governments also acted to supplement these activities when necessary.

According to Ker because food production was not generally perceived as a problem, it often did not receive priority research attention.

Increased population brought increased demand for food. Traditional agricultural methods could no longer feed the burgeoning number of people. This led to the establishment of global agricultural research system. The development of International Agricultural research has passed through two phases is in the third and is heading for a fourth (Rhoades 1984). The phases Rhoades said, coincide with four central issues: productivity, equitability, sustainability and institutional viability.

Some researchers focused on on-farm research in which new technologies such as alley cropping or disease resistant varieties were tried out in farmers' fields in the hope of better appreciating the environmental and socio-economic constraints to adoption. A frequent problem, in the view of Jordan (1995), was that in the researchers' desire for success, genuine farmer participation was reduced.

Another approach as reported by Jordan (1995) was to concentrate more on the farmers' needs. The starting point was the analysis of existing farming systems to determine needs, problems and constraints to which subsequent technological innovations were directed. On-farm research with a farming systems perspective consists of the following steps (Conway and Barbier, 1990).

Diagnostic survey

- Identification of farmers needs
- Search for appropriate technology

Testing via on-farm trial

Recommendations for adoption

CHAPTER FOUR

METHODOLOGY

4.1 Research Design:

The research was to find out the effectiveness of agricultural extension on the practices and methods of migrant farmers within Awudome communities towards improved production.

It was conducted using the simple survey research method of the descriptive type. This method was adopted because it offered the advantage of tailoring questions to respondents to provide specifically needed information on their practices and methods of farming and probing for reasons behind these answers.

4.2 Study Population:

The survey covered two types of population in the area:

- a) All migrant farmers in Awudome Traditional area; and
- b) All agricultural extension agents in the Ho District.

Awudome Traditional area in Ho District of the Volta Region was chosen for the study because; it has a large number of migrant settlers. According to the Danish Support District Database System conducted in October 2000, migrant settlers constituted more than one-third of Awudome traditional area's total population.

4.3 Study Area:

Awudome is a traditional area in the Ho district of the Volta Region. From south to north, it is about 30km long and about 10km in its widest portions, which are in the north and in the south. Its area is about 150sq. km (Asem, 1982).

Awudome traditional area is divided into two main traditional council units: The Tsito traditional council made up of the various clans of Tsito and Borkovikope, Tsiamekope, Dededo North and Dededo South. These are predominantly migrant settlements. The other is the Anyirawase traditional council made up of Anyirawase, Avenui, Kwanta, Bame, Tsibu, Dafor and Bethel, which are Awudome towns. Tsawenu, Abalakpoe and Avenui Camp are also migrant settlements under Anyirawase traditional council.

The population of Awudome traditional area according to the Danish Support Database System (2000) is about 15,524. This is made up of:

Anyirawase traditional council - 7,887 with about 1,412 migrant settlers, and

Tsito traditional council – 7,637 with about 4,800 migrant settlers.

Farming is the major activity in the area, and majority of the people are subsistence farmers whose main objective is to feed themselves and their dependants with their own produce. They sell the surplus produce to find money for items that cannot be provided on the farm.

4.4 Sampling Design:

The migrant settlers in Awudome have been grouped into seven major settlements; Dededo South, Dededo North, Tsiamekope, Borkovikope, Tsawanu, Avenui Camp and Abalakpoe.

Dededo is a religious camp – Apostles Revelation Society (ARS). They are most of the time involved in religious activities and majority of them are also traders and thus spend less time in farming. They were therefore not considered as part of the study population.

The remaining five settlements are mainly involved in farming; they were thus selected as the study population.

The population of the various settlements are as indicated in Table 1

Table 1: The population of the various settlements.

Settlement	Population
Tsiamekope	1,071
Borkovikope	729
Tsawenu	791
Avenui Camp	420
Abalakpoe	201
Total	3,212



Source: Danish Support Database System (2000).

The population of the various settlements was divided by the population of the smallest settlement, Abalakpoe (201), this gave an approximate ratio of 5:4:4:2:1. The sum of the ratios (16) was used to divide the number of respondents required, that is 100. This gave a value of 6.25. The 6.25 was used to multiply the approximate ratios to obtain the number of respondents selected from each of the settlements.

Systematic sampling method was used to select the respondents from the various settlements. The houses in each of the settlements were numbered during the 2000 population census. The total number of houses in each of the settlements formed the population for that settlement.

A house was selected at random from each of the settlements and this became the basis, then every fifth house thereafter was taken. An adult occupant of each house was selected using simple random sampling to represent a respondent as shown in Table 2 below.

Table 2: Distribution of Respondents.

Traditional Council Area	Settlement	Number of Respondents
Tsito	Tsiamekope	31
	Borkovikope	25
Anyirawase	Tsawenu	26
	Avenui Camp	12
	Abalakpoe	6
Total		100

Distribution of respondents according to traditional areas and settlements.

The second group of respondents was made up of the Agricultural Extension Agents who worked in the district. There were 20 extension agents in the district and all of them were served with questionnaires.

4.5 Data Collection Techniques:

The interview was used to collect data from the migrant farmers. This was because the farmers were predominantly illiterate. The instrument was administered in the local language 'Ewe' and translated into English by the researcher who personally conducted the interview. Questionnaires were given to the extension agents by personal contact and retrieved in the same way.

The questions in the instruments were mainly close-ended. This was to help in the recording of the responses quickly and also facilitate the analysis of the results. Where it was found necessary, respondents were probed further to elicit information not requested by the interview schedule.

4.6 Method of Data Analysis:

Manual approaches were used for data analysis. Some of the responses, after frequencies had been worked out and percentages determined were represented in pie charts, tables and a histogram.

In some cases, the arithmetic mean and the median of scores were computed to provide the basis for judgement.

CHAPTER FIVE

PRESENTATION AND ANALYSIS OF DATA

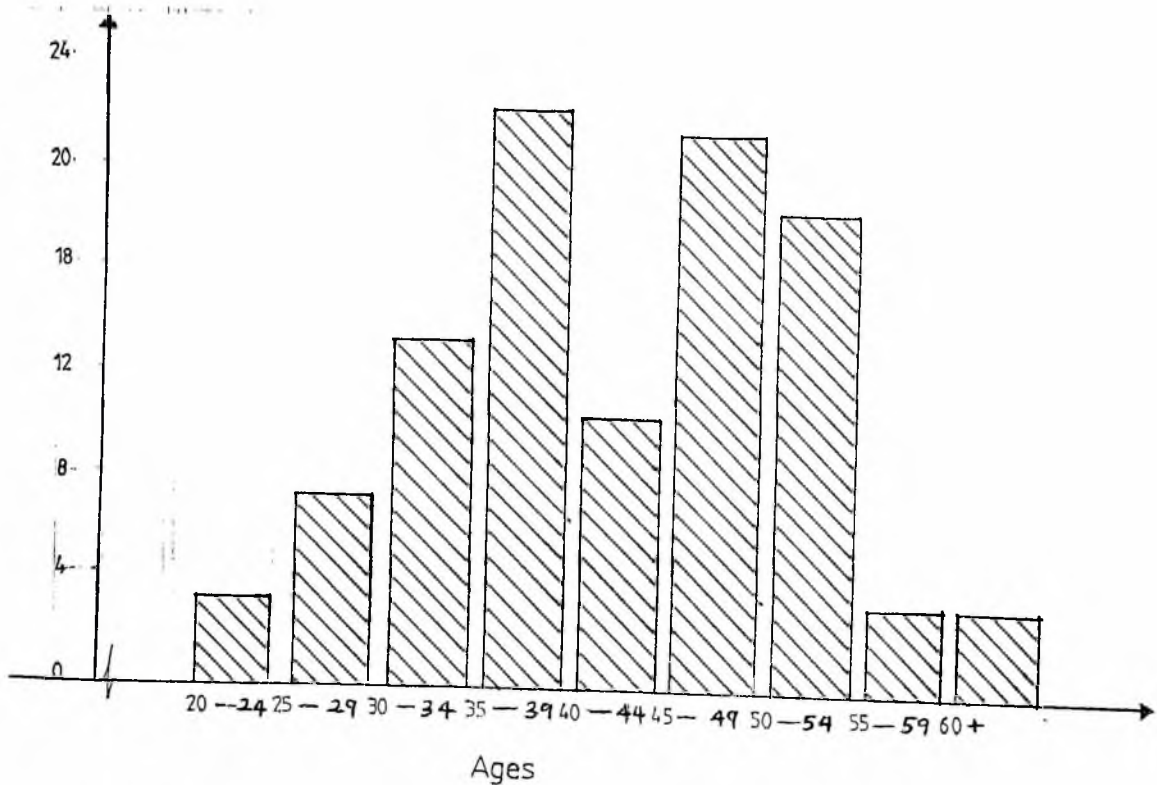
5.1 Background of Respondents:

The interview schedule used for the migrant farmers drew out information on their sex, age, marital status, number of dependants, place of birth, how long they had been in various settlements, level of education, main occupation and how they acquired the land on which they farmed.



Figure 1: Age Distribution of Farmers:

It was necessary to know the ages of the migrant farmers to determine how old they were.



Key  Number of Farmers

The age distribution of the respondents is shown in figure 1. The figure shows that the age of the farmers interviewed ranged from 20 – 64 years. Out of the 100 farmers interviewed, 10 percent (10%) represented the youth, who were normally between the ages 20 – 30 years; people in their middle ages (between 30 – 54 years) constituted 84% and those above age 54 were made up of only six percent (6%).

The mean age of the farmers was 42 years. According to the study, almost all the farmers below age 30 were born in the settlements by their settler parents. The large proportion of the middle-age farmers was due to the fact that these settlers travel with the aim to look for land to farm, hence it was only those who were mature and could fend for themselves that travelled in search of land. The percentage of the elderly farmers was low because when the farmers are old and weak and could not engage in active farming, they are sent back to their ancestral homes by their children, rather than to die and be buried in these settlements.

5.2 Sex and Marital Status:

Respondents were asked to state their marital status and indicate their sex.

All told, there were 61 male and 39 female. Figure 2 below represents marital status of respondents.

Figure 2
Marital Status of Respondents

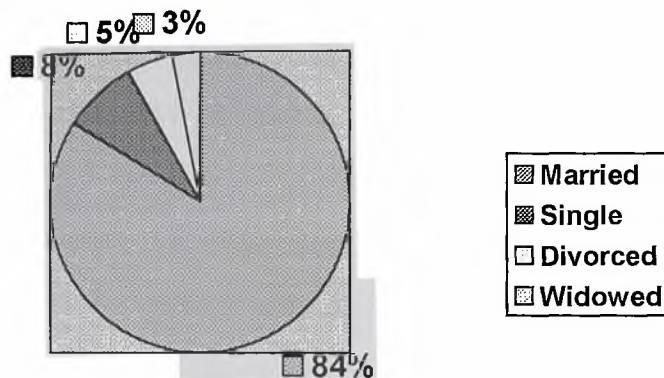


Figure 2 shows that majority of the respondents (84%) were married, 8% of them were single, 5% divorced and 3% widowed. There were really only 8 who had not tasted married life.

Respondents were asked to state the number of dependants they each had. Table 3 below provides the details.

Table 3: **Number of Dependants of Respondents**

Class	Frequency	Percentage
0 - 3	17	17
4 - 6	44	44
7 - 9	27	27
10 and above	12	12
Total	100	100

Table 3 shows the number of dependants for each farm family. Dependant was defined as the husband/wife, the head's own children and other children and others who were under the care of the head. Male-headed households' accounted for 70 percent of household heads and females for 30 percent. This high value is due to the fact that the

settlers were subsistence farmers who depended very much on the labour of family members.

It was observed that the type of dwelling units occupied by households in migrant settlements were owned by the residents. They were usually mud houses with thatch roofing. Owing to uncertainties in land tenure, the settlers were reluctant to put up cement blockhouses with roofing sheets, which they considered as permanent structures. The mud house with thatch roof could be abandoned any time they were driven from their settlements or when they decided to move to a different settlement or return to their ancestral homes.

Access to amenities and services such as safe water, electricity, improved sanitation and public transport in the migrant settlements was non-existent. Of the 100 respondents, 20% had been living in their settlements for less than 10 years, 73% between 11 and 40 years and 7% for over 40 years. They had indeed become settler farmers.

5.3 Level of Education:

The level of education of the respondents was asked to determine how it affected their acceptance of innovations.

Table 4 - Level of Education of Migrant Farmers

Highest Educational Level	Frequency		Percent	Ranking
	Male	Female		
No Formal Education	18	19	37	1
Incomplete Primary	4	1	5	5
Completed Primary	3	2	6	4
Completed Middle/JSS	30	4	34	2
Incomplete Secondary	1	0	1	7
Completed Secondary	3	0	3	6
Functional Literacy	4	10	14	3
Totals	100		100	

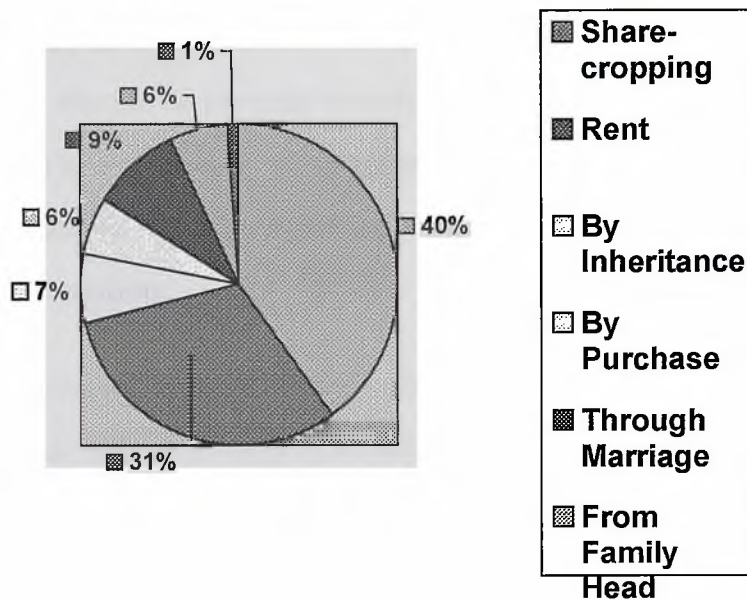
Table 4 showed that, the number of farmers who have had no formal education were ranked highest - 37%; this was made up of 18 males (29.5% of all males interviewed) and 19 females (48.7% of all females interviewed). This was followed by those who completed Middle/JSS, 34% and was made up of 30 males (49.2%) and 4 females (10.3%). Of all the respondents only 3 completed secondary and were all males. 14% of the respondents attended functional literacy classes and were made up of 4 males (6.5%) and 10 females (25.6%). These figures showed that the male respondents were more literate and had attained higher educational levels than the female respondents.

5.4 Mode of Land Acquisition:

Respondents did not own land all on the same basis. They were therefore asked to determine how they came by the land they farmed.

Figure 3 shows the mode of land acquisition by migrant farmers.

Figure 3:
Mode of Land Acquisition



A majority (40%) of the farmers were sharecroppers. They shared their produce in the ratio 2:1 where the farmer took two parts and the landowner one part. Another 31% of the respondents paid rent for their land use, ranging between ₵10,000 and ₵100,000. Of this group, 51.6% paid ₵20,000 as rent, 25.8% paid ₵40,000 and only 3% paid ₵100,000. Those who acquired the land through marriage constituted 9%, 7% acquired their land through inheritance, 6% through purchase, 6% were given the land by their family heads and the remaining 1% as gift.

Asked how they acquired land for the expansion of their farm, 86 of the respondents said as sharecroppers, the bigger the land they cultivated, the more the share of the produce the landowner would get. And since they had a large expanse of land, they would not

face any problem if they had to expand their farm. However, 14 of the respondents said their landowners did not have enough land to enable them to expand their farms.

Thirteen of the farmers who paid rent said they were satisfied with the amount they were charged. Their reason was that, after the payment of the rent, they did not share their produce with the landlord. Also after the payment of the rent one could weed any size without hindrance from the landlord. However, 11 said they were not satisfied with the rent because it was too expensive, and in a bad season when produce was low they still had to pay the rent to their landowners.

Some sharecroppers were also not satisfied with their mode of payment because when it came to sharing, expenses made on the farm by the farmer were not taken into consideration by the landowner. As a result, they at times were left with nothing after sharing. Meanwhile they continued with the sharing, as they did not have any other means of livelihood.

5.5 Farm size of Respondents:

After the complaint about the arrangement of land holding, it was necessary to ask about farm size. Table 5 below provides the picture.

Table 5: Farm Size of Respondents

Farm Size / ha	Frequency
Less than 1	66
Between 1 – 2	23
Between 2 – 3	10
Above 3	1
Total	100

Table 5 shows the various farm sizes of the 100 migrant farmers. 66 of farmers had holdings of less than 1 ha while 23 had holdings 1 – 2 ha, and 10 had between 2 – 3 ha. Only 1 held above 3 ha.

5.6 Farming Activities:

The farmers were asked how long they had been farming in the area. It was found that 39 of the respondents had been farming for between 1 to 10 years, 43 between 11 to 25 years and only 18 had been farming for over 25 years.

Almost all the farmers were involved in food crop production, 90% cultivating maize and 60% cassava. Other food crops cultivated included groundnut, yam, cowpea, sugarcane and rice. Some intercropped maize with cassava and yam with vegetables such as okro, pepper, tomatoes and garden eggs. Only one farmer was involved in cash crop production, oil palm cultivation.

In their land preparation and planting activities, they used simple hand tools such as hoe and cutlass. Only the groundnut farmers used tractor services in land preparation. There were 29 of them.

The farmers also depended heavily on family labour. This may account for their large family sizes. The study also showed that those who had holdings greater than 0.4ha employed the service of hired labour in their activities. A few farmers engaged in the practice of exchange to gather to work on the farm of the members of the group in turns.

With respect to planting, 56 of the farmers planted in lines. However, only maize and sugarcane were planted in lines. The remaining 44 planted their crops haphazardly.

Those who planted in line had adopted the spacing recommended by extension programmes.

The study also revealed that 86% of the farmers still planted the local varieties of maize and other seeds and had never tried any improved variety of seed. However, 14% tried the improved variety of maize alongside the local variety.

Most of the farmers reared animals in addition to the cultivation of crops. The animals mostly kept were poultry – 65%; goats - 45%; and sheep – 7%. 26% of the respondents did not own any animals.

The animals reared were kept on an extensive basis. The poultry were given maize in the mornings and left to feed on their own for the rest of the day. The goats also fed on their own and only given supplementary feeding such as cassava peelings and lopping from some trees during the dry season.

The type of housing provided for poultry was a hencoop made from palm fronds. Some of the birds were also left to roost on trees in their compounds. Some farmers provided their goats and sheep with bamboo fencing with thatch roofing, others tethered them under shades of trees in their compound while others left the animals to roam about without any control.

It was found out that farmers used high proportion of their farm produce for food, sold some and used the remaining as seed for the next planting season. By proportions, 50% produce were used as food, 10% to 40% was sold whereas 10% was kept as seed for the next planting season.

5.7 Cash Income:

The data revealed that all the respondents derived their cash income from their farming activities through the sale of farm produce and animals by those who kept them. Taking the size of their holdings into consideration, the cash income from farming could not sustain most of the farmers. They thus, resorted to the sale of their own labour to earn extra income to take care of the family. 24% of them were involved. The study also pointed out that some farmers sold their produce early after harvest when the prices were low in order to get money for some other items and only few of them engaged in trading as a side line.

5.8 Farmers' Constraints:

The farmers enumerated some problems they faced in their farming activities. Plant diseases were the common ones: stem borer infestation in maize, especially during the minor season, weevil infestation of stored maize and cowpea, expensive agrochemicals, difficulty in getting labour during the peak farming season especially when the farmers do not have money, poor yield caused by drought and infertile land; removal of germinated seedlings by rodents, birds and toads. Termites also destroyed maize plant, especially, when there was drought. Prices of farm produce were too low when compared with the prices of farm inputs, and there was lack of credit facility. These problems, the farmers contended, reduced their efficiency in crop production and consequently their incomes.

5.9 Extension Contact by Farmers:

In the light of the constraints raised by the farmers, it was imperative to know the state of farmers contact with extension programmes. Table 6 below shows the farmers' contact with extension programmes.

Table 6: Extension Contact

Extension Contact	Frequency	Percent
Once a Week	2	2
Once a Fortnight	8	8
Once a Month	12	12
Once in a While	12	12
Not at all	66	66
	100	100



Table 6 revealed that majority of the migrant farmers (66%) had never had any contact with extension programmes. An extension agent in their community had not visited them and they had also not participated in any activity organised by extension programmes.

Some of the farmers had been having regular visits, once in a week (2%), once a fortnight (8%), once a month (12%) and another 12% also had visits once in a while. Those who had been having regular visits were the contact farmers of the extension agents who were expected to teach other farmers what they had been taught.

Some of the farmers, especially those from Tsawenu and Avenui Camp said they learnt of some of the recommended practices from programmes organised by the Awudome Project Demonstration Farm, while some also learnt the improved practices of farming particularly planting in line and spacing from friends.

5.10 Effects of Extension Education:

The study points out that of the improved seeds such as maize, cowpea, cassava, pepper and tomatoes, introduced by extension programmes, only maize was tried and

adopted by the migrant farmers. Even here the proportion was small, only 14%, 86% had never cultivated any of the improved seeds.

When questioned why they had not tried any improved varieties of seed, the farmers gave the following reasons:

- ◆ No knowledge of the improved seeds, 11%;
- ◆ Improved seeds were not available to the farmers, 12%;
- ◆ They were not palatable, 1%;
- ◆ Spoiled early in storage, 3%;
- ◆ They were too expensive, 22%;
- ◆ Used to the local variety and not interested in improved varieties, 13%

On the use of agrochemicals, 77% had never used any agrochemical on their farms, 18% had used both fertilizer and weedicide and only 5% had ever used pesticide.

It was also realised from the study that those who have ever used these chemicals had stopped using them. The reason given was that they were too expensive and they could not afford to buy them. A majority of the farmers (90%) agreed that the poor yield they were getting was due to infertile land as a result of continuous cropping. They also agreed that the use of fertilizer would improve the yield of their crops but were hampered by high prices.

Some of the farmers – 7% confirmed that they had no knowledge of the use of these chemicals, while 3% contended that their land was fertile and did not need fertilizer.

With regards to spacing and planting in line, 30% of the respondents confirmed that they did not have any idea how it was done while 21% considered these practices as time wasting and labour intensive.

Those farmers who plant in line as recommended by extension programmes agreed that it made weeding and other cultural practices easier than when they planted haphazardly. The farmers who planted both the local and improved variety of maize confirmed that the improved variety gave higher yield, and was able to withstand drought as compared to the local variety.

5.11 Background of Agricultural Extension Agents (AEAs):

The remainder of the chapter is devoted to the findings on the agricultural extension agents, the other group involved in the study besides the farmers.

Total number of AEAs involved – 20

Age range – 34 to 59 years

Sex - 19 males and one female.

Marital status – 17 married, 2 separated and one divorced.

The age of majority of them - 11 ranged between 40 – 49 years, while 2 were above age 55.

The AEAs were asked of their educational levels. This was to help determine their ability to teach the farmers agricultural innovations.

Table 7: Educational Level of AEAs

Educational Level	Frequency	Percent
MSLC	1	5
Ordinary Level	1	5
Advanced Level	-	
Post Secondary (Agric)	15	75
Diploma (Agric)	2	10
Degree (Agric)	1	5
	20	100

Table 7 shows the educational level of the extension agents. Out of the 20 AEAs, 15 had Post-Secondary (Agriculture), 2 had Diploma in Agriculture and only one had a Degree in Agriculture. One person each also had Middle School Leaving Certificate and Ordinary level certificate. That is, the basic education of AEAs was satisfactory.

Besides almost all the AEAs had attended courses since their appointments, apart from their regular fortnightly training sessions. Some of the courses attended included Land and Water Management for 9 of them, Cocoa Production for 8, Root and Tuber Improvement Programme for 8, Maize Production for 2, training on Larger Grain Borer for 2, Snail and Bee keeping for 4. Other courses attended were Fruit Tree Management, Post Harvest Loss Technology, Farm Household Book-keeping, Village Infrastructure Project and Seed Certification. They were therefore educationally equipped for this work.

12 of the AEAs had been working for between 15 and 24 years, 5 between 5 and 14 years and 3 between 25 and 44 years. The least number of years an AEA had been working was 5 years while the longest serving AEA in the district has served for 42 years. The number of years the AEAs served showed that they had enough experience in teaching farmers.

It was also found out that 11 AEAs did not perform any other function apart from extension. However, 9 performed additional functions such as Veterinary duties, supervision of other AEAs, Ad hoc survey among others.

The AEAs were further questioned on how many farmers they had seen over a specified period and the reactions of farmers. The following were the answers.

5.12 Extension Contact by AEAs:

Table 8: How AEAs meet their farmers

How do you meet your farmers	Frequency	Percent
Individual contact	2	10
Contact farmers	5	25
Farmers group	5	25
All of the above	8	40
Total	20	100

The AEAs met their farmers by individual contact, through contact farmers or through farmers associations (groups). It could be deduced from table 10 that, 2 of the AEAs met their farmers through individual contacts, while 5 used contact farmers and farmers groups. However, 8 of the AEAs used all the above methods in meeting their farmers.

It was further established that 7 of the AEAs were visited by farmers to seek advice all the time, while 6 visited once a week. 15 of the AEAs visited individual farmers once a week, 3 twice a week and 4 visited once a fortnight.

The AEAs were asked of how they make contact with their farmers.

19 out of 20 AEAs considered it more convenient working with contact farmers than with individual farmers. Various reasons were given:

- It was easier to meet the contact farmers than individual farmers;
- The contact farmers were ready to accept new technologies and they communicated these messages to other farmers faster than if AEAs were to reach them individually;
- The contact farmers, they contended, convinced other farmers and information is propagated widely.
- They also stated that, through contact farmers, AEAs could easily get to other farmers groups.

7 of the AEAs lived in the community in which they worked, 5 lived at a distance of between 5 and 9 Km from their place of work, 7 lived at a distance of between 10 to 34 km from their place of work while one AEA lived at the District Headquarters of the Ministry of Agriculture.

Most AEAs (80%) used motorcycles to get to their target community. However, they complained of insufficient maintenance allowance, which was also not regular and hampered their effective performance.

The AEAs were also questioned on the types of seed farmers like to cultivate. 15 AEAs said farmers preferred improved varieties while 5 said farmers preferred the local variety.

The data on the AEAs' views on the practices adopted by the farmers was as follows:

All said contact farmers had adopted planting in line, 13 spacing, 11 fertilizers, 9 pesticides, and 8 weedicide use. Only 4 had adopted thinning out.

Also with regards how farmers perceived improved seeds, 17 of the AEAs said the farmers perceived it as having higher yield while 3 saw it as being the same. About

palatability, 4 of the AEAs said farmers perceived improved maize as being more palatable while 5 saw it as being less palatable. They said farmers saw improved seeds as having higher market demand as compared to one AEA who see it as having lower market demand.

CHAPTER SIX

DISCUSSION OF THE RESEARCH FINDINGS

6.1 Introduction:

In the past, Ghana (and most part of Africa) was not densely populated, so cultivators were able to use the land extensively by practising “shifting cultivation” or “slash and burn” system of farming which were sustainable in those conditions.

As the population in particular area increases and the cultivator cannot find more fertile land, the farming practices may be intensified and simple soil conservation and other techniques that can conserve and build up soil fertility may be practiced.

The main responses of most smallholder farmers seemed to be in the direction of shifting cultivation and the rate of change toward intensification appeared to be too slow to provide the needs of the increasing populations. Agricultural extension is an educational process that brings information and technology to farmers and teaches them how to use it to improve their productivity.

In this research, therefore, the farming systems practiced by migrant farmers in Awudome Traditional area and the farming activities they carried out were identified. These included their mode of land acquisition, average farm size and farming activities they performed. Secondly, the awareness of agricultural extension programmes and their effect on the migrant farmers were considered in terms of how often the farmers had contact with the extension agents, awareness of extension programmes, level of adoption of agricultural innovations and how extension programmes had affected the farming behaviour of the migrant farmers.

The programmes of agricultural extension, the contact of AEAs with their farmers, how they perceived the farming behaviours of migrant farmers, and their rate of adoption of recommended practices were also considered.

6.2 Summary of Findings

From the data presented and analysed, the major research findings were summarised as follows:

- All the respondents were subsistence farmers who practiced “shifting cultivation”.
Majority of the farmers interviewed acquired the land on which they farmed by either sharecropping or by renting.
- The average holding of the farmers was 0.85ha with the males having slightly bigger holding than the females.
- All the respondents were involved in food crop production. The main crops they cultivated were maize, cassava and yam. Some proportion of the farmers intercropped their main crops, especially, yam with vegetables, while some intercropped maize with cassava.
- All the respondents used hand tools such as hoe and cutlass in their farming activities. However, a few who cultivated groundnut employed the service of a tractor in their land preparation.
- The settler farmers depended heavily on family labour for their farming activities. Those who had bigger holdings sometimes used the services of hired labour in addition to their family labour. Some of the farmers also exchanged their labour by working in turns at their group members' farms.

A relatively high proportion of the farmers planted local or improved variety of seeds from the previous harvest. Only small proportion cultivated the improved variety of maize.

- Very few of the farmers planted their crops in lines and used the recommended spacing, however, a large proportion still planted their crops haphazardly.
- Most of the farmers also reared animals extensively and the animals mostly kept were poultry, goats and sheep.

All the respondents derived their cash income from their farming activities, however, some proportion also sold their labour to earn extra income.

A remarkably high proportion (66%) of the respondents had never heard or had any contact with extension programmes.

The farmers obtained their inputs by purchasing them from their personal savings.

- Among the various improved seeds introduced by extension programmes, only improved maize seed was adopted and cultivated by the farmers, but the adoption rate was low.
- The adoption and the use of agro-chemicals were low. As much as 77% of the farmers, had never used any agro-chemical before.

- The small proportions of the farmers who used agro-chemical had stopped using them because of their high cost.
- A significant proportion of the farmers had adopted planting in lines and the recommended spacing.

Most AEAs met their farmers regularly through contact farmers and farmers groups. They considered it more convenient than meeting with individual farmers.

A majority of the AEAs agreed that farmers preferred cultivating and using the local or unimproved seeds compared to the improved varieties.

To the AEAs, the extension practices most adopted by farmers were planting in lines, use of the recommended spacing, fertilizer and pesticide application. However, the adoption of weedicide and thinning out was low.

Majority of the AEAs had been working between 15 – 24 years and a significant proportion lived in the community in which they worked while the others lived outside their work communities.

A large proportion also used motorbikes to get to their target communities.

6.3 Discussion Of Findings:

6.3.1 Farming Systems:

The research findings showed that the migrant settlers were subsistence farmers. Most of them did not own the land on which they farmed, they acquired the land by share-cropping where they were given a piece of land by a landowner to farm and, in turn, had to give part of the crop they harvested to the landowner as rent. Usually, the farmer takes two parts while the landowner takes one. Some also made cash payment as rent

for their land use, and this ranged between ₵10,000 to ₵100,000. The other means by which the farmers acquired their land were by purchase, through marriage, from family heads, by inheritance and as a gift.

Even though some of the farmers were not satisfied with their mode of land acquisition, they continued to accept the conditions, as they did not have any alternative.

The farming system they adopted was “shifting cultivation”, where they cultivated a piece of land and when the fertility and crop yield declined, they moved to a more fertile land.

The size of holdings of the migrant farmers in the study area on average was about 0.85 ha per person. However, where crops were grown for sale, the area cultivated ranged between 1.0 and 3.2 ha.

It was also revealed that 69% of the farmers lived on holdings smaller than 1 ha, 27% on holdings of 1 and 2 ha and only 4% lived on holdings over 2 ha.

The bigger area cultivated by migrant farmers was as a result of low fertility of the land on which they farmed due to their exploitative land use practices, hence they needed to cultivate more land in order to obtain sufficient food.

For a sustained and increased productivity, these farmers needed to intensify their farming activities but because of insecure land tenure and relatively small holdings, they pursued land use practices that best met their family's immediate needs of food, shelter and cash.

6.3.2 Farming Activities of the Migrant Farmers:

The migrant farmers were subsistence farmers mainly involved in food crop production. The main crops they cultivated were maize, cassava, yam, groundnut, vegetables, rice and sugar cane. A majority of the farmers who cultivated maize intercropped it with cassava. The farmers who cultivated yam intercropped it with cassava and vegetables such as okro, tomatoes and pepper. A few of the farmers cultivated rice and sugar cane.

The farm produce, which the farmers normally sold were vegetables, yam, groundnut and sugarcane, while maize, cassava and rice were consumed. As subsistence farmers, what the family consumed regularly exceeded what was sold. From the data the farmers used 50 – 70% of their produce as food, 20 – 40% for sale and between 5 – 10% as reserve seed for planting the next season.

All the migrant farmers used hand tools such as hoe and cutlass in their farming activities. Only a small proportion (29%), which cultivated groundnut, employed the services of a tractor. They perceived its utility as reducing their labour and increasing productivity and thereby their profit margins.

As a result of the use of primitive tools, the migrants depended heavily on family labour (82%) in their activities. This also confirmed, the reason why they had large number of dependants, on the average 6. However, 67% of the farmers with bigger holdings (0.8 ha or more) employed the services of hired labour in their activities. Some (23%) teamed up with other farmers and worked in turns (exchange) in their various members' farms. Labour exchange and mutual support groups were common, both for the physical advantage of extra help on laborious tasks and the social pleasure of working together.

6.3.3 Type of Seed Cultivated and Mode of Cultivation:

A relatively high proportion of the farmers (86%) cultivated the local or unimproved seeds from the previous harvest. Out of these number, 46% seemed to have no knowledge or interest in improved variety of seeds; 44% of the farmers planted their crops haphazardly and considered planting in line as laborious and time wasting. Also, majority of the farmers (77%) had never used any agro-chemical on their farms.

The implications of a large number of respondents who did not know of improved seeds, planted their crops haphazardly and never used any agro-chemical on their farms indicated that the method of using contact farmers by AEAs did not helped in reaching out to the farmers. The contact farmers, it appeared, did not disseminate information on new knowledge to their counterparts as the method seeked to do.

Migrant farmers who kept animals seldom gave them supplementary feed. No adequate housing facilities were provided for the animals, most were left to roam in the villages. However, some farmers provided bamboo fencing and thatch hut for their goats and sheep, while palm frond was used to provide shelter for poultry.

All the animals kept were indigenous breeds, which were less productive and took a long time to mature. The farmers kept the animals as an insurance policy to be cashed in if there was need to purchase food or fulfil social obligations, as well as a source of egg and meat.

The migrant farmers got all their cash income from their farming activities. However, the farmers had less secured tenure and smallholdings, less farm equipment and owned fewer animals. When these could not support the family, they sold their own labour to

others to earn extra income; as such they were less likely to interact with extension agents in their fields.

6.3.4 Farmers Constraints:

Shortage of capital was a constraint to the migrant farmers. These farmers may be bypassed by formal credit systems because of lack of collateral (usually land title) and the subsistence nature of their farming operations.

Over 90% of the farmers interviewed said “lack of cash” kept them from using more improved varieties of seeds, agro-chemicals, labour saving implements and other inputs. Payment of wage labour also required cash, often at a time when low-resourced farmers were unlikely to have ready cash or access to credit.

Farmers who could not afford inputs and who could not pay for hired labour were less likely to be interested in extension activities, like-wise extension agents were less likely to target this group because of their inability to respond to recommendations to purchase inputs and additional labour.

Migrant farmers, because they could not access credit from formal financial institutions, resort to the sale of their produce soon after harvesting when there was a glut in the market. This resulted in low prices for their produce. They sometimes relied on informal credit systems, including traditional credit/savings societies such as “susu” collection, moneylenders, relatives and friends with exorbitant interest rates.

Migrant farmers were heavily dependent on rain-fed agriculture. However, one of the most difficult factors with which farmers must contend is rainfall variability. In the years that the rains were inadequate or poorly distributed, it resulted in severe reduction in crop

yield or crop failure. Irrigation could be used as a means of correcting soil moisture deficiency, however, this was not available in the migrant communities.

Seasonality of farm work also affected the productivity of migrant farmers. As a result of marked seasonality, there were peak labour demands for fairly short periods, followed by longer periods with lower demands. Under these conditions, with a relatively inelastic labour supply, migrant farmers found it difficult to increase their labour productivity. The large time-gap between the expenditure of effort or cash and the returns, often months or even years, was also a constraint to farmers.

Other constraints identified by migrant farmers included: Stem borer and weevil infestation of maize, expensive agro-chemicals, labour deficiency, infertile land and low prices of farm produce. These negatively affected adoption of techniques that involved raising credit.

6.3.5 Extension Contact:



The study showed that high proportion of the migrant farmers had never heard or had any contact with extension programmes, and only small proportion had contact with the programmes quite recently.

An interview with the extension agents however, revealed that, they had been meeting regularly with their farmers through their contact farmers.

The AEAs interviewed agreed that they preferred working with contact farmers and farmers groups than with individual farmers. These contact farmers they expected to help other farmers by transmitting knowledge gained from extension agents.

Contact farmers were supposed to be representative of farmers in their villages, but often, their problems and resources differ from many of the other farmers, as a result, do not communicate knowledge gained from extension agents to the other farmers. It was also evident that, farmers preferred to talk with other farmers who were similar to them in resource and social status. Migrant farmers had smallholdings and a large number of them were illiterates. This had affected the rates of diffusion of innovations among them. Also in their effort to get fertile land, migrant farmers, were scattered in small settlements, which were distant from one another. They were not organized into any groups; as such, agricultural knowledge could not be effectively communicated to them either by the extension agent or the contact farmer.

The operational areas, the AEAs contended, were too large. The operational area for each AEA was to be 20Km radius, however, there were 45 operational areas manned by 25 field agents instead of 45, due to lack of trained field extension agents. This could also contribute to the poor farmer - AEA contact. Most of the AEAs did not live in their target communities. Road infrastructure was lacking in most of the small and scattered holdings of migrant farmers, as such the extension agents were reluctant to work with such distant plots. These affected the level of awareness created by extension programmes.

Some of the farmers confirmed that they were having regular visits (once a week, once a fortnight or once a month) by their AEAs. These farmers may be the contact farmers who were supposed to pass information and resources about improved methods of farming from AEAs to other farmers. If they did, then their follower farmers found it difficult to understand the advice second-handed or they were not familiar enough with agricultural operations or crops to effectively transfer the information.

Some of the farmers who had had contact with the extension programme, especially those from Tsawenu and Avenui Camp, learnt some of the recommended practices from programmes organised by Awudome Project Demonstration Farm, Tsawenu, while others learnt by observing how others worked and discussed their farm experiences with their friends and neighbours.

6.3.6 Effects Of Extension Education:

Among the various seeds introduced by extension programme, the migrant farmers adopted only maize. Even this, the adoption rate was low. Majority of the farmers had never planted any of the improved seeds.

On the contrary, the AEAs asserted that farmers preferred improved variety of maize to the local variety. It seemed the AEAs measured their success with the few contact farmers they selected; therefore, majority of the farmers who should benefit from their services did not. Majority of the farmers therefore did not benefit from increased production, since they relied on their traditional methods of farming.

Also, most of the respondents had never used any agro-chemicals on their farms. Only small number had used fertilizer, weedicide and pesticides. These were farmers with above average size holdings and who had money to purchase these chemicals.

Another point was that, most of the migrant farmers were just a little above subsistence level and their low capital base made it impossible for them to be able to afford the recommended inputs which were expensive, even if they were aware of extension methods. Some of them may have never learnt how to use these inputs or were

unaware of high yield seed varieties, fertilizers, pesticides, weedcides, modern advice on spacing, planting dates and crop rotation.

Migrant farmers' access to agricultural extension and their ability to comprehend and use technical information was compromised by their lack of basic education. The impact of education on efficiency was likely to be particularly strong when modern as opposed to traditional agricultural techniques were being introduced. The presence of 38% with formal education from the Middle/Junior Secondary schools and above was a healthy sign for the adoption if AEAs would extend their services directly to all farmers.

The AEAs contended that the adoption of recommended practices by their contact farmers were high: planting in line, fertilizer, pesticide and weedicide, but thinning out was quite low. They said the farmers perceived improved seeds as having higher yields than the local varieties, while they saw no significant difference between palatability and market demand for improved and local varieties of maize. The farmers, however, contended that the cultural practices for improved varieties of seeds were too complex.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 SUMMARY OF FINDINGS:

The concern of this research was to find means of improving agricultural production in Ghana through a case study of extension education for migrant farmers in Awudome Communities. The study intended to find out the effectiveness of agricultural extension on the practices and methods of migrant farmers towards improved production.

The study sought to find out:

the level of awareness created by extension programmes; and
the extent to which migrant farmers were using innovations introduced by extension programmes for a sustained and increased agricultural productivity.

Attempt was also made to determine the extent to which migrant farmers were adopting:

- improved agricultural practices such as new varieties of crops, cultural practices, and
- use of agro-chemicals and other farm inputs.

The basic consideration of this research in finding answers to these questions were based on:

- the extent to which migrant farmers were aware of the innovations introduced by extension agent and using the innovations;
- how the change in practices and methods influencing their production;
 - some of the constraints faced in adopting innovations and what corrective measures to be taken in order to improve the programmes.

In order to provide answers to these questions, the researcher adopted a simple survey research method of the descriptive type.

From the presentation and analysis of the data, the major findings were:

All the respondents were subsistence farmers who practice “*shifting cultivation*”.

They acquired the land on which they farmed by sharecropping and renting, and used simple hand tools. The settlers depended heavily on family labour. However, those farmers with above average size holdings used the service of a hired labour.

A relatively large proportion of the farmers planted the local varieties of seeds haphazardly; and never used any agro-chemical in their farming activities.

The migrant farmers had no access to credit facilities and depended on their personal savings to purchase their inputs. As such, some sold their own labour as an additional source of income, while some sold their produce soon after harvest.

Remarkably high proportions of the migrant farmers were not aware of the existence of extension programmes and had never had any contact with the extension programmes, because of this, the adoption of innovations were very low.

On the contrary, extension agents asserted they had been meeting regularly with their farmers, but contended that they worked with contact farmers and farmers’ groups rather than individual farmers.

These contact farmers as pointed out by the extension agents, had high adoption rate of recommended practices.

Most of the extension agents did not live in their work community; this was thought to have affected the extension agent - farmer contact.

Some constraints of the farmers were identified as lack of credit; rainfall variability, seasonality of farm work, absence of extension agents in their communities, the high cost of farm inputs and low cost of farm produce. Because of these constraints, the migrant farmers were reluctant to practice and adopt improved practices, which could lead to sustainable and increased production.

7.2 Conclusion:

From the study, a large majority of the farmers were in their middle ages (30 – 54 years), their most productive age. The age at which, they can put their maximum into farming.

They acquired the land on which they farmed by sharecropping and rent. Even though most of the farmers were not satisfied with the condition of sharing of their crops and payment of rent on their land use, they persisted, because, they did not have any alternative means of acquiring a different land.

The migrant farmers depended on rain-fed agriculture and the farming system they adopted was "*shifting cultivation*" which does not sustain production or conserve the natural resources. They were mainly in food crop production, and their aim was to produce to meet their family's immediate needs of food, shelter and cash.

Migrant farmers lived in settlements that were geographically dispersed and remote, they had no access to basic amenities and services. In their farming activities, they used simple hand tools, unimproved seeds, while most of them never used any agro-chemical or other recommended inputs or practices on their farms.

Despite all these constraints, they produced enough food using their family labour to feed them and also sold the surplus to meet some of their other needs.

Extension was to help improve the living standards of rural people, by increasing their agricultural production through education. However, the research findings showed that the extension messages were not reaching a large majority of the farmers. Most of them were not aware of the existence of extension programmes, as such, had not had any contact with the extension agents. As a result, they continued to do things in their traditional farming ways.

However, some of the farmers, even though they have not had any contact with the extension programmes, had observed and discussed the improved practices and some inputs with their friends and neighbours who had been using them and also practiced them on their farms. Some of the farmers who have had contact with the programmes had adopted and were using the more productive inputs and practices. These showed their willingness to learn and improve their practices.

The study showed that a large majority of the farmers have not had any contact with extension programmes. It seemed the extension agents measured their success with the few contact farmers they selected and worked with, therefore majority of the farmers who should benefit from their services did not.

The level of education attained by the farmers was an indication that, they would have understood and used the improved practices and inputs if they had the information. The

implication of this is that, the method of contact farmers used by the extension agents seemed not to be an effective means of disseminating innovations to peasant farmers. This is because the information did not get to the majority of the farmers as intended.

Some of the problems identified by extension agents which they said hampered the smooth and efficient performance of their duty included: poor road infrastructure to the remote areas in the villages, unavailability of logistics at the right time, inaccessible agricultural credit, shifting cultivation, the farmers asked of credit facilities and inputs from them and the farmers did not respond to meetings, the operational areas of the extension agents were too large and most of the agents lived outside their target community. These they claimed reduced the farmer-to-agent ratio.

The major constraints identified by the migrant farmers that reduced their adoption of innovations included: lack of credit facilities, high cost of farm inputs and lack of extension agents to give advice on improved practices.

The study also revealed that extension services could be made sustainable by increasing the participation of farmers and their organisations in the management of research, training and extension activities.

In sum, even though extension education had been in place at the Awudome area, coverage and consequently the adoption of extension practices had been rather low among the migrant farmers since most of them were not reached by AEAs.

7.3 Recommendations:

1. The study revealed that working with groups rather than individual farmers would be more conducive to effective extension education. Farmers groups are attractive vehicle

for reaching farmers. It would reduce cost by increasing the total number of farmers reached, maximising farmer-to-agent ratios and decreasing time and expenses associated with travelling to individual farmers' fields. The group would also allow members to pool resources for production or collateral to obtain credit and other inputs; sharing expensive equipment, that individuals could not afford and help in the distribution of improved inputs and a collective voice to convey to extension officials the needs of farmers such as inputs to accompany the information being provided.

2. In communicating extension messages to the rural audiences, the mass media (radio & TV) are promising as adjuncts to, not as substitute for face-to-face extension. Attention, according to the study, should be paid to timing messages to coincide with agricultural operations. Also because of the lower level of education, migrant farmers may be less fluent in national languages and more comfortable with the local dialects; hence to maximise and bolster the potential change, the local language should be the best medium for communicating extension messages. They may also respond less to the written extension materials; hence oral or visual forms of communication may be used.

3. In modifying the T & V system to suit the socio-economic and administrative context of Ghana, and the implication of operating a "unified" extension system, that is, delivery of extension messages to farmers in many areas such as crops, livestock, agro-forestry and fisheries, as opposed to crop-specific services, the assumption should be that the extension's concerns should be congruent to farmer's concerns.

4. There is the need to give increased attention to research on hitherto neglected areas, especially on food crops such as yam, cassava, sweet potato, cocoyam (which were perceived as no problem in the past), inter-cropping and natural resource management.
5. For sustained and improved productivity it is necessary to include advice regarding the management of soil and water conservation at farm level in extension messages.
6. Improved seeds and agro-chemicals of the right type and packaged in appropriate small bags or containers and other inputs must be available everywhere.

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APPENDIX A

QUESTIONNAIRE FOR AGRICULTURAL EXTENSION AGENTS

INTRODUCTION

This is an attempt to find means of improving agricultural production in Ghana.

I therefore wish to have your personal views on extension education for farmers, and kindly request that you answer the following questions as frankly as possible.

I wish to assure you that any information given will be treated as confidential.

A. DEMOGRAPHIC CHARACTERISTICS

1. Sex of respondent
 - i. Female ()
 - ii. Male ()

2. Age of respondent
 1. 15 – 19 ()
 2. 20 – 24 ()
 3. 25 – 29 ()
 4. 30 – 34 ()
 5. 35 – 39 ()
 6. 40 – 44 ()
 7. 45 – 49 ()
 8. 50 – 54 ()
 9. 55 – 59 ()
 10. 60 years and above ()

3. Marital Status
 1. Married ()
 2. Divorced ()
 3. Separated ()
 4. Widowed ()
 5. Single ()

4. Please indicate your highest academic qualification by coding the appropriate code.

1. MSLC ()	5. Diploma (Agric) ()
2. G.C.E. 'O' Level ()	6. Degree (Agric) ()
3. G.C.E. 'A' Level ()	7. Others (specify)
4. Post Secondary (Agric) ()	

5. How long have you been employed as an agricultural extension agent (AEA)?

6. What official duty do you perform other than being an extension agent?

.....

7. What language(s) do you speak?

B. EXTENSION CONTACT

8. How do you meet your farmers?

1. Individual contacts ()
2. Through contact farmers ()
3. Through farmers association (groups) ()

- 9a. Do farmers come to seek information from you?

1. Yes ()
2. No. ()

- 9b. If yes, how often?

1. Once a week ()
2. Twice a week ()
3. Once a fortnight ()
4. Not applicable ()
5. Other (Specify)

10. How often do you visit individual farmers?

1. Once a week ()
2. Once a month ()
3. Once every 2 weeks ()
4. Once every 3 months ()
5. Twice a year ()
6. Once a year ()
7. No visit ()
8. Other (Specify)

- 11a. Do you consider it more convenient working with contact farmers than with individual farmers?

1. Yes ()
2. No. ()

- 11b. If yes, why?

- 11c. If no, why?

12. On what type of farming do you usually give advice or assistance?

1. Food crops ()
2. Cash crops ()
3. Vegetables ()
4. Animals/Poultry Farm ()
5. Combination of types ()

13. How far away do you live from your target Community?

.....

14. How do you get to your target Community to work?

1. On foot ()
2. By Bicycle ()
3. Motorcycle ()
4. Private/Commercial Vehicle ()
5. Others (Specify)

15. How often do you attend extension staff meetings?

- | | |
|-------------------------|-------------------------|
| 1. Weekly () | 5. Once in 3 months () |
| 2. Once a month () | 6. Once a year () |
| 3. Once in 2 months () | 7. Twice a year () |
| 4. Twice a month () | |

16. Have you attended any course(s) since your appointment as an AEA?

1. Yes ()
2. No ()

b. If yes, please list the course(s) you have attended

Course:

Date:

C. EXTENSION PRACTICES

17. In your opinion, which variety of seed do the farmers most want to cultivate?

1. Local Variety ()
2. Improved Variety (ies) ()

18. How do the farmers perceive the improved seeds as compared to the local ones?

1. Higher yield ()
2. The same yield ()
3. Lower yield ()
4. More palatable ()
5. The same taste ()
6. Higher market demand ()
7. The same market demand ()
8. Lower market demand ()

19. Which of these ideas and practices introduced by extension programmes have the farmers adopted?

- | | | |
|----|---------------------------|-----|
| 1. | Planting in line | () |
| 2. | Spacing | () |
| 3. | Thinning out | () |
| 4. | Application of fertilizer | () |
| 5. | Use of pesticides | () |
| 6. | Use of weedicides | () |

20. Which of the farm practices recommended by extension did the farmers find difficult to practice and why?

- i.
- ii.

21. What problems do you face as an AEA when performing your duties?

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22. In what ways do you think agricultural extension programmes can be improved to make it more effective?

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19. Which of these ideas and practices introduced by extension programmes have the farmers adopted?

1. Planting in line ()
2. Spacing ()
3. Thinning out ()
4. Application of fertilizer ()
5. Use of pesticides ()
6. Use of weedicides ()

20. Which of the farm practices recommended by extension did the farmers find difficult to practice and why?

- i.
- ii.

21. What problems do you face as an AEA when performing your duties?

.....

22. In what ways do you think agricultural extension programmes can be improved to make it more effective?

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APPENDIX B

INTERVIEW SCHEDULE FOR MIGRANT FARMERS

A. DEMOGRAPHIC CHARACTERISTICS

1. Sex of respondent
 1. Female ()
 2. Male ()
2. Age of respondent
 1. 15 – 19 ()
 2. 20 – 24 ()
 3. 25 – 29 ()
 4. 30 – 34 ()
 5. 35 – 39 ()
 6. 40 – 44 ()
 7. 45 – 49 ()
 8. 50 – 54 ()
 9. 55 – 59 ()
 10. 60 years and above. ()
3. Marital Status
 1. Married ()
 2. Divorced ()
 3. Separated ()
 4. Widowed ()
 5. Single ()
4. Number of children
Code actual number (e.g. 1,2,3, etc)
5. Number of other dependants
Code actual number (e.g. 1,2,3, etc)
6. Where is your place of birth?
Name:
Rural:
Urban:
7. Which is your usual place of residence?
Name:
Rural:
Urban:
8. How long have you been here?

9a. Did you attend School?

1. Yes () 2. No ()

9b. If yes, what level of education did you attain?

1. Incomplete Primary ()
2. Completed Primary ()
3. Completed Middle School/JSS ()
4. Incomplete Secondary ()
5. Completed Secondary ()
6. Technical/Vocational (Non-formal) ()
7. Technical/Vocational (formal) ()
8. Other, specify e.g. functional literacy

10. If you attended functional literacy classes, how long did you stay at the classes?

Code actual number of years e.g. 1,2,3, etc.

11a. Do you own the land on which you farm?

1. Yes () 2. No ()

11b. If yes, how did you acquire the land?

1. By purchase ()
2. By inheritance ()
3. Gift ()
4. Other (specify)

11c. If no, how did you acquire your land for farming?

1. From family Head ()
2. By rent ()
3. Share-cropping ()
4. Through marriage ()
5. Other (please specify)

12. Would you face any difficulties if you had to acquire more land to expand your farm?

1. Yes, explain why

2. No, explain why not

13. As a settler, how much do you have to pay as rent for the use of land

.....

14. Do you consider this rent on land as:
1. Satisfactory? ()
 2. Unsatisfactory? ()

Give reason?

B: FARMING ACTIVITIES

15. Please, how long have you been farming?
Code actual number (e.g. 10 years, 15 years, etc.)

16. What is the estimated size of your farm?

17. What crop(s) do you grow (mention name)
1. Food crop ()
 2. Cash crop ()
 3. Vegetable ()
 4. Other (Specify)

18. What kind of land preparation activities do you perform before planting?

Operation	Date*	Method**	Labour***
1. *First part ()		**H-Hoe ()	***F-Family ()
2. Middle ()		C-Cutlass ()	E-Exchange ()
3. End ()		T-Tractor ()	H-Hire ()

(Can check more than one)

19. What were all the activities that you performed in relation to planting?

Operation	Date*	Method**	Labour***	Planting****
1. *First part ()		**Hoe ()	***F-Family ()	****Ha-Haphazardl ()
2. Middle ()		Cutlass ()	E-Exchange ()	L-Line ()
3. End ()		T-Tractor ()	H-Hire ()	B-Broadcast ()

20. What type of seed did you plant?

Type of seed*	Source of seed**
*L-Local Variety ()	**F-Own Farm ()
I-Improved Variety ()	N-Neighbour ()
	E-Extension ()

21. What other crops(s) were planted with the major crop? (throughout the field)
.....
22. Among the following three uses, what proportion of your farm produce do you use for:
1. Food(%)
 2. Seed on the farm(%)
 3. Sale(%)
23. What problems do you have in crop production? (In each case specify. The type of crop and variety that has this problem)
1. Poor germination
 2. Disease (describe).....
 3. Pest control.....
 4. Purchase and use of crop-chemicals.....
 5. Insufficient seed/ seedlings.....
 6. Farm labour.....
 7. Poor yield.....
 8. Harvesting and storage.....
 9. Land for expansion.....
 10. Lack of market
 11. Other (specify).....
24. Do you rear animals?
1. Yes ()
 2. No ()
- b. If yes, what type and how many?
1. Cattle ()
 2. Sheep ()
 3. Goat ()
 4. Pig ()
 5. Poultry ()
 6. Other (specify).....
25. How do you feed your animals during the dry season?
26. What type of housing do you provide for your animals?
27. Does the cash income your family earns come more from
1. Farming (crop and animals)? ()
 2. Off-farm work (Specify) ()

C. EXTENSION CONTACT

28a. Is the AEA a regular visitor to your community?

1. Yes ()
2. No ()

b. If yes, how often?

1. Once a week ()
2. Once a fortnight ()
3. Once a month ()
4. Not at all ()

39. How often does the AEA come and visit your farm?

1. Once a week ()
2. Once a fortnight ()
3. Once a month ()
4. Not at all ()

30. a. Have you ever participated in any extension activity/activities?

1. Yes ()
2. No ()

b. If yes, which of these extension activities do you personally participate in?

1. Farm visit/ field trips ()
2. Demonstration classes ()
3. Workshops ()
4. Film shows ()
5. None of these ()

c. If no, why not?

31. In which language does the AEA speak to you?

1. Ewe ()
2. Twi ()
3. English ()
4. Other, (Specify)

32. How do you obtain the recommended inputs for use on your farm?

1. Purchase ()
2. Credit ()
3. Gift ()
4. None of these ()
5. Other (specify)

33. If you had to buy inputs, how did you raise funds for them?
1. Personal savings ()
 2. Bank loans ()
 3. Loan from friends/relatives ()
 4. Loan from money lenders ()
 5. Other, (please specify)
-

D. EFFECT OF AN EXTENSION EDUCATION

34. Which of the improved seeds introduced by extension programme did you ever cultivate on your farm?
35. If you had never used any of the improved seeds, state the reason why?
36. Which of the agro-chemicals did you ever use on your farm?
- | | | | |
|---------------|-----|------------------|-----|
| 1. Fertilizer | () | 3. Weedicide | () |
| 2. Pesticide | () | 4. None of these | () |
37. a. Which of them have you stopped using?
- b. Why did you stop using it/them?
38. If you had not used any of the agro-chemicals stated below, state why.
1. Fertilizer:
 2. Pesticide:
 3. Weedicide:
39. a. Which of the new techniques did you ever practice on your farm?
1. Spacing ()
 2. Thinning out ()
 3. Planting in lines ()
 4. None of these ()
- b. Which of them have you stopped practising if you ever used any?
-

c. Why have you stopped practising it/them?

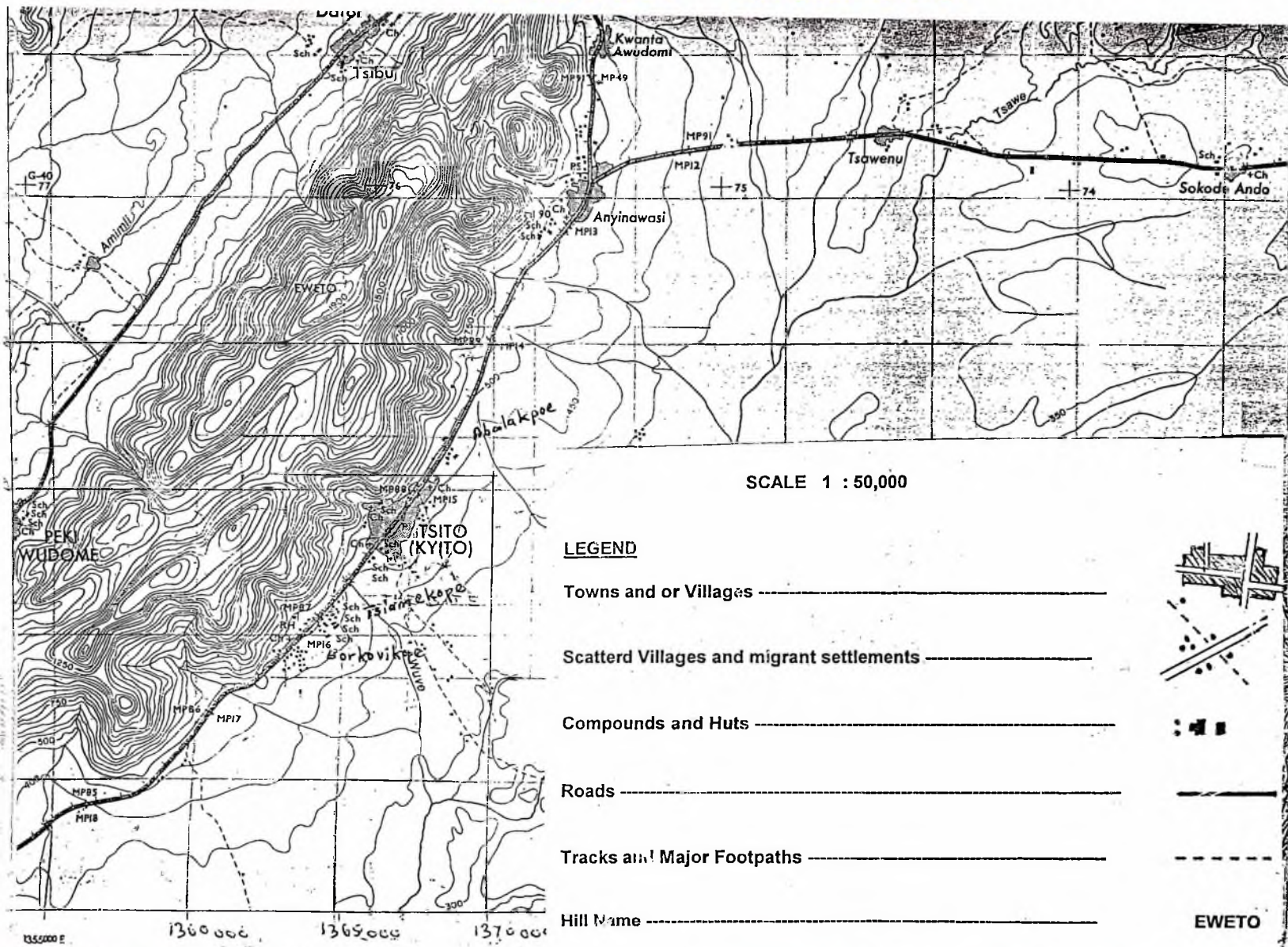
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40. If you had never practised any of the techniques stated below, can you say why?

1. Spacing
2. Planting in line
3. Thinning out

41. In what ways do you think extension programmes can be improved so as to help you better in your farming activities?

.....



APPENDIX C

MAP SHOWING MIGRANT SETTLEMENTS IN AWUDOME COMMUNITIES

