A STUDY OF FARM INPUT SUPPLY IN THE WEST GONJA DISTRICT: IMPLICATIONS FOR SMALLHOLDER DEVELOPMENT

A Thesis Submitted to the Board of Postgraduate Studies, University of science and Technology Kumasi, in partial fulfilment of the requirements for the degree of Master of Science in Development Planning and Management

By

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JULY, 1990

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V I T A

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ABSTRACT

The population of the West Gonja District is increasing at an annual rate of 4.2 percent while agricultural productivity is rather very low. To be able to feed the present and the future population, agricultural production, especially food crops production must increase at an appricable rate. The farmers who will increase agricultural production are mainly smallholders (over 80 percent) who continue to employ traditional technology in farming. This prompted the present study which seeks to investigate the circumstances of the smallholders in relation to the availability and use of improved farm inputs especially fertilizers which increase agricultural productivity several fold, all other condition being suitable.

Literature is cited on some theories and practice of input supplies.. Examples of farm input supplies as practiced both in Ghana and elsewhere are also cited.

A conceptual framework is also advanced to give some support to the examples of experiences cited and to throw some light on the various factors affecting inputs supplies. The need for an effective supply system for agricultural inputs is also highlighted.

Data for the study were collected from both secondary and primary sources. The secondary sources included mainly library research. Primary data were collected by administering interviews schedules in a Smallholder Household Survey in four settlements: Damongo, Buipe, Daboya and Mpaha. Officials of the Ministry of Agriculture and Parastatals as well

as private companies involved in farm input supply were also interviewed.

The analysis of data gathered is based on the socio-economic characteristics of smallholder farmers which are likely to influence their adoption of improved technology. Factors such as transportation and warehousing and other social and technical infrasturcture which are likely to affect input distribution, as well as government agricultural policies are also analysed and their implication noted.

Major findings from the analysis and their implications for smallholder development are also given.

Based on the major findings and implications, recommendations are offered for the development of smallholder farming in particular and agriculture as a whole in the West Gonja District and Ghana in general.

Conclusions are drawn from these and the need for future research into the farm input supply system echoed.

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1.0 INTRODUCTION

1.1 GENERAL INTRODUCTION

Agriculture, including forestry, in the past, accounted for about 57% of Gross Domestic Product (GDP), close to 80% of merchandise exports, and employed 55% of the labour force. About 70% of the population (8.5 million) live in rural areas. In every respect therefore, agriculture is the "prime-mover" of the Ghanaian economy; and it is in the agricultural sector that the battle for long-term economic growth and development will be won or lost.[1]

Ghana has, however, failed over the years to develop her agricultural sector both in food and cash crop production. This can be attributed to: the massive shift of resources from agriculture through taxation and negative pricing policies, the neglect of the smallholder in resource allocation, technological and institutional weaknesses, and lip-service paid to agriculture by successive governments.

Before 1984 the development of Ghana into a solid agricultural nation capable of feeding herself and exporting her surpluses suffered as a result of a general decline in Ghana's economy. Gross Domestic Product (GDP) declined by 0.5% per annum between 1970 and 1982. Real per capita income fell by 30%, import volumes fell by 65% real export earnings declined by 52%, falling from 21% of GDP in 1970 to 4% in 1982. The consumer price index increased by 80% per annum between 1975 and 1982, and by 122% in 1983. Population growth rate on the other hand averaged 2.6% per annum between 1970 and 1984. The population in 1984 was 12.2 million and per capita GNP was about US $320.[2]

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[1] Government of Ghana (GOG); Government Statement of Agricultural Policy, 1987, Accra.

[2] Government of Ghana (GOG); Government Statement of Agricultural Policy; 1987, Accra.

The general decline in the Ghanaian economy was caused among other things, by inappropriate and unco-ordinated economic policies, outmoded institutions and unworkable procedures. The inappropriate policy include inter alia, the maintenance of grossly overvalued exchange rate, quantitative import institutions which protected non-competitive systems of industrial and agricultural production, excessive taxation of exports resulting in reduced production and foreign exchange earnings, maintenance of low product prices through subsidies for the benefit of urban consumers resulting in a marked decrease in domestic production, and the unco-ordinated fashion in which research, extension and other institutions pursued their narrowly defined objectives.

Being predominantly agrarian the economy of Ghana has the best opportunities for long term growth and sustainability in the agricultural sector. Inappropriate pricing policies, infrastructural deterioration, drought, and most importantly erratic supply of inputs especially fertilizers, have led to domestic food shortages and the decline of export crops.

Agriculture in Ghana is primary rainfed, most farmers are smallholders (90%) and productivity is generally low. Agricultural production is particularly risky and the task of reaching several small farmers with improved techniques and inputs is of paramount importance to agriculture's development. Most smallholder's practice shifting cultivation. However, in the more densely populated areas permanent cultivation has to be adopted and maintenance of soil fertility is of particular concern. In the long term, the pressure on land will intensify as the country's population is growing at a rate of 3% per annum. This calls for the application of improved technologies especially fetilizers application which improves soil nutrient supply and has been found to be the main input for increased crop production.

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Lack of adequate fertilizers, which is a key input for increased crop production constitutes a major constraint in achieving the Government's declared objective of becoming self-sufficient in the production of food crops and some industrial and export crops. Fertilizer supply operations have thus become paramount in national agricultural policies in a bid to increase agricultural production.

1.2 PROBLEM STATEMENT

Increasing food production has been a major preoccupation of most countries, especially the developing countries where population increases far outweigh increased agricultural production. To increase agricultural production entails changes in the ways that production is carried out at the present time. New information is needed. New information in the form of technology and procedures is usually generated through deliberate research. These new ideas get to the farmers through various information channels. If these new ideas are considered, accepted, and adopted by the farmers, it is assumed that the result will be increased agricultural production or new improved farming methods.

Agriculture in Ghana is dominated by smallholder farmers. It is primarily rainfed, with low yields characteristic of traditional techniques. Population is increasing at a rate of about 3% per annum (1984 population consus), intensifying the pressure on land. Government's development goal is to improve productivity by promoting widespread adoption of modern techniques and use of related inputs and by improving marketing infrastructure.[3]

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[3] GOG; Government Statement of Agricultural Policy; 1987, Accra.

The economy of the West Gonja dristict, like the rest of Ghana is predominantly agrarian. Even more people (62%) in West Gonja depend on agriculture for their livelihood as compared to the northern region (60%) and the nation (55%). This state of affairs can be attributed to several factors. The remoteness of the district from other centres of innovation, the unavailability of markets for industrial and other products and the poor state of development of the district are responsible.

Inspite of its importance agricultural practice is still largely traditional. But since agricultural policy in Ghana is centralized the sector has not received the policy and institutional support it needs for sustained development. Inappropriate pricing policies, infrastructural deterioration, drought and most importantly erratic supply of inputs for increased crop production constitute a major constraint in achieving the Government's declared objective of self-sufficienty in the production of food crops especially grains.

In West Gonja, agriculture is primarily rainfed, most producers are aged, illiterate, smallholders (about 90%), and using traditional tools such as hoes and cutlasses. This has resulted in generally low productivity of land and labour.

Agricultural production is particularly risky especially on the part of smallholders (1.1 ha.) who produce about 95% of the food.

The task of reaching several smallholders with improved techniques and inputs is of paramount importance to agricultural and for that matter smallholder development. Only 15% of the cultivable land is actually cultivated and there is virtually no irrigation practice while rainfall is erratic. Most smallholders practice shifting cultivation and mixed cropping is the most common response to reducing risks of rainfed agriculture. In the more densely popu-

lated areas around Damongo however, a more permanent cultivation needs to be adopted and soil fertility is of particular concern. In the long term, the pressure on land will intensify as the population of the area continues to grow at a rate of about 3.6% per annum as against the national rate of 3% per annum.

Savannah soils, as exist in the district, are poor in organic matter and nutrients are especially susceptible to deterioration. This has been the result of increased firewood requirements and extensive burning, leading to the reduction of the already scattered tree population. Soil erosion is thus favoured and the contribution of humous to soil fertility is reduced.

Pests and diseases are a major cause of low productivity but farmers are reluctant to use pesticides because of various reasons.

All these problems causing low productivity call for the introduction and use of improved technologies and of inputs such as fertilizers, improved seeds, persticides, water, adequate labour, farmer education among others, for increased agricultural productivity. There are also post harvest losses in storage which further reduce smallholders volume of marketable produce.

The non-use of improved technology by smallholders is attributable to several factors. Farmers lack of knowledge, unavailability, untimely availability and high costs among others have been some of these reasons.

Input supply for all agricultural inputs except fertilizer, is largely privatised. The supply of improved seeds is handled by parastatals - Ghana Seed Company (now defunct) and the Grains Development Board.

The Ministry of Agriculture is the sole importer, distributer, and retailer of fertilizers. There is no local production. In the

Upper Region and Volta Region Government controlled FASCOMS have assumed the role of transportation, warehousing and distribution of fertilizers. The Government has not been able to manage timely deliveries, owing to poor assessment of demand, delays in procurement, slow discharge at port, poor road communications unsuitable and inadequate storage facilities and deficient management. Inappropriate types are frequently imported. Fertilizer is sold at a uniform national price incorporating subsidies which cost the Government.

The case of West Gonja is even worse. The Ministry of Agriculture collects fertilizer from Buipe port for direct distribution to zonal and sub-zonal MOA offices. Only Damongo, Buipe, Busumu, Daboya and Fufulsa have fertilizer depots. Except Damongo the rest of the depots are makeshift structures which cannot keep fertilizer in good condition for any period. Besides the sales points are insufficient considering the size of the district and scattered settlement structure.

Fertilizer sales in the zones and the sub-zones are done by the respective agricultural extension officers. Proceeds from fertilizer sales are often misused by these local sales officers instead of paying to the district MOA office. The scattered nature of settlements and absence of banks in the area add to this problem. The scattered settlement structure and the very poor state of roads and the absence of these in most of the district makes it impossible to reach most smallholders with fertilizers. Farmers who want to use fertilizers have to travel several kilometres to purchase it. Sometimes they spend days looking for fertilizers because they get to the sales outlet only to find out that the agricultural extension officer, a typical civil servant, has closed the depot. The stranger farmer has no alternative than to spend the night at the sales outlet village and if he is unlucky he may be told the next day that there is no fertilizer.

These culminate in waste of time and money and frustrates small holders who are already poor. In his frustration the smallholder may decide not to apply fertilizer at all or just reduce the size of his operation. Even if the smallholder gets the fertilizers he still incurs huge sums of money on transport which makes the price of a bag of fertilizer more expensive in West Gonja than it should be. Smallholders in Daboya and to a lesser extent Mpaha pay transport charges amounting to about 60% of the price of a bag of fertilizer.

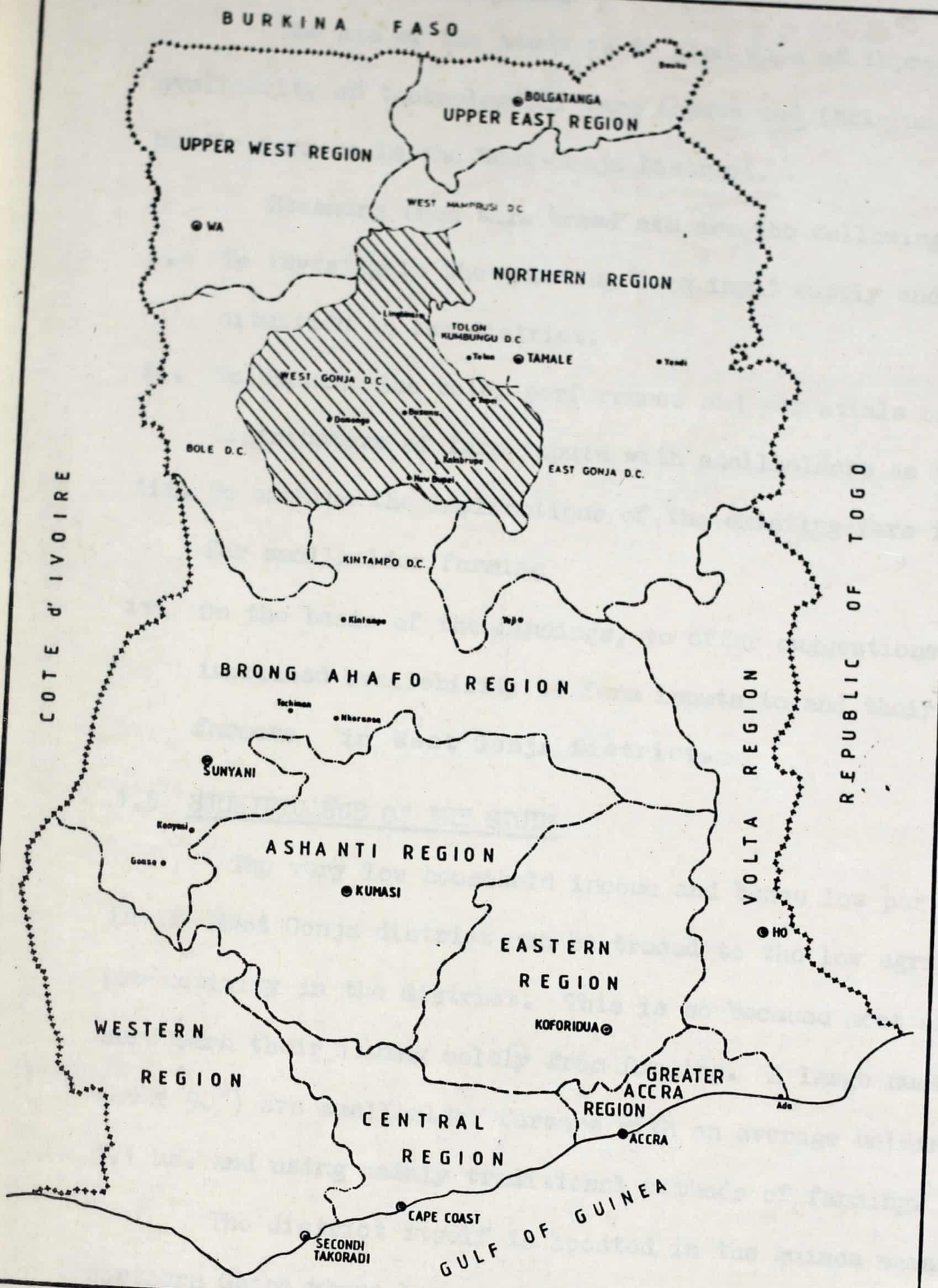
Added to this could be the low level of education of most smallholders in the district. This could affect the rate of diffusion of innovation in the area. Wrong application times and rates are also problems of illiteracy.

Other inputs like improved seeds and agrochemicals have no sales outlets in the district except seeds given to the few Global 2000 farmers in form of input loans. Most smallholders depend on the market or their own harvest for planting material.

The study therefore seeks to find out the implications of these problems of inputs distribution and use for smallholder farming and development and to make certain recommendations aimed at improving the lot of the smallholders in their use of farm inputs to increase their yields and ultimately their standard of living.

1.3 DELINEATION OF THE STUDY AREA

The study area is referred to as the West Gonja District. It is one of thirteen (13) district of the Northern Region of Ghana. It is an administrative district with an area of about 15,250 square kilometres. It borders the Brong-Ahafo Region to the south, Bole District to the west, Upper-West Region to the north-west, Walewale District to the north and Tolon and East Gonja Districts in the east. The position of the district is between $2^{\circ}\ 3^{1}$ and $1^{\circ}\ 30^{1}$ West and 8° and 10° North. Map 1 shows the district in the regional and national context.



SPRING 1989/90 WEST GONJA DISTRICT STUDY

WEST GONJA DISTRICT IN REGIONAL & NATIONAL CONTEXT

MAP NUMBER 1

1.4 OBJECTIVES OF THE STUDY

The aim of the study is to find ways of improving the availabilty of technological farm inputs and their use by smallholdor farmers in the West Gonja District.

Stemming from this broad aim are the following objectives:

i. To investigate the existing farm input supply and distribution situation in the district.

ii. To examine the role, performance and potentials of various distributors of farm inputs with smallholders as the target group.

iii. To examine the implications of the existing farm input supply for smallholder farming

iv. On the basis of the findings, to offer suggestions to ensure increased availability of farm inputs to and their use by smallholder farmers in West Gonja District.

1.5 SIGNIFICANCE OF THE STUDY

The very low household income and hence low per capita income in the West Gonja district can be traced to the low agricultural productivity in the district. This is so because most of the people here earn their living solely from farming. A large number of these (over 90%) are smallholder farmers with an average holding size of 1.1 ha. and using mainly traditional methods of farming.

The district itself is located in the guinea savannah of northern Ghana where because of low inherent soil fertility more fertilizer is used by farmers to increase crop yields than any part of the country. Relatively, however, the soils in the district are more fertile on the average than in other areas of the north. The return on farm inputs is likely to be higher than in other areas.[4]

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[4] Schmidt, G., Mercer-Quarshie, H. et al; (Nyankpala Agricultural Research Report - Annual Report 1987/88 p.60).

To improve the per capita income situation therefore has the best chances of succeeding through increased agricultural productivity by smallholder farmers. The low productivity of farm labour, land and other resources in agriculture is largely due to the lack of certain complementary inputs of technological, educational and institutional-organizational nature and also to the traditional nature of farming.

The scattered nature of settlements and their rather low accessibility suggest a very low level of integration and articulation of services.

Under these circumstances, a crucial requirement for devising an appropriate agricultural development policy is to identify these complementary inputs, determine in what proportions they should be combined and establish priorities among programmes designed to increase their availability.

This study hopes to contribute to ideas and measures by which technological inputs especially fertilizers can be made more available to smallholder farmers. It would also increase farmers knowledge of the importance and use of these inputs.

All this would culminate in improved transportation and marketing of both farm inputs and produce. This would lead to higher farm productivity and hence, higher farm incomes. As a result more smallholders would be able to meet their tax and development levy commitments, and to buy what manufactured goods they desire for themselves and their families and even save some money. Savings can then be used to expand production and accelerate rural development through higher investments in agriculture and the rural sector in general. This would lead to improved living conditions of smallholder farmers and for that matter the people of West Gonja since the small - holders form the bulk of the workers in the district.

1.6 SCOPE OF THE STUDY

Small holder farmers and officials of the Ministry of Agriculture in Tamale and the district were the main focus of the study. Information gathered from other organizations was mainly used for verifying the data generated from smallholder farmers. However, information gathered from suppliers of other farm inputs was only used as a supplement. Hence, there was a brief treatment of supply and distribution aspects of seeds, agrochemicals and farm tools and implements.

Fertilizer was used as the case input because it is the major improved input used by smallholders in the district and in the country. The main issue in input supply in Ghana centres around fertilizer importation and distribution. The term 'farm inputs' was used to mean inputs for crop farming.

The study was limited to four settlements in the district: Damango, Buipe, Daboya and Mpaha. Except Mpaha, these are the zonal centres of the three agricultural extension zones in the district. Mpaha was included to compare its situation in input supply to that of the zonal centres. (See Map 2 and Figure 1).

1.7 RESEARCH METHODOLOGY

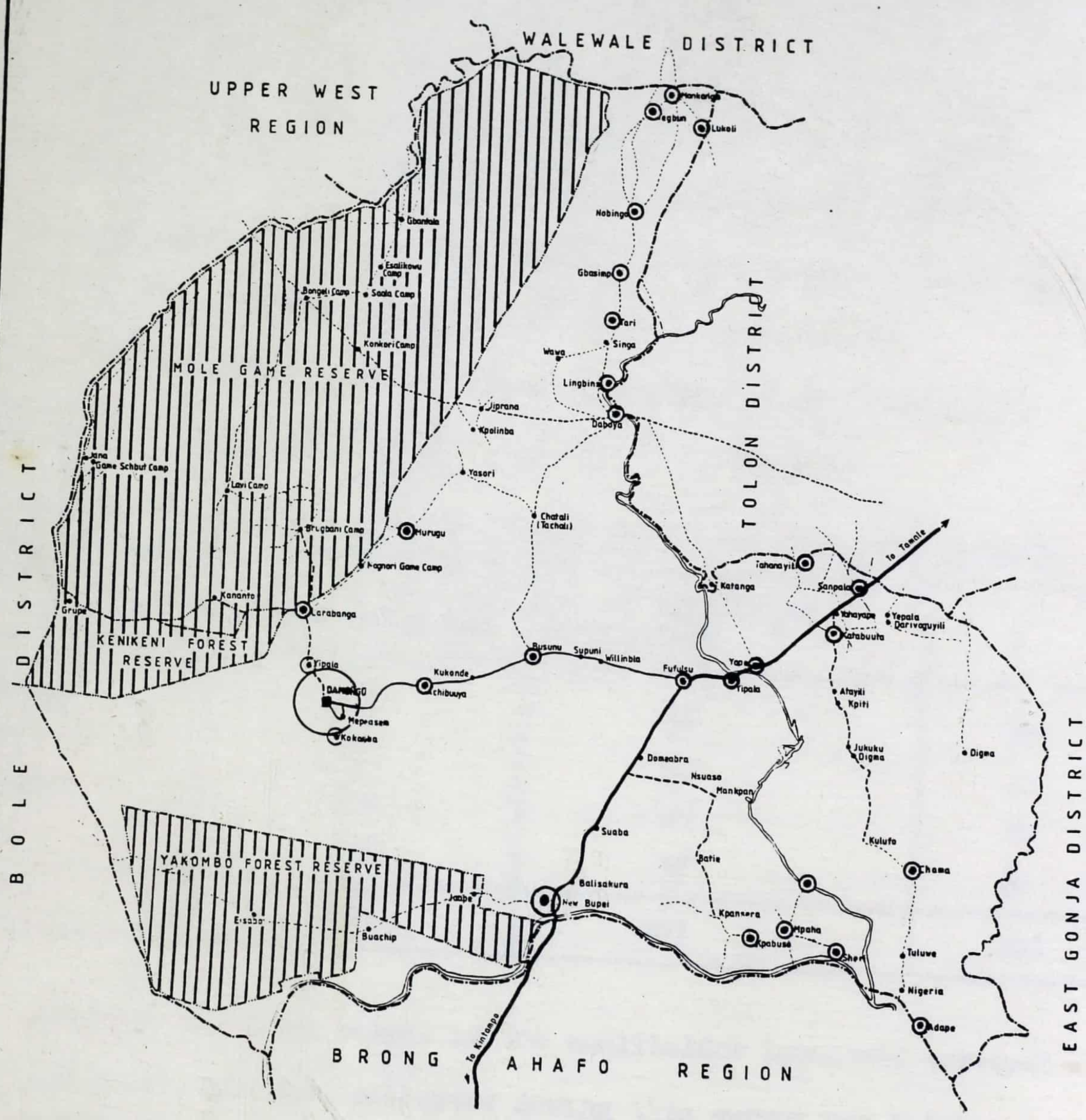
Data for this study were collected from four principal sources: field surveys, secondary sources, consultations and the Development Workshop Field Survey Reports (SPRING II, 1989/90).

i. Secondary Sources

Before and after the field investigations, existing available literature on the issue was examined. The sources included libraries at the University of Science and Technology and publications of the Ministry of Agriculture and similar organisations. This provided useful baseline information on the topic.

11. Field Surveys

Field studies into the use of farm inputs (mainly fertilizer) by smallholder farmers in the West Gonja district and the fertilizer distribution system were undertaken



SPRING 1989/90

WEST GONJA DISTRICT STUDY

EXISTING SETTLEMENT HIER

Discussions were held with personnel of the NOA, Damongo, Bupe and Daboya and those in Tamale since the NOA was the sole importer and distributor of fertilizers.

ii. Field Surveys

Field studies into the use of farm inputs (mainly fertilizer) by smallholder farmers in the West Gonja district and the fertilizer distribution system were undertaken in the three agricultural zones (Damongo, Buipe and Daboya) and Mpaha, a sub-zone. Smallholder household surveys were conducted in these settlements (above Map 2). These settlements constituted about 32% sample of the total population of the district. An attempt was made to interview 10% sample of the total number of smallholder households in each settlement. This was based on an advice by the district agricultural extension officer on the Ministry of Agriculture's own samples for target smallholders in the various settlements.

The following are the numbers of smallholder families in the settlements sampled by the Ministry of Agriculture:

TABLE 1.1 SETTLEMENTS SAMPLED SHOWING NUMBER OF CONTACT HOUSEHOLDS

SETTLEMENT	NO. OF HOH CONTACT HOUSEHOLD	NO. OF HOUSEHOLDS INTERVIEWED	%
Damango	500	50	10
Buipe	200	20	10
Daboya	250	25	10
Mpaha	120	12	10
TOTAL	1,070	107	10%

Although the total sample of the smallholder household surveyed was small, the data collected during this survey was fairly representative because of the homogeneous nature of the farming communities in this area.

iii. Consultations and Interviews

Guided interviews were held with personnel of the MOA, Damongo, Buipe and Daboya and those in Tamale since the MOA was the sole importer and distributor of fertilizers.

Other organisations interviewed included:

'(a) Farmers Services Company (FASCOM) - Upper Regions. This company will as from the 1990 cropping season takeover the distribution of farm inputs (Fertilizer) from the MOA in the northern region. The company now has a representative in Damongo.

(b) Tamale Implements Factory - Manufacturers of agricultural implements.

(c) Ghana National Trading Company (GNTC), Tamale. The Pharmaceutical Division deals in agrochemicals supplied by Tema Chemical Company.

(d) Reiss and Company - agrochemicals,

(d) SAKABIO - agrochemicals

iv. The Development Workshop Field Survey Report (SPRING II, 1989/90) was very useful source of information.

1.8' OPERATIONAL DEFINITION OF KEY CONCEPTS

i. Smallholder Farmer

The smallholder farmer, here is used interchangeably with the term small-scale farmer as a smallholder planting an area of about two to eight acres (0.8 - 3.2 hectares) frequently divided into small and sometimes scattered plots. He uses his own labour and sometimes supplements it with that of his family. He may on occassion, hire labour to assist his efforts. He is mostly a subsistence producer and only a small portion of his produce finds its own into the market.[5]

This definition is adopted in this study. In this context, smallholders use rudimentary implements such as hoe and cutlass, and

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[5] Morgan, W.B. "Peasant Agriculture in Tropical Africa", in Environment and Land Use in Tropical Africa by M.F. Thomas and G.M. Whittington, 1969 (Metumon and Company Ltd. p. 243.)

occassionally, the hiring of a tractor and grow food crops such as maize, yam, cassava, guinea corn, millet among others.

The MOA in the Northern Region defines the smallholder as a small-scale farmer who cultivates not more than 5 acres (2 ha.). This definition falls within Morgan's limit and this is adopted in this study since the study area is in the Northern Region.

ii. Farm Inputs

This refers to manufactured physical inputs used by farmers in the production of crops. In this study it refers mainly to fertilizer.

1.9 LIMITATION OF THE STUDY

i. Some respondents were skeptical about the purpose of the study and regarded it as tax evasion and other socio-economic malpractices. They therefore did not co-operate.

ii. Budgetary constraints and short time for the field survey, analysis of data and write up were very serious limitations. Time also limited the effective control of the interview campaign.

iii. The scattered settlement structure coupled with poor roads limited the area of coverage during the field work.

1.10 ORGANIZATION OF THE STUDY

The study is divided into six chapters. Chapter one deals with introduction, problem statement, the study area, objectives, significance, scope of the study, research methodology and information sources, operational definition of key concepts and limitations of the study.

Chapter two reviews literature on the subject with particular reference to the need for fertilizer and other technological inputs, theoretical framework and the hypothesis.

Chapter three is devoted to the description of the study area with some analysis on the bio-physical characteristics, the socio-economic characteristics of the area.

Chapter four analyses the existing fertilizer supply system including the socio-economic characteristics of smallholder farmers which are likely to influence the fertilizer supply situation. Institutions involved in fertilizer supply operation are dealt with. A brief description of the supply situation of other farm inputs such as agrochemicals, improved seeds and farm tools and implements is also given.

Chapter five deals with major findings and recommendations. The implications of the existing farm input supply situation for smallholder development in West Gonja District is discussed here.

Chapter six is devoted to summary and conclusions.

2.0 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 THEORY AND EXPERIENCE

In order for agricultural productivity to rise, each farmer depends more and more on resources from the outside. There are five of these which Mosher refers to as "The essentials for Agricultural Development." They include; markets for farm products, constantly changing technology, local availability of supplies and equipment, production incentives for farmers, and transportation.[1]

The supply and use of improved inputs fall within Mosher's definition and classification of "essentials."

For agricultural development to proceed the way farming is done must constantly be changing and the supplies and equipment that are required to practice this change must be available at several local points in sufficient quantities to meet the needs of every farmer who may want to use them. The supplies include fertilizers, seeds, pesticides among others. These are referred to as farm inputs in this study with emphasis on fertilizer.

An adequate supply of inputs like fertilizers, agrochemicals insecticides, weedicides, pesticides and farm implements is an essential pre-requisite in modern farming. This implies both an intimate knowledge of local conditions and an effective organization, especially because timely availability and low cost are also important requirements.

The Economic and Social Commission for Asia and the Pacific (ESCAP) observes that in some ESCAP countries input distribution is still largely in the hands of privatate traders. Elsewhere, the state has taken on responsibility, sometimes through special programmes like,

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[1] Mosher, A.T., 1966, Getting Agriculture Moving Essentials for Development and Modernization, (New York, Frederick A. Praeger, Inc. Publishers, for the Agricultural Development Council Inc.) p. 61-62.

for instance, INMAS and BIMAS in Indonesia.[2] Where the distribution of inputs is left to private traders, the spatial distribution of services may leave much to be desired. In sparcely populated, remote areas it may be virtually impossible to obtain inputs at all, or only at a high price. The high profits demanded by many private traders imply high prices, which many smallholder farmers cannot afford to pay. Progress may be blocked altogether if high prices of inputs prevent the adoption of innovations, because they become unprofitable for small farmers.[3] In such circumstances, the governments have no choice but to take appropriate measures to correct the situation. The people themselves can organize the distribution of inputs by establishing a co-operative.

ESCAP continues,

> In certain instances, input distribution can be made more effective if combined with the provision of credit and marketing of produce. This ensures that credits given for inputs are indeed used for that purpose and that credits can be recovered from the sale of produce. (p. 242)."

In Peru, a phased pattern of distribution of supplies and equipment was introduced in about 1950. In this system, seeds, fertilizers, pesticides and implements were made available through a central government agency and by private suppliers to those private merchants who wished to stock them locally. Meanwhile, modest stocks of each were kept on hand at the local offices of the governmental extension service, and these stocks were replenished as needed from a central supply depot. The price at which each input was offered at the extension office was slightly higher than that at which a private merchant in the same locality would have to sell it in order to cover

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[2] ESCAP, 1979, "Guidelines for Rural Centre Planning" (United Nations, New York) p. 242.

[3] ESCAP, 1979, "Guidelines for Rural Centre Planning" (United Nations, New York) p.242.

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his costs and an acceptable margin. The result of this system was that when a new input was first recommended for local use, farm operators could get it through the extension office. As demand increased, local private merchants began offering it at a slightly lower price and the task of distributing the particular input gradually shifted from governmental into private channels. The government continued to stock the items in extension offices, primarily as a check on the prices charged by private mechants.

In this way private merchants did not have to stock the new input until after they were sure farmers would be willing to buy it in considerable quantities. At the same time, the government extension offices only have to "pioneer" in offering inputs for sale. Once an effective demand had developed, private merchants relieved them of this task and the extension service had only to keep small amounts on hand as a check on prices and quality.[4]

> "Putting adequate amounts of farm supplies and equipment where farmers can buy them is complex and difficult to achieve. Whatever the difficulties, "it must be accomplished" if agricultural productivity is to rise", Mosher concluded.

Most farm supplies and equipment have to be manufactured and since the minerals or materials required to manufacture them through complex processes are found only in certain places, most manufactured inputs frequently have to be imported. This is because the processes of manufacture require large manufacturing plants and most third world countries lack the know-how. In addition, the amount of such inputs as fertilizers that farmers are ready to buy may or may not be great enough so it may not make economic sense to set up a manufacturing plant in the country. This means that fertilizers will have to be imported at least for now.

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[4] Mosher, A.T. 1966, p. 97-98

Even when the supplies and inputs are locally available each must have five qualities if farmers are to buy it and keep on buying it year after year. These include:

1. It must be technically effective.
2. It must be of dependable quality.
3. The price must be reasonable.
4. It must be available locally precisely when farmers need to use it.
5. It must be offered for sale in appropriate sizes or amounts.[5]

2.2 GOVERNMENT (AGRICULTURAL) POLICY AS A DETERMINANT OF FARM INPUT SUPPLY AND AVAILABILITY

Government policy influences the supply and availability of farm inputs in several ways. Since most farm inputs needed by Ghanaian farmers are imported the currency exchange rate is seen here as a major government policy area which could affect the supply and availability of those inputs. Prices of both inputs and farm produce as well as public sector salaries influence input supply in other ways.

The following sub-sections go into a little detail to support the above concept. Government policy to effect the following measures is very vital for agricultural development through input supply and availability.

i. Production Incentives for Farmers

Improved farm practices, access to markets for farm products and the availability of supplies and equipment - these provide opportunities for farmers to increase production but will they use them? Farmers will always make sure they produce enough to feed themselves and their family. To be able to obtain other goods

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[5] Mosher, A.T., P.92

[6] Mosher, A.T., 1966 p. 99.

each farmer wants to sell enough produce and as varieties of goods and service become available in his locality he wants to obtain some for his family, This means producing more and selling more at good prices. The margin between costs and returns, the farmer's "net income" must keep increasing if he is to be able to give his family a rising level of living.

There are therefore, incentives that can be effective in getting farmers to increase their production. These are primarily economic:

1. remunerative price relationships.
2. a reasonable share of the harvest.
3. the availability of goods and services that farmers would like to be able to purchase for themselves and their families.

(a) Remunerative Price Relationships

To the extent that a farmer produces for the market, his incentive to increase production depends on the relationship between the price he will receive for his product and the costs of producing it. The costs of production are influenced by the prices he must pay for purchased inputs.

A recent series of studies in the state of Punjab in India revealed that farmers there shift from producing one crop to producing another in response to price changes to at least the same degree as do the highly commercial farmers of the United States.

Similarly, there is increasing evidence that farmers seek to "increase the production per acre of a particular crop" when the price of that crop rises, particularly by purchasing increasing amounts of fertilizers for use on the crop. In Indonesia, where prices of farm products had been held down, controls were abandoned in 1964 and prices allowed to seek their

own level. Farm prices shot up. Farmers became more interested in fertilizers and improved seed. Land was farmed more intensively and larger amounts of rice, corn, vegetables, and other cash crops came on the market.[7] If it is felt necessary to hold down the cost of food to urban consumers, it is better to do this by government subsidy within the food distribution process than it is to choke off the source of supply by setting low product prices for farmers that deter them from adopting measures to increase production.

(b) Prices for Supplies and Equipment

By a calculation from data from FAO Production Yearbook, Vol. 17, 1963 by the Department of Agricultural Economics, University of Minnesota on "Quantity of Rice (in kilogrammes) Required to Purchase One Kilogram of Fertilizer". Mosher inferred that

"..... whereas it takes only about one kilogram of rice to buy one kilogram of either nitrogenous or phosphatic fertilizer in Pakistan or Japan, in India it requires three to four times as such."

There is therefore more price incentive for a farmer to use fertilizer in rice production in Pakistan or Japan than there is in India as long as price relationships hold. It is the relationship between the cost of inputs and the amount by which they farmers will increase production that is important.

(c) Share of the harvest

The farmer who is a share tenant does not consider as income the share of the harvest that goes to the land. If he is considering the use of new techniques that promise to raise

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[7] Mosher, A.T., 1966 p.100-101.

production he takes into account only the value of that share of the harvest that will be his. If he is to pay the full additional cost of the new techniques, his incentive to adopt new techniques is much weaker than if he is either an owner-operator or a cash tenant, with the cash rent remaining the same regardless of level of production.

ii. Transportation

Agricultural development cannot be achieved in the absence of efficient and low cost transportation. This is so because farms must be spread out over the rural area to use all available natural conditions. A corresponding widespread transportation network is required to bring supplies and equipment to each farm, and to take products from farms to consumers in the towns and cities.

The cost to a farmer of an input like fertilizer is its price at the factory or in the case of West Gonja the MOA sales outlet plus the cost of getting it from there to his farm. His returns for the maize or rice he sells is the price in the market minus the cost of getting the products from his farm to the market. If transportation costs are too high, he will find fertilizer too expensive and the return for his maize or rice too low. But if transportation costs can be brought down the cost of the fertilizer at his farm will be lower and the return for his maize or rice will be higher.

2.3 ROLE OF PARASTATALS IN INPUT SUPPLY AS A DETERMINANT OF INPUT AVAILABILITY

FARMERS SERVICES COMPANIES

In Ghana, the Farmers Services Company (Upper Regions - UR) Ltd., FASCOM, was established as a commercial wing of the World Bank funded Upper Region Agricultural Development Programme (URADEP).

The purpose of URADEP was to cater for the well-being of the 125,000 farm families of the Upper Regions, comprising some one million people, about 10% of Ghana's population. The purpose was to increase the agricultural productivity of the small farmers, and hence, their incomes which, in turn, will raise the quality of their lives while simultaneously rebounding to the benefit of Ghana's Gross National Product (GNP).

There are 90 Farmer Services Centres (FSCs) established by the URADEP. The equitable distribution of financial and material resources to small-scale farmers has long been a knotty problem in the Upper Region. Supplies seemed chronically short and distribution appeared to favour large-scale farmers. Establishment of the 90 FSCs makes possible an efficient, more equitable and timely distribution system bringing inputs closer to the farm gate.[8]

For effective distribution of inputs and dissermination of agricultural extension services, the FSCs are located in farming areas in such a way that farmers are within 15 kilometres of the farthest FSC.

A commercial facility, the FASCOM was established to employ business methods of procurement and distribution of farm inputs through the FSCs to local farmers on a deferred payment basis where necessary. The FASCOM, a private company is owned by the Government of Ghana, the Bank of Ghana, the Ghana Commercial Bank and the National Investments Bank.

The farmers of the Upper Region will, however progressively own the company and more directly influence its policies. Funds for acquiring this ownership will come from a mark-up on all inputs sold

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[8] Dr. Abudu, Assibi, O. and Dr. Ascroft Joseph. "The solutions - The Story of URADEP." An article in "The Ghana Farmer" Oct. 1978 p. 29.

at FSCs. This mark-up will be placed in a fund, which, as it grows, can be used to purchase shares of FASCOM for the farmers.

In addition, the regional branch of the Agricultural development Bank is to be strengthened in order to increase its capacity for making small-scale loans to members of FSCs. 9

Each FSC is designed specifically to be multi-purpose. They are at once village stores from which to procure farm inputs, village workshops for artisans, such as blacksmiths, to ply their trades, village extension centres for the dissemination of advice and information and village meeting places where farmers can gather to plan their own development. They are intended to become the hubs of community-oriented activities which, in time, may well attract services from such other Ministries as Social Welfare, Community Development, Health and Education.

In fact 9 farmers representatives from each FSC area are nominated by farmers to hold frequent meetings with the FASCOM and URADEP officials on issues of mutual interest. In this way there is constant feedback.

Another FASCOM was also established under the Volta Region Agricultural Development Project (VORADEP) with funds from the World Bank and International Fund for Agricultural Development (IFAD). It is called FASCOM (Volta Region - VR) and was established in 1981.

The VORADEP has established 84 FSCs throughout the Volta Region at intervals of 10 - 20 km. 34 of those FSCs are permanent structures constructed by the VORADEP while 50 are rented. Each FSC has a storage capacity of 200 metric tonnes. For ease of marketing operation the 9 districts in the region have been split in zones of

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9 Abudu Assibi O. and Ascroft Joseph. (p.29).

3 districts - southern, central and northern zones.

According to FASCOM (VR) the criteria for location of FSCs are:

i. Farming population in the area

ii. Types of crops grown in the area

iii. Market centres within the area for farm produce.

In addition rural sales are organized for areas which are inaccessible to FSCs.

The FASCOM depends on VORADEP for recommendations as to which inputs it (FASCOM) should procure because it is the VORADEP/MOA that has extension agents in the field. They are able to tell what types of inputs farmers need most and in which areas of the region.

In terms of input supplies the FASCOM (VR) has total monopoly in the region and has been able to service about 90% of client smallholders who are also their target. For specific inputs the coverages are: fertilizers (60%), fishing inputs (20%), farm tools 10%), agrochemicals (5%) and others 5%

The VORADEP project analysis found that the logistical implications of head-loading fertilizer were a severe disincentive to their use. As a reference indicator, the implied transport costs based on a labour/hour cost of ¢24, at walking speed of 4 kilometres per hour and no back-load are ¢116 per t/km.[10]

2.4 ROLE OF THE PRIVATE SECTOR AND NON-GOVERNMENTAL ORGANIZATIONS (NGOs) IN INPUT SUPPLY

It is a fact that Government alone cannot do everything for the people. The private sector and NGOs play a very vital role in agricultural development. Except fertilizers, the import and distribution of most other farm inputs, agrochemicals, improved seeds, and farm tools and implements is largely privatized. Organizations

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10 Source: VORADEP and FASCOM (VR). "VORADEP, Project Annual Report, 1988.

such as Reiss & Co., Ghana National Trading Corporation, SAKABIO, Toma Chemicals Company, Shell Agrochemicals, Tamaloe Implements Factory among others are involved in the supply and distribution of farm inputs. These have limited spatial distribution of sales points. Smallholder farmers most of whom live in the remotest areas have no access to their products.

Some NGOs, among them GLOBAL 2000 and Church Agricultural Projects (CAP) are also involved in input supply and distribution.

These organizations have better distribution networks where they operate. The GLOBAL 2000 for instance gives loans in form of fertilizers and improved seeds to smallholder farmers, using the agricultural extension system.

2.5 SOCIO-ECONOMIC CHARACTERISTICS AS A DETERMINANT OF FARM INPUT SUPPLY AND AVAILABILITY

The level of complexity of the socio-economic system in geographic space influences the decision of smallholder farmers to purchase and use particular farm inputs. This again influences policy-makers and others involved in the agricultural and allied fields (industry, transport, commerce, among others) with regards to farm input supply and distribution. The complexity of the system is given by the level of variety and dynamism of the following major components: populations (the family, community, agricultural extension agents, inputs suppliers, transporters etc.); problem and objectives; activities; outputs and resources; and, locations and natural phenomena.

2.6 PHYSICAL AND SOCIAL INFRASTRUCTURAL DISTRIBUTION AS A DETERMINANT OF FARM INPUT SUPPLY AND AVAILABILITY

The fact that farms and for that matter communities are scattered implies that a corresponding widespread network of transportation and warehousing facilities is required to bring supplies

and equipment to each farm and to take products from farms to consumers in the towns and cities. The warehouses serve as storage and assembling points for inputs and outputs. These must be efficient and low cost. The need for a network of markets as points of exchange is closely woven with these.

Secondly, the spatial distribution of social services as schools, clinics, water also determine where farmers will be willing to settle. This aspect is even more important in the case of civil servants and other white colour workers who man these facilities.

The foregoing gives an idea of how farm inputs can be distributed and how inputs have actually been supplied and distributed. In the following chapter some light will be thrown on the study area to give an insight into the problems, constraints, and prospects for input supply in West Gonja.

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA
THE WEST GONJA DISTRICT

3.1 LOCATION AND SIZE

The West Gonja District is located in the Northern Region of Ghana. It borders the Brong Ahafo Region to the south, Bole District to the west, Upper West Region to the north-west, Walewale District to the north, Tolon and East Gonja districts in the east. The district covers an area of 16,706 sq km, making it territorilly the largest district in the country. The position of the district is between 2^{o}, 30' and 1^{o}, 30' west and 8^{o} and 10^{o} North (see Map 1 showing location of the district in regional and national context).

3.2 NATURAL CONDITIONS

3.2.1 TOPOGRAPHY AND DRAINAGE

The district is generally undulating with an altitude o of 150m to 300m above sea level. The only high ground is the Damongo escarpment. There are also a few outcrops of weathering resistant high rise grounds around Daboya which is an area composed of an old pre-cambrian geological structure dissected mainly by the Volta drainage system.

The drainage froms a dendritic pattern with two main systems. The Mole flows from beyond the western boundary of the district and joins the main stream of the White Volta south of Daboya. The Sorri river runs south of Damongo in a west-east direction eventually joining the Black Volta.

Both the Black and White Volta pass through the district. The White Volta demarcates partly the boundary of the District with Tolon District and later bisects the eastern parts of the district before joining the Black Volta which forms the southern boundary of the district with Brong Ahafo Region.

3.2.2 CLIMATE

- Temperature:

The area experiences warm temperatures during the dry season. The hottest months are March and April when maximum temperatures are recorded and the coldest months are December to January. These phenomena are associated with the dry harmattan wind which blows from the north-east. The harmattan raises the rate of evapotranspiration thus causing soil moisture deficiency.

- Rainfall:

The rainfall regime is predominantly unimodal in nature, which is considered enough for a single season farming activities. The average annual precipitation is 1144mm. The pattern of fall is erratic at the beginning of the season. The rainy season begins in Late April and reaches its peak in July. In August there is a prolonged dry spell, lasting about two weeks and could have adverse effects on crops. Another characteristic of the rainfall is its high intensity, about 300mm per hour. This often causes flooding. About

10 percent of the rain is lost in runoffs while 2-4 percent is recharged into the groundwater and the rest is returned into the atmosphere through evaporation.

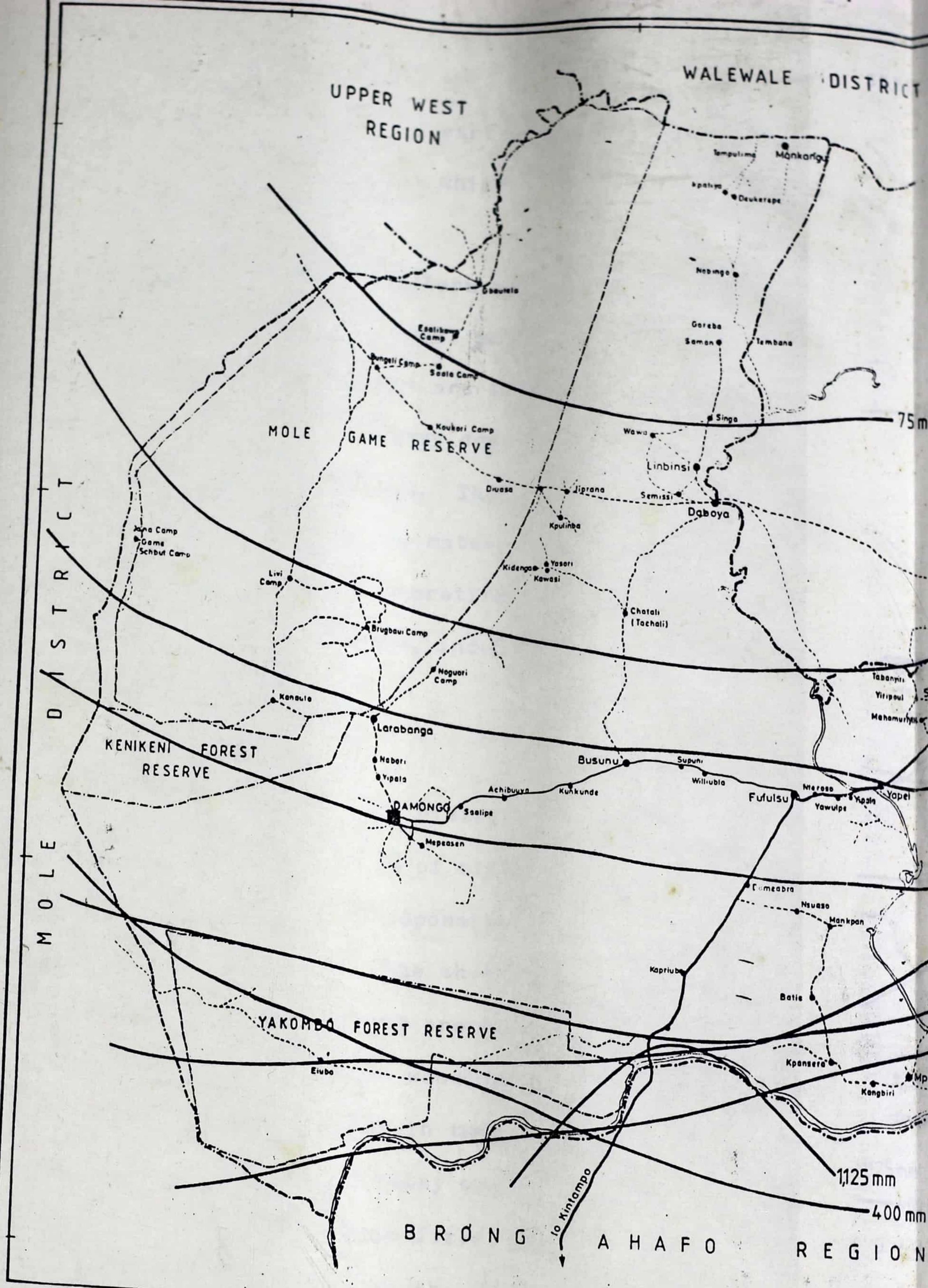
Due to the irregularities in the distribution of rainfall pattern, there is severe limitation to crops and vegetation growth period. In the south rainfall is much more reliable about 1,000mm as compared with 750mm annually in the north. (See Rainfall Map 3)

3.2.3 SOIL AND VEGETATION

- Soil:

The district is situated in an old geological area which has been subjected to extensive weathering and erosion over a long period of time. Apart from the alluvial materials, the most recent rocks are upper voltaian formations. Some cambrian complexes are also found.

The soil distribution can be referred to as Voltaian series. Damongo formations, sandstones and mudstones or inceptisols are commonly referred to as alluvial deposits of low inherent fertility. These series cover the entire district except where pre-cambrian crystalline formations are found. In the central part of the district, shallow Voltaian shales are found. These are limiting factors where conventional and intensive land use are concerned. Limestone outcrops are occasionally found between the middle and the lower Voltaian series as in the case around Daboya and Buipe, a factor which is responsible for the saline soil conditions in these



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STUDY

RAINFALL

areas. The extreme western part of the district is composed of granitic soil type which is parallel to the Voltaian sandstones.

Towards the south-western part of the district, around Kenikeni Forest a small pocket of brachy and rocky material with shallow soils are found. Damongo area however, has rich alluvial sandy deposits which are suitable for cereals and other crops. The extreme south eastern portion of the district has material of Voltaian mudstone shales which are highly concretionary bisected by a belt of fluvio-alluvial deposits, inceptisols, from the White Volta (see Map 4).

- Vegetation:

The vegetation of the district is guinea savannah woodland. The combinations of climate, soil characteristics and human activities are responsible for the present vegetation. The main trees are the sheanut tree, baobab and dawa-dawa trees. Generally, they are scattered throughout the district except where dense woodland forests occur in the moist valleys. Grass grows in tussocks and can reach a height of 2.7m during the rainy season. Nearly all species are deciduous. Regular bush fires, grazing of livestock and cultivation have resulted in the gradual degeneration of the guinea savannah woodland .



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STUDY

SOILS

3.3 SOCIO-ECONOMIC CHARACTERISTICS

Introduction:

This chapter describes the social and economic characteristics of the West Gonja District, with the view to analysing existing inequalities in the spatial development of the district and how this has affected the supply of farm inputs to smallholder farmers in the district. This will subsequently point to how the income levels of smallholders has been influenced by the existing farm input supply situation.

3.3.1 DEMOGRAPHIC

According to the 1984 population census[1], the district population was 69,518 with a rather high growth rate of 4.2 percent which exceeds the northern region's growth rate of 3.4 percent and the national average of 2.6 percent.[1] In 1989, the district population was projected to be 80,373.[2] The labour force constitutes about 60 percent while children of school-going age (5-14 years) was 32.9 percent and the rest 7.1 percent were old people. About 62 percent of the labour force are engaged in agriculture. The district has a very low population density of 4.8 persons per square kilometre.

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1 Ghana Population Census Report, 1984.

2 SPRING Development Workshop Report, West Gonja District, 1989/90

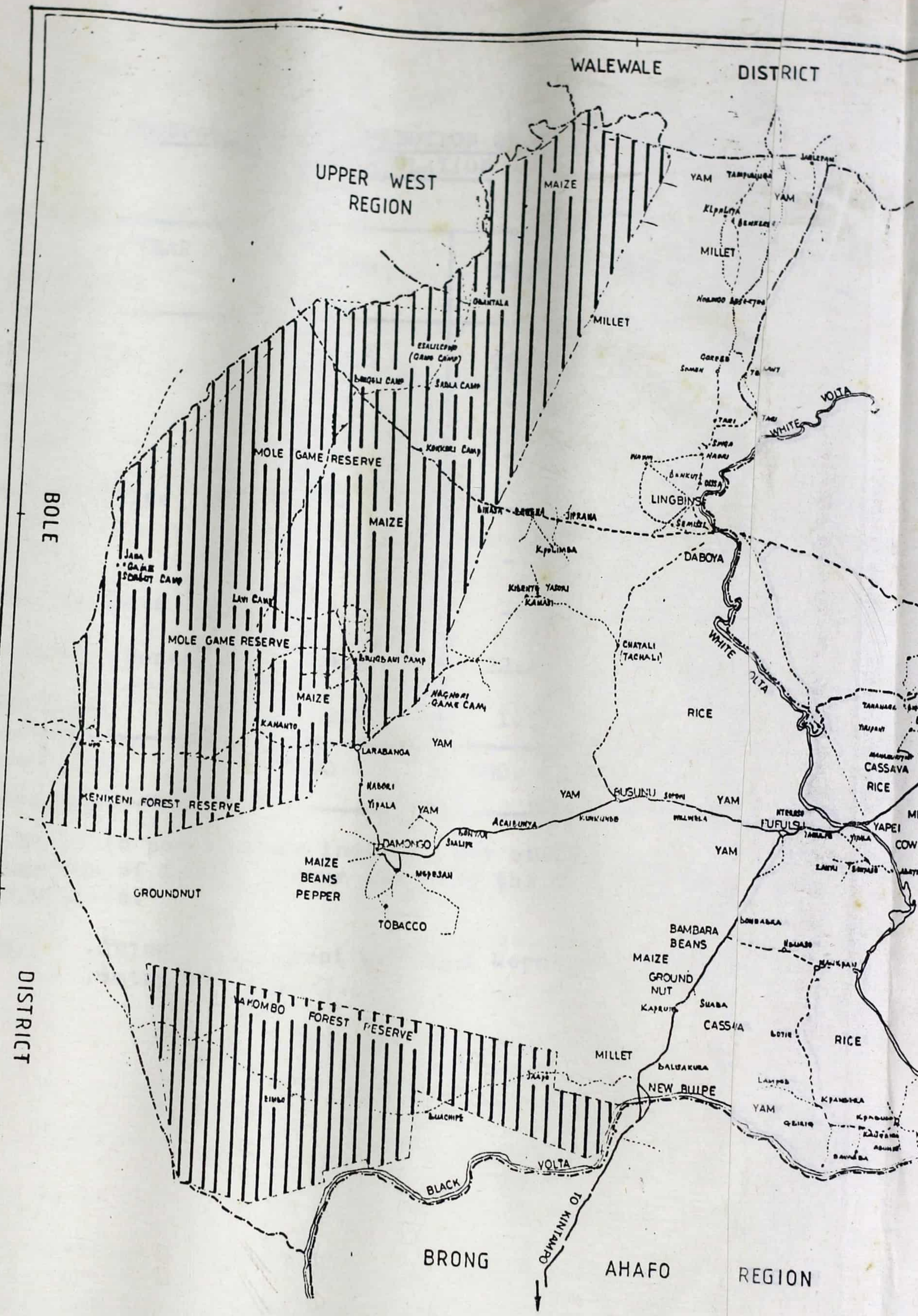
3.3.2 ECONOMIC ACTIVITIES

The major economic activities of the people in the district include farming and traditional cloth weaving. Fishing, brewing of pito, manufacturing and trading are carried out in some parts of the district. About 62 percent of the labour force are farmers (see Table 3.1). The district is the largest producer of maize in the northern region and exports maize to other parts of the country. Other crops produced include guinea corn, millet, rice, yams, groundnuts and cowpeas. Cotton and tobacco are the main industrial crops cultivated. (See Map 5).

Fishing is done along the Black and White Volta rivers mostly by migrant communities from the main fishing zones in the southern sector of the country. Buipe with an inland port has the largest fish market in the district.

Traditional cloth weaving, as a cottage industry, is well organised in Daboya. About 7.7 percent of the labour force in Daboya are engaged in this activity and the major output is smock. The scale of operation is at the family level and the technology is traditional and labour intensive.

Brewing of pito for which sorghum is the raw material is a small scale industrial activity which is carried out in every part of the district. Other economic activities include repair works, carpentry, blacksmithing (manufacturing of farm tools and cooking pots) and dress sewing which are



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WEST GONJA DISTRICT
STUDY

CROPPING

Table 3.1 OCCUPATIONAL DISTRIBUTION OF ECONOMICALLY ACTIVE POPULATION

YEAR / OCCUPATION	1960	1970	1984
Agriculture	83.8	76.3	61.6 (13.8)*
Industry	-	-	7.7 (6.8)
Commerce	-	-	15.0 (14.2)
Public Service	-	-	5.3 (1.4)
Mining	-	-	0.0
Other Services	-	-	9.9 (6.9)
Sub-Total (Non-Agric)	14.2	22.4	37.9 (29.1)
Unemployed	2.0	1.3	0.5
Grand Total	100	100.	100

* Figures in parenthesis indicate the extent of participation of female labour force in the respective occupation.

Source: SPRING Development Workshop Report, West Gonja District, 1990.

practiced in places like Damongo, Buipe, Daboya, Yapei, Mpaha which are also periodic market centres.

3.3.3 NATURAL RESOURCES

The district has large deposits of limestome which is a potential for rural cement industry. Exploitation has just started as a subsidiary of the Bank for Housing and Construction. Salt and clay deposits are also found in Daboya and Damongo respectively. Salt is mined by women while clay exists as a potential for ceramic industry development.

The Mole National Park is the largest tourist attraction in the northern region. Other tourist attractions in the district include the Larabanga stone and mosque and the Gonja Kingdom regalia.

3.3.4 DISTRIBUTION OF SOCIAL AND TECHNICAL INFRASTRUCTURE

Inequality exists in the spatial distribution of social and technical infrastructure in the district. Grove and Huszar, in 1964 identified Damongo as the top hierarchy of central places within the district which provides services for the district.[3] A survey in 1989 confirmed Damongo as the only first order centre in the district which provides central functions like hospital, bank, post office, information, district administration, second cycle education among others. There is no second order centre in the spatial hierarchy, whilst Buipe is the only third order settlement.

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3 Grove and Huszar, The Towns of Ghana, The Role of Service Centres in Regional Planning. (Planning Research Studies No.2) Ghana Universities Press, 1964, p. 35.

All other central places are fourth order centres providing services like primary education.[4]

The district has a developed first order centre and a high underdeveloped periphary. (see Map 2)

ROAD NETWORK AND TRANSPORT FACILITIES

Available data indicate that the Northern Region is the least accessible region in the country since it has an average feeder road dnsity of 0.028km/sq km. compared to neighbours Upper East (0.159km/sq km) and Upper West (0.058km/sq km) and a national average of o.072km/sq km. These figures give a fair idea of the relative level of rural accessibility in the region.

The West Gonja district with a land area of 15247km^2 is the largest district in the northern region. With a total road network of some 328.3km, the district has a rather low road density of 0.02km/sq km as compared to the northern region, neighbouring regions and the nation as indicated above. Except Damongo, the district can be described as rural with a rather low accessibility.

The following is an attempt at analysing the road network in the district.

The section of the Kumasi-Tamale trunk road passing through the south-eastern tip of the district in the zone of Buipe and Yapei is the only first class (primary) road in the district as indicated in Map 2. The section of this

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4 SPRING Workshop Development Report, 1989/90.

road within the district is about 83.7km long. There are two stretches of second class (secondary) roads - the Fufulso-Damongo-Larabanga-Grupe road (76.8km) and the Larabanga-Mole National Park (Game) road (9km). There are eight (8) stretches of feeder roads while the Murugu-Bowena track has been earmarked for construction of a feeder road. The following are the details:

Feeder Roads:

a.	New Buipe-old Buipe	- 14km
b.	Larabanga-Kadeju-Marugu	- 36.8km
c.	Damongo-Kpiri	- 7.4km
d.	Damongo-Old Buipe Junction	- 48.0km
e,	Domeabra-Mpaha	- 52.0km
f.	Busunu-Daboya	-
g.	Mankarigu-Daboya	-
h.	Bowene-Daboya	-
i.	Murugu-Bowena*	-

* Earmarked for construction of feeder road.

Source: Author's field investgation and SPRING II Development Workshop, 1990.

Summary

First Class (Primary) Roads	- 83.7km
Second Class (Secondary) Roads	- 86.4km
Feeder Roads	- 158.2km
Total Road length	- 328.3km

In addition to these there are several foot paths and tracks connecting various settlements in the district.

It may therefore be inferred that because of the rather low road density in the district, the important roles of transport as a pre-requisite and co-requisite of development have been hampered. Some of the factors contributing to this state of affairs are identified as follows:

i. The West Gonja district occupies a large land area: estiamted to be about 22% of the land area of the northern region, itself with a land area of about 30 percent of the country's area. Hence, it has ben relatively difficult and expensive to provide access to every community in the district.

ii. Poverty is widespread in the district: about 70 percent of income is in the hands of only 20 percent of the population and 30 percent for the majority 80 percent.[5] This makes it difficult for rural dwellers especially smallholder farmers who also constitute the majority of the poorest to meet transport bills for themselves and family, farm produce to the market and farm inputs to the farm. Farm input distributors would not risk high maintenance costs of vehicles (high transportation costs) in favour of effective

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5 SPRING Development Workshop, 1990.

distribution since poor farmers cannot pay for costs of delivery.

iii. The scattered nature of settlements as well as the relatively low population density (4.8 persons/sq km) in 1984 and, the long distances between villages make the per capita cost of constructing standard engineered roads expensive.

iv. The State Transport Corporation (STC) and the Omnibus Services Authority (OSA) run transport services between major settlements (Buipe and Yapei on the main Kumasi-Tamale trunk road and Damongo) but their services leave much to be desired. Smallholders in the district therefore spend fantastic amounts in transport charges for themselves, farm inputs and produce to few private itinerant transport operators and traders.

All these factors have serious implications for any meaningful farm input distribution system within the district.

The spatial location of services is discussed below.

EDUCATIONAL FACILITIES

The district has one senior secondary school and one agricultural institute located in Damongo. Besides these, there are eighty-two primary schools, twenty-nine junior secondary schools and twenty-nine nusery schools. Primary school facilities are ubiquitos in settlements with popu-

lation of 500 and above. In general, only 27 percent of the school age children are enrolled in schools while teacher-pupil ratio is 1:90.

- WATER SUPPLY

The Ghana Water and Sewerage Corporation is the main supplier of potable water in the district. There are 157 standing pipes and 40 bore-holes. These water facilities are however, largely non-functional. About 59 percent of the population do not have access to potable water.

- HEALTH FACILITIES

Health facilities in the district include: one general hospital in Damongo, two health centres one each in Daboya and Buipe and one community clinic at Mpaha (non-functional). Primary health care is administered from Damongo hospital to various parts of the district.

Common diseases such as malaria and other curable diseases however, are the main causes of illness and this affects production negatively.

BANKING FACILITIES

There is one commercial bank - the Ghana Commercial Bank in the district located in Damongo.

MARKET FACILITIES

There are nine periodic markets in the district. These are found at Damongo, Buipe, Yapei, Mpaha, Busumu, Sankpala, Larabanga, Lingbinsi and Mankarigu. The sphere of influence of these markets goes beyond the district

Table 3.2 TYPES OF LABOUR FOR CROP FARMING

TYPE OF LABOUR	No.	%
Family labour	191	60.5
Co-operative labour	38	12.0
Hired labour	62	19.6
Family and hired labour	12	3.8
Family and co-op labour	9	2.9
Co-op and hired labour	3	0.9
Family, Co-op and hired labour	1	0.3
TOTAL	316	100

Source: Household Socio-economic Survey, December 1989

The period when labour shortage is critical is during weeding followed by land preparation. The harvesting and planting operations of the cropping cycle have relatively less serious labour problems. This labour shortage in critical periods of the cropping cycle could lead to decrease in yields or increase in production cost. In terms of land preparation, it would limit the size of farms; hence the small farm sizes while in terms of harvesting, it would cause delay which would result in crop loss and consequently revenue leading to lower incomes.

3.4.3 CAPITAL/FINANCE

Agricultural activities are financed mainly from farmers own-savings (85 percent). The rest comes from family money (9.2 percent), private money lenders (5.1 percent, Commercial Banks (1.6 percent) and credit unions (0.9 percnt). See Table 3.3.

Table 3.3 shows that the official sources of credit are inadequate and accessible to only a few farmers. This may be attributed to the collateral security and other lending policies of the financial institutions. Such policies need to be reviewed in order to suit the needs of the majority of smallholder farmers.

Table 3.3 SOURCES OF FARM FINANCE

SOURCE	No.	%
Own savings	261	82.6
Family money	29	9.2
Private money lender	16	5.1
Commercial Banks	5	1.6
Co-op Credit Unions	3	0.9
Others	2	0.6
TOTAL	316	100

Source: Household Socio-economic Survey, Dec. 1989

Lack of credit facilities is the major problem facing farmers in the mobilisation of funds for farming activities. Others include fear of harassment if unable to repay farm loans, lack of collateral security, high interest rates and government ban on loans in that order of magnitude. The implication of all this is that farmers do not have the financial resources to acquire modern farming inputs as well as pay for farm labour

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3.4.4 FARMING SYSTEMS AND CROPPING PATTERN

The combinations of the effects of the factors of land, labour and capital has resulted in the adoption of the present traditional farming systems and cropping pattern in the district.

- Farming Systems and Technology

Shifting cultivation is the dominant farming system in the district albeit, crop rotation and mixed farming are also practised. Pressure on land is gradually increasing. This is supported by the reported decrease in fallow periods (by 43 percent of interviewed farmers) and the gradual introduction of crop rotation.

Agricultural practices in the district are basically traditional with some improved form of technology in Damongo and its immediate environs. Farm plots are small and scattered; and are being managed by smallholders of whom (73 per cent) use hoes and cutlasses in cultivation. Tractors are used by(20 - 30 percent)of the farmers while a handful (1per cent) use bullock-ploughs in land preparation (see table 3.4)

According to the survey, 50 percent of the farmers use fertilizers, while improved seeds and pesticides are used by 52 percent and 17 percent respectively.

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Table 3.4 METHODS OF LAND PREPARATION

METHOD/IMPLEMENT	No.	%
Hoe/Cutlass	166	52.5
Tractor and Hoe/Cutlass	86	27.2
Tractor	60	19.3
Ox-plough	4	1.0
TOTAL	316	100

Source: Socio-economic Household Survey, December, 1989.

- Cropping Pattern

West Gonja District is the largest producer of maize in the northern region, About 91 percent of the farmers are maize producers over an area of approximately 8,000 hectares. Other important crops include yam, rice, sorghum, groundnuts, millet, cassava and beans. Sorghum is grown in the south-eastern part around Tuluwe, the south-western part and north of the Yakombo forest reserve. Millet is grown in the eastern northern and southern sectors around Yapei, Mankarigu and Buipe. Yam, like maize is cultivated all over the district. Cassava is grown in the central, southern and eastern parts. Beans are mostly grown around Damongo, Suaba and Kapribo areas. Groundnuts are cultivated around Damongo, Buipe and Tuluwe areas. Rice is found along the valleys of the White and Black Volta. Most of these crops are cultivated as mixed crops except for tobacco, rice and cotton (see Map 5).

Crop Output

Agricultural productivity in the district is rather low although there exists the potential to increase it. For instance, the average yield of maize is 4.7 bags/hectare as compared to the regional average of 14 bags/hectare.

According to information supplied by the District Agricultural Office, as at 1989/90 the total outputs of some major crops are: maize 133,200 bags, sorghum 106,900 bags, groundnuts 51,600 bags, millet 70,200 bags, rice 76,600 bags and beans 7,800 bags. These figures are observed to be relatively low especially as compared to the district potential.[8] This can be attributed to the fact that the existing farm technology is not appropriate for higher productivity.

3.4.5 PROBLEMS OF AGRICULTURE

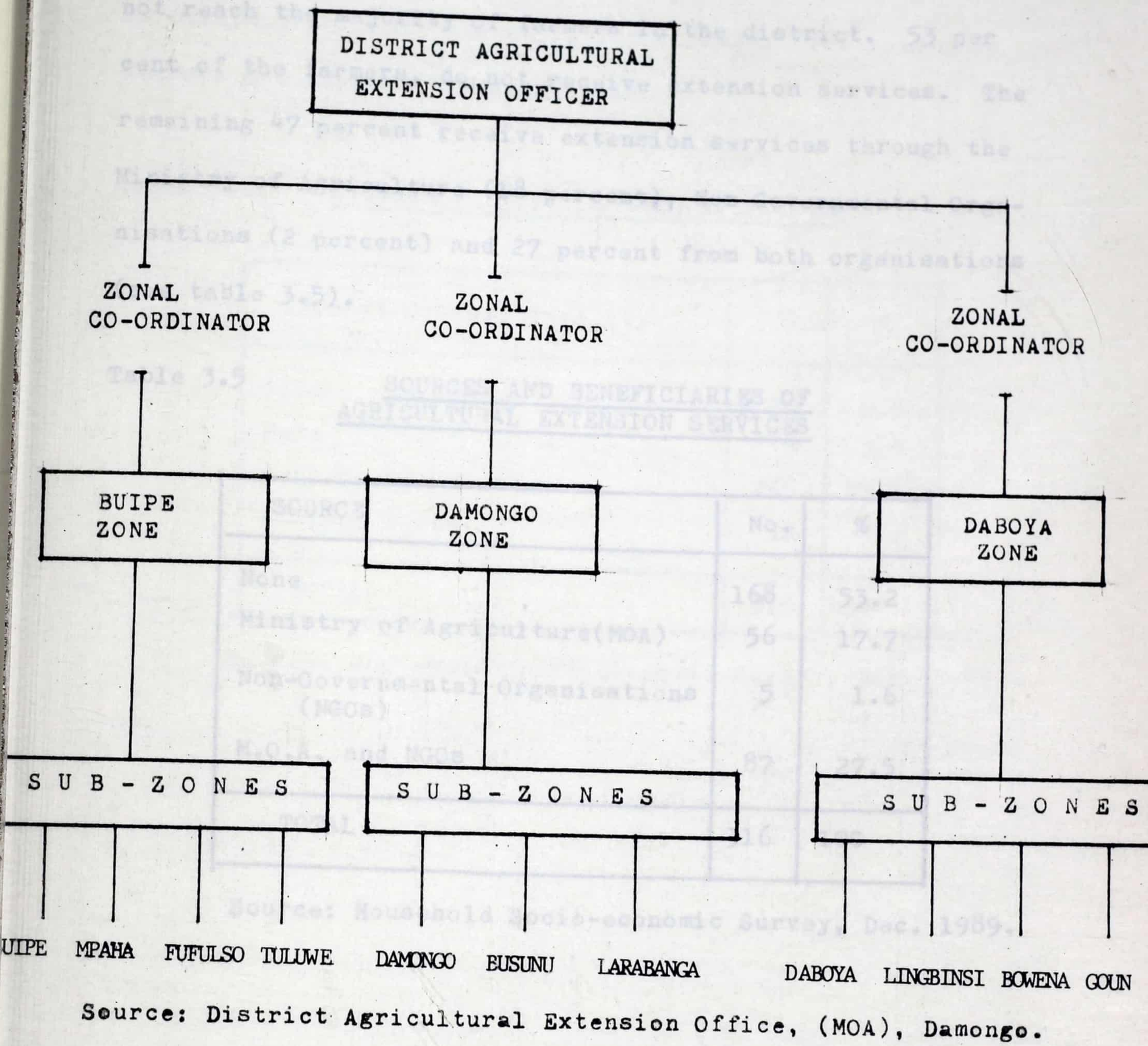
Extension Services

The district is divided into three agricultural extension zones, namely Damongo, Buipe and Daboya. The zones are further sub-divided into sub-zones comparising Damongo, Buipe, Daboya, Busunu, Larabanga, Lingbinsi, Fufulso, Tuluwe, Mpaha, Bowena and Goun. Each zone is run by a technical officer. The District Agricultural Extention Officer at Damongo is the overall coordinator for the entire district. (See Fig. 3.1)

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FIGURE 1 : ORGANISATIONAL CHART - AGRICULTURAL EXTENSION SERVICE (MOA) WEST GONJA DISTRICT



Source: District Agricultural Extension Office, (MOA), Damongo.

At present the district has an extension officer to farmer ratio of 1:1,500 which is comparatively better than the national ratio of 1:2,100. However, due to the scattered nature of the settlement pattern and inadequate transport facilities for extension workers, the extension packages do not reach the majority of farmers in the district. 53 per cent of the farmers, do not receive extension services. The remaining 47 percent receive extension services through the Ministry of Agriculture (18 percent), Non Governmental Organisations (2 percent) and 27 percent from both organisations (see table 3.5).

Table 3.5 SOURCES AND BENEFICIARIES OF AGRICULTURAL EXTENSION SERVICES

SOURCE	No.	%
None	168	53.2
Ministry of Agriculture(MOA)	56	17.7
Non-Governmental Organisations (NGOs)	5	1.6
M.O.A. and NGOs	87	27.5
TOTAL	316	100

Source: Household Socio-economic Survey, Dec. 1989.

Storage Facilities

Table 3.6 reveals that most farmers (83.8 percent) lack proper storage facilities. They store their produce in bags, sacks or polythene hence produce is prone to insect damage or other in storage. The table also shows that a few farmers(9.5 percent) use silos for storage. The remaining farmers use storage barns and pots.

Table 3.6: STORAGE FACILITIES USED BY FARMERS

Type of Storage Facility	No.	%
Silo	30	9.5
Pots	9	2.9
Bags/Sacks/Polythene	265	83.8
Storage barns	12	3.8
TOTAL	316	100

Source: Household Socio-economic Survey, Dec. 1989

CHAPTER 4

4.0 ANALYSIS OF FARM INPUTS SUPPLY IN WEST GONJA DISTRICT

4.1 BACKGROUND INFORMATION

The central characteristic of traditional agriculture is that change is slow, while in modern agriculture it is rapid.

The principal problem of traditional agriculture as it is practiced in the West Gonja district is that farmers work most of their lives within a fixed technology.

Increase in agricultural productivity should be the major goal of an appropriate policy for agricultural development. The low productivity of farm labour, land and other resources in agriculture in the district is largely due to the lack of certain complementary inputs of a technological, educational and institutional/ organisational nature. Under these circumstances, a crucial requirement for devising an appropriate agricultural development programme is to identify these complementary inputs, determine in what proportions they should be combined and establish priorities among programmes designed to increase their availability.

This chapter discusses issues involved in the process of making fertilizers available to smallholders at the right time and in the right types and quantities. Smallholder farmers themselves as consumers of fertilizer and other farm inputs play a vital role in this process.

Fertilizer importation, evacuation, transportation, warehousing and distribution and purchasing and ultimate usage, constitute this vital process.

4.2 ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS OF SMALLERHOLDER FARMERS

The behaviour of any group of individuals is determined and guided by certain human and environmental factors. Smallholder farmers are, as a group, guided by some or all of these factors which in the end shape and fashion their lifestyle. The decision as to what to cultivate, when and where to cultivate have been influenced to a large extent by socio-economic characteristics.

This section will dwell on some of these characteristics of smallholder farmers in West Gonja District and how these are likely to affect farmers adoption and use o of improved farm inputs.

4.2.1 Age Structure of Smallholder Farmers

The youth and middle aged smallholders (25-44 years) form barely half of the smallholder population (51.4 per cent). About 27 percent are between 45-54 years, while those between 55-64 years account for about 16 percent. About 5.6 percent represents the remainder aged 65 years. and above. The age composition of smallholders is comparatively old. Those aged 45 years and above constitute nearly half 48.6 percent) of the population. This means that the most active age group, (15-44 years), would have to work extra hard to make up any shortfalls by the 45-54 years group to sustain overall production. With regards

to the traditional nature of farming technology in the area there is the need for strong yuong men who can do a lot of manual work. Table 4.1 gives further details of findings.

Table 4.1: Age Groups of Smallholders

Age Groups	No. of Respondents	%
Less than 25	-	-
25 - 34	18	16.8
35 - 44	37	34.6
45 - 54	29	27.1
55 - 64	17	15.9
65 and above	6	5.6
Total	107	100.0

Soucre: Author's Field Investigations, May 1990.

4.2.2 Sex Structure of Smallholders.

Majority of smallholders (93.5 percent) are males while 6.5 percent are female. This could be a result of the fact that the Gonja inherit paternally and the male is superior. Command structure for farm work is likely to be effective in terms of labour productivity. Married females

Table 4.2: Sex Structure of Smallholders

Sex	No.	%
Male	100	93.5
Female	7	6.5
Total	107	100.0

Source: Author's Field Investigations, May, 1990

leave their parental home to stay with their husbands. The male children stay behind to takeover from their fathers in any eventuality.

4.2.3 Level of Education of Smallholders

A significant percentage (74.7 percent) of smallholders have had no formal education. A relatively low proportion (18.7 percent) managed to have elementary (primary and middle school) education. Secondary/Commercial, Vocational/Technical and post-secondary school leavers account for 6.6 percent of smallholder farmers in the district.

The implications of such a high level of illiteracy include a slow rate of diffusion and adoption of technological innovation and low technical efficiency among smallholder farmers. The level of education is likely to affect the attitudes of smallholders towards the purchase of their inputs. This is likely to lead to low productivity which further results in low incomes and hence smallholders inability to have enough funds to purchase essential farm inputs needed to increase farm production. Low living standards result from this.

A summary of the literacy levels of smallholder farmers is depicted below in the table 4.3:

Table 4.3: Level of Education of Smallholder Farmers

Level of Education	No. of Respondents	%
No formal education	80	74.7
Primary school	3	2.8
Middle school	17	15.9
Sec/Comm. school	3	2.8
Voc./Tech. school	2	1.9
Post-Sec. school	2	1.9
Total	107	100.0

Source: Author's Field Investigations, May 1990.

4.2.4 Number of Smallholder Household Children in School

A significant proportion (30 percent) of smallholder households have no children attending school while an encouraging 70 percent have children in school.

The implications are that smallholders need more money to be able to educate all the children in school. This meand more work and increased production on the part of smallholder farm families. The other aspect of this is that the labour of school going children will not be available for farming for most parts of the cropping cycle. In addition children, after completing schooling prefer to stay in urban areas to look for white colour jobs. This is likely to reduce the number of farmers in the future as the aged farmers retire. This would likely reduce agricultural production in the district. If on the other hand these children ever decided to stay and farm then they,

literate as they are, are more likely to adopt new technologies faster. Technological innovation and high technical efficiency would result from the likely fast rate of innovation. Older, illiterate farmers can then learn from the young literate farmers.

Table 4.4 summaries the number of smallholder families who have children in school and literacy rate of smallholder households. From the table an encouraging 72 percent of smallholder households have members who can read and write as against 28 percent who have no literate household members.

Table 4.4: Number of Smallholder Households with Children in School and Household Literacy rate

No. of Children	No. of H'sehold with Children in School		Literate Household Members (Literacy Rate)		
	No. of HH	%	No. of Literate	No. of HHs	%
Nil	32	30	Nil	30	28.0
1 -2	44	41	1 - 2	49	45.8
3 -5	25	23	3 - 5	24	22.5
6 and above	6	6	6 and above	4	3.7
Total	107	100	Total	107	100.0

Source: Author's Field Investigation, May 1990

Those literates can help the illiterate members in adoption of innovations. It is hoped however, that those literates are interested in farming and are ready to help the illiterates.

It may be prudent to observe at this juncture that the average smallholder household size (about 9) is higher than that of the district average of 7 persons. This implies that they need higher incomes to survive.

4.2.5 Smallholder Household Size.

A significant percentage (about 46 percent) of smallholder farm households have household sizes (5 - 8 persons) within the district average of 7 persons. About 23 percent have size of 9-12 persons and 5 percent have 13-16 persons. Households with a size of 17 and more persons account for about 12 percent. See table 4.5 for details. It is worth noting that 25 percent and 32 percent smallholder households in Daboya and Mpaha respectively have size of 17 and above.

Table 4.5: Smallholder Farm Household Size

Size	No. of Hosueholds	%
1 - 4	15	14
5 - 8	49	45.8
9 - 12	25	23.4
13 - 16	5	4.8
17 and more	13	12.1
Total	107	100.0

Source: Author's Field Investigations May, 1990

This means that the average smallholder household size could be more than the district average. The implication is that smallholder per capita income could be low given the low level of farm productivity (about 4 bags/ha of maize).

4.2.6 Smallholder Incomes.

It was difficult in most cases to obtain reliable information on the income of smallholder farm families. Most of them were reluctant to disclose their income for various personal reasons, the main one being fear of taxation. Crude gross annual incomes could be derived from the total volume of the annual output of crops marketed. Costs for transport and inputs could be deducted from the monetary value of the total volume of crops marketed to obtain the smallholder household income.

The average smallholder household income obtained is ¢52,840 giving a per capita income of about ¢7,550. This is extremely low compared to the district figures of ¢87,357 and ¢12,480 for household and per capita income respectively.[1] It is still very alarming when compared to the regional and national per capita incomes of ¢49,308 and ¢54,184 respectively. It is dangerously lower than the poverty line (⅓ of national per capita income) as defined by the World Bank.

This means that smallholder farmer households can hardly feed and clothe themselves and still have some money to purchase improved farm inputs which they have always perceived as being rather expensive. The implication is that smallholder farmers would prefer not to purchase "expensive" inputs since they also do not have the necessary

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1 Development Workshop (SPRING II, 1989/90).

education to make them comprehend the need for these inputs. They view investments in new inputs as a big risk so they play safe.

4.2.7 Factor Allocation For Crop Production

All the smallholders interviewed (100 percent) are crop farmers. This is in agreement with the finding of the household socio-economic survey by SPRING II 1989/90 in December 1989 that livestock production is not commercialized. This section discusses land, labour and capital allocation by smallholders in their work.

i. Land and Land Tenure

Land Tenure

Traditionally the chiefs are the custodians of all lands in the district. They decide on the distribution and use of the land resources.

48 percent of smallholder farmers own communal land. A large proportion (45 percent) acquire a land through family inheritance. These are in conformity with the basic principle of customary law, that there is no "ownerless" land and the customary law of descent and distribution in the district. Some 7 percent of smallholders are tenants (see table 4.6).

Generally, there is no problem of land acquisition for farming. Only 2 percent indicated that

they had problems with land acquisition. See table 4.6)* Kamara, 1990 confirmed that individual ownership is not a common phenomenon in the district.

Financial transactions per se in respect of acquiring farmland is not practiced. The most popular terms for acquiring land are share-cropping and the offering of a drink. It can be inferred that share-cropping and the offering of drink for the use of land could have been encountered mainly by migrants. This pattern of land tenure could be a disincentive to migrant

Table 4.6: Smallholders' Title to Farm Land

Title	No. of Respondents	%
Landlord on Communal land	51	48
Landlord on Family land	48	45
Tenant	8	7
Total	107	100.

Source: Author's Field Investigation, May, 1990

farmers to maximize production since land owners are the ultimate beneficiaries of their (migrant farmers) hardwork and high production. Both landlords and tenants become victims of this circumstance and low income is the result. They cannot buy those non-farm goods for themselves and their families. This would likely lead to

Table 4.7: Problems of Land Acquisition for Farming

Response	No. of Respondents	%
Have Problems (Yes)	6	1.9
No Problems (No)	274	86.7
No Response	3.6	11.4
Total	107	100

Source: SPRING II, 1989/90 Workshop Report.

low standard of living.

b. Farm Plots and Farm Sizes

The communal system of land ownership inhibits the use of land as collareral security for obtaining credit.

Generally, farm sizes are small, and scattered. Smallholders own one or more small farm plots which could be at different locations. 39.3 per cent of smallholders have only one plot and 38.3 percent own two plots while 11.2 percent cultivate three and four plots each respectively (See table 4.8).

Table 4.8: Number of Plots Owned by Smallholders

No. of Plots Owned	No. of Respondents	%
1	42	39.3
2	41	38.3
3	12	11.2
4	12	11.2
Total	107	100

Source: Author's Field Investigations, May, 1990

Individual plot sizes lie between less than 0.4 hectares (ha) - 1.6 hectares. While 11.2 percent of smallholders own plots of size less than or equal to 0.4 ha., 42 percent cultivate plot sizes of greater than 0.4 - 0.8 ha. 26.2 percent and 20.6 percent cultivate plots sizes of greater than 0.8 - 1.2 ha and greater than 1.2 - 1.6ha respectively (see table 4.9).

Table 4.9: Frequency of Plot Sizes Owned by Smallholders

Plot Size Range (ha)	No. of Respondents	%
Less than or equal to 0.4	12	11.2
Greater than 0.4-0.8	45	42.0
Greater than 0.8-1.2	28	26.2
Greater than 1.2-1.6	22	20.6
Total	107	100

Source: Author's Field Investigations, May, 1990

Average farm sizes of the localities studied are: Damongo - 0.8ha; Buipe - 1.2ha; Daboya - 0.8ha amd Mpaha - 1.5ha. These are indications of the levels of productivity of smallholders in these localities. The overall average farm size in the district is 1.1ha for smallholders.

The implications of this are varied. Farm sizes are small in relation to average smallholder farm family size (about 9 persons) which is higher than that of the district (7 persons). Farm production can be increased either by increasing farm size or by adopting improved farm technologies. Both

of these options require capital. Implements such as bullock-ploughs and tractors are needed for cultivating larger acreages while fertilizers, agrochemicals and improved seeds are required for increased yields on even the same small plots.

Farm plots are rather far away from smallholders houses and are scattered. The avrage distances of farms from houses for the various localities is depicted in table 4.10. The average for Damongo is 4.32km; Buipe is 2.88km; Daboya is 4.96km and Mpaha 4.85km. This gives a district average of about 4.3km.

Table 4.10: Farm Size Ranges and Average Distance from House

Farm Size Range(Ha)	Average distance from house/location			
	Damongo	Buipe	Daboya	Mpaha
Less than or equal to 0.4	3.6	2.4	4.5	-
Greater than 0.4-0.8	3.87	2.8	4.53	-
Greater than 0.8-1.2	5.6	1.3	5.4	4.85
Greater than 1.2-1.6	6.4	2.0	-	-

Source: Author's Field Investigations, May, 1990

This implies that farmers use a lot of time and energy travelling to and from their farms. This time and energy could have been profitably utilized to either increase farm production or engage in other income generating activities.

ii. Labour Inputs

Labour, as a major factor of production has a lot of influence on farm productivity levels. Farm labour can take several forms. This section discusses some aspects of labour for crop farming.

- Types of Farm Labour for Crop Farming

Family labour is the most important (61 percent) followed by hired labour (about 20 percent) for smallholder crop farming. See table 4.11 for details. This is similar to the general trend in the district as indicated in table 3.2. This could be a probable logic behind the large size of smallholder households (about 9 persons) as compared to 7 persons for the district.

Table 4.11: Types of Farm Labour

Type of Labour	No. of Respondents	%
Family labour	65	61.0
Hired labour	21	19.6
Co-operative labour	13	12.0
Family and hired labour	4	3.7
Family and co-operative labour	3	2.8
Co-op. labour & hired labour	1	0.9
Total	107	100

Author's Field Investigations, May, 1990

The study also revealed that 58.5 percent of household members who work on household farms are male and 41.5 percent are female while a significant average of 5 household members are dependants giving

a dependency ratio of 1.25 hence, low per capita income.

This means that labour productivity must be high to support the dependants. This can be difficult and therefore calls for the use of technological inputs to increase production.

Table 4.12: Farm Operations for which Smallholder Hire Labour

Operation	No. of Respondents	%
Land preparation	3	13.0
Planting	1	4.4
Weeding	8	34.8
Fertilizer Application	2	8.7
Harvesting	2	8.7
Weeding and Harvesting	3	13.0
Land preparation and weeding	4	17.4
Total Hiring Labour	23	100
No. who do not hire labour	84	
Total Interviewed	107	

Source: Author's Field Investigations, May, 1990

Table 4.12 shows that about 27 percent of smallholders hire labour. Of this, a significant percentage 34.8 percent hire labour during weeding. The farmers themselves work an average of 7 man-days per week.

The study also revealed that a large percentage (97 percent) of those who hire labour also incur additional coats in form of food, drinks and cigarettes to the tune of ¢100 - 200 per labourer per day. This could bring to about ¢600 - 700 on a labourer per day for weeding. This is rather high for smallholders with a low per capita income.

Table 4.13: Farm Labour Wages per Labourer per day

Farm Operation	Daily Wage(¢/day
Planting or fertilizer Application	200 - 300
Land preparation	300 - 400
Weeding	500
Harvesting	150 - 200

Source: Author's Field Investigations, May, 1990

- Peak Working Periods

As depicted in the table 4.14, the farming season falls between April to December. Because of the long rainy season, farmers are able to utilize any time during the period depending on the growth habits of particular crops (see also figure 2 - Cropping Calender).

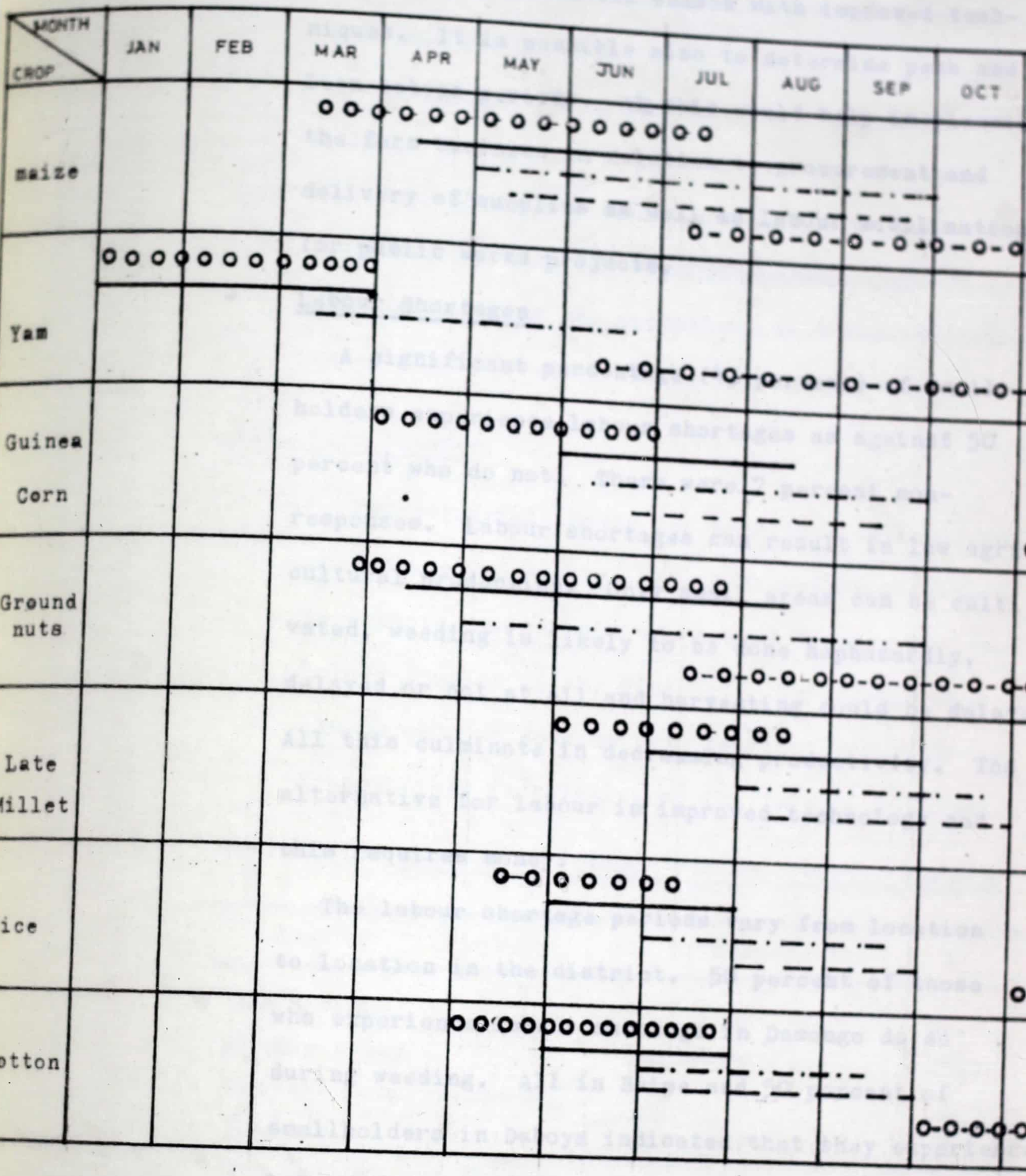
Table 4.14: Peak Working Periods for the Various Localities

Location	Periods for various farm operations (months)			
	Land Prep.	Planting	Weeding	Harvesting
Damongo	Mar/April/May	May-June	May-June	Nov - Dec.
Buipe	April - May	May-June	May-June	Sept-Dec.
Daboya	April - May	May-June/ July/Aug.	May/June July/Aug	Nov. - Dec.
Mpaha	May/June	June/July	June/July	Nov. - Dec.

Source: Author's Field Investigations, May 1990 and District Agricultural Extension Officer, Damongo.

The implication is that farm inputs must be at the farm gate by February/March just before land

FIG.2 CROPPING CALENDER, WEST GONJA DISTRICT



KEY:— Land Preparation; Basic Fertilizer application; Weeding; Fertilizer Top Dressing; Harv

Source: MOA, District Agricultural Extension Offices, Damongo.

preparation if optimum yields are to be obtained. It should also be possible to cultivate crops like maize twice in the season with improved techniques. It is possible also to determine peak and lean labour periods. All this would help in planning the farm business in relation to procurement and delivery of supplies as well as labour mobilization for public works projects.

- Labour Shortages

A significant percentage (43 percent) of smallholders experience labour shortages as against 50 percent who do not. There were 7 percent non-responses. Labour shortages can result in low agricultural production. Only small areas can be cultivated, weeding is likely to be done haphazardly, delayed or not at all and harvesting could be delayed. All this culminate in decreasing productivity. The alternative for labour is improved technology and this requires money.

The labour shortage periods vary from location to location in the district. 50 percent of those who experience labour shortage in Damongo do so during weeding. All in Buipe and 50 percent of smallholders in Daboya indicated that they experienced labour shortage during harvesting while all in Mpaha experience it during both land preparation and weeding. The alternatives left for such farmers include reducing area of operation, delay operation or not doing anything about it. These actions by farmers are likely to reduce yields with attendant income

reduction. The only other alternative in the positive direction is to use improved technology which requires huge financial investments which smallholders lack.

Smallholders have over the years adopted certain measures to cope with labour shortages. To cope, 63 percent said they hire more labourers, 5 percent by reducing area of operation and 32 per cent by delaying the operation, with varied implications as discussed in the last paragraph.

iii. Farm Finance

Technological inputs for increased agricultural production are costly. It is therefore pertinent to explore the various sources of finance for smallholder farming in the district. An attempt will also be made at looking into smallholders financial transactions in relation to the farming business.

Table 4.15: Sources of Finance for Smallholder Farmers

Source	No. of Respondents	%
Own Savings	66	61.4
Family money	27	25.0
Private Money lenders	2	2.3
Friends	2	2.3
Own Savings and Friends	10	9.0
Total	107	100

Source: Author's Field Investigations, May, 1990

As indicated in Table 4.15, farming activities are financed mainly from smallholders own savings (61.4 percent) as against 85 percent by farmers in the district. Family money as a source accounts for 25 percent as against 9.2 percent for the district, A possible explanation of these differences could be the low per capita income of smallholder households. They therefore cannot save as much as other farmers in the district and so they in turn depend more on family money for farming (25 percent) than the district average (9.2 percent). See tables 3.3 and 4.15 for details.

The table 4.15 further reveals that formal sources of credit are not available to smallholder farmers. This may be attributed to the collateral security a and similar lending policies of the banks which are unfavourable to smallholders. To be able to adopt improved technology requires huge sums of money which smallholders cannot afford. Financial policies tailored to the needs and situation of smallholders are needed in this context to improve the lot of the smallholders.

- Mode of Payment for Inputs

About 57 percent of smallholders pay for their inputs in cash and 23 percent pay with harvest while 18 percent pay by both means (see table 4.16)

Table 4.16: Mode of Payment for Inputs

Mode of Payment	No. of Respondents	%
Cash	61	56.8
In kind (with harvest)	24	22.7
Cash and Kind	20	18.2
On credit	2	2.3
Total	107	100

Source: Author's Field Investigation, May, 1990

In the absence of credit where smallholders have to depend on their own meagre savings to farm, most farmers would not find it prudent to invest in technological inputs. It is safer to continue with the traditional method since smallholders are more often suspicious of the performance of new inputs.

Table 4.17: Stages in the Cropping Cycle when money is most needed

Stage in Cropping Cycle	No. of Respondents	%
Land Preparation	24	22
Planting	7	7
Weeding	17	16
Harvesting	2	2
Planting and Weeding	22	21
Land preparation and Weeding	17	16
Land preparation, Weeding & Harvesting	15	14
Weeding and Harvesting	2	2

Source: Author's Field Investigations, May 1990

From table 4.17 more smallholders (22 percent) need money for farming most during land preparation Those who need money both during planting and weeding constitute 21 percent. 16 percent need money most during weeding, and during both land preparation and weeding respectively.

Smallholders who cannot raise money from their own savings for use during the various operations have other options: to reduce farm size which results in loss of output; refuse weeding or weed haphazardly which reduces yield, or use weedicides or other pesticides which require more money; delay operation which also results in yield loss.

Savings By Smallholders

About 11 percent of respondents indicated that they operate savings accounts. Of this, 80 percent save with the Ghana Commercial Bank, Damongo and 20 percent with the Co-operative Credit Union. It is interesting to note that all those who have savings accounts live in Damongo. The rest (89 per cent) in the district have no savings accounts.

The fact that most smallholders do not operate savings accounts with any bank does not mean they d do not save anything at all. While 75 percent said they spent all their income from crop farming last year, 25 percent indicated they saved some money, though not in banks. Of those who saved some money, 45.5 percent live in each of Damongo and Daboya and 9 percent live in Mpaha. No smallholder in Buipe

smallholder was about ¢27,700 last year.

Smallholders do not save money with banks probably because they are not accessible to banking facilities. There is only one branch of the Ghana Commercial Bank situated at Damongo, the district capital. The other reason would be the lcw literacy rate among smallholders. This attitude of smallholders explain why they do not get credit facilites from the banks or credit unions.

Lack of credit facilities (42 percent) was cited as the main problem facing smallholders in their bid to adopt improved farm technology because these inputs are expensive. High bank interest rate (30 percent), harrassment from banks for loan repayment (18 percent) were some of the problems mentioned.

Some suggestions to improve the credit situation include: MOA to give input loans like GLOBAL 2000 , lower interest rates, rescheduling of repayment in cases of crop failure and bank officials should be honest among others.

iv. Farming Systems and Yields

The continued adoption and use of the present traditional farming systems and tools are the direct results of the combined effects of land, labour and capital. The result has been very low yields of land and labour in farming in the district.

- Farming Systems and Technology

The predominant farming system among smallholders is shifting cultivation or the practice of fallow. Crop rotation and mixed farming are also practiced but to a lesser extent. There are indications that pressure on land is increasing.This is supported by the gradual change in cultivation habits by some smallholders interviewed. The study revealed some peculiar chacteristics of smallholder farming in the district. It must be said however, that agricultural practices by smallholders are basically traditional with small and scattered farms.

- Shifting Cultivation/Fallowing

Some smallholders (6.5 percent) indicated that they cultivate their lands continuously for between 1 2 - 4 years before fallowing while 13.2 percent cultivate continuously for 5-6 years and 3.7 percent fallow after cultivating for over 6 years. These periods of cultivation mean that the soil is continuously taxed. Besides, smallholders use very little modern inputs which will otherwise replenish the lost soil nutrients. The land, under these present practices is likely to get exhausted and ultimately producing reduced yields. See table 4.18 for details.

Table 4.18: Years of Continuous Cultivation Before Fallowing

No. of Years	No. of Respondents	%
1	7	6.5
2	29	27.0
3	34	31.8
4	19	17.8
5	9	8.4
6	5	4.8
More than 6	4	3.7
Total	107	100

Source: Author's Field Investigation May 1990

Length of Fallow

A significant percentage (20.6 percent) of smallholders leave their farmlands to fallow only for a period of one year. 49.5 percent fallow their lands for periods between 2 - 4 years before cultivating again and 14.9 percent fallow for 5 - 6 years while 5.6 percent fallow for periods of over six years. These fallow periods are relatively short compared to the usual seven years and above accepted by the FAO as long enough for replenisment of soil nutrients. Land may be plentiful, as is the case in West Gonja district, but if new land is far away, coupled with the very poor transportation situation, then farmers will have no option than to shorten fallow periods. This will drain the soil of its nutrients as well as physically exhausting it. Soil erosion and similar degradation of soil are likely results. The use of modern farm inputs such as fertilizers become imperative.

Table 4.19 gives the details of length of fallow.

Table 4.19: Years of Fallow (Length of Fallow)

No. of Years	No. of Respondents	%
Nil	10	9.4
1	22	20.6
2	12	11.2
3	14	13.1
4	27	25.2
5	13	12.1
6	3	2.8
More than 6	6	5.6
Total	107	100.0

Source: Author's Field Investigation, May 1990

About 30 percent of smallholders intimated that the period of fallow has decreased over the past ten years while about 70 percent said it has not changed. Those smallholders who said the fallow period has decreased advanced certain reasons why it is so. Most of these smallholders (53.2 percent) think that the most important reason for decrease in fallow years is that "more people compete for the land" while a large percentage (31.2 percent) indicated that the reason could be that "new land is too far away", and 15.6 percent hinted that it could be a result of the "use of new technological inputs". See table 4.20 for details.

Table 4.20: Smalholders Reasons for Decrease in Fallow Period

Reason	No of Respondents	%
More people compete for land	17	53.2
Use of new technological inputs	5	15.6
New land too far waway	10	31.2
Sub Total	32	100.0
Not Applicable (unchanged)	75	
Total smallholders interviewd	107	

Source: Author's Field Investigation, May, 1990

33.6 percent of the smallholders said that there are fields they cropped yearly and 64.5 per cent have no fields which they cropped yearly. There were about 1.9 percent no responses. The large percentage (64.6 percent) who do not have fields they cropped yearly implies that farm technology remains traditional with associated small sizes and lowy:ields.

Smallholders who said they have fields they cropped yearly gave the reasons in table 4.21 why fallowing was not necessary. 22.2 percent also said the 'land is fertile' and the same percntage indicated that it is because of 'lack of land/new land is too far away'. A significant percentage 16.7 percent think it is the availability and use of chemical fertilizers' which has rendered fallowing unnecessary.

Table 4.21: Smallholders Reasons Why Fallowing is not Necessary

Reason	No. of Respeondents	%
Land is fertile	8	22.2
Lack of capital to clear land	2	5.6
Availability and use of chemical fertilizers	6	16.7
Restricted to alloted area	4	11.1
Lack of land/New land to far away	8	22.2
Practice Intercropping	4	11.1
Practice Crop Rotation	4	11.1
Total (Cropping field yearly	36	100.0
Not Applicable (no continuous croppin)	69	
Total (All Smallholders	107	

Source: Author's Field Investigations, May, 1990

- Tools/Implements Used for Land Preparation

According to the survey, 64.5 percent smallholders use hoe/cutlass for preparing their land and 22.4 percent use tractors. 12.1 percent use a combination of hoe/cutlass and tractor while 0.9 percent use a combination of hoe/cutlass and bullock plough. In the various localities studied, 80 percent in Buipe; 72 percent in Daboya and 100 percent in Mpaha use hoe/cutlass only. This high percentage implies that only small land areas can be cultivated and weeding could be unsatisfactory. The result would be low farm outputs and hence low incomes. Table 4.22 shows the details of tools and implements used by smallholders for land preparation.

Damongo is more advantaged in relation to the other localities in terms of tools and implements.

Table 4.22: Tools/Implements Used for Land Preparation

Tool/ Implement	Damongo		Buipe		Daboya		Mpaha		Dist. Total	
	No	%	No	%	No	%	No	%	No	%
Hoe/Cutlass	23	46	16	80	18	72	12	100	69	64.5
Tractor	18	36	4	20	2	8	-	-	24	22.4
Hoe/Cutlass & Bulloch plough	1	2	-	-	-	-	-	-	1	0.9
Hoe/Cutlass & Tractor	8	16	-	-	5	20	-	-	13	12.1
Total	50	100	20	100	20	100	12	100	107	99.9

Source: Author's Field Investigations, May, 1990

- Crop Yields

The yields of important crops cultivated by smallholders reveal rather surprisingly, that smallholder have the ability to increase their yields and hence production. Table 4.23 shows that the average yield of maize for smallholders in the ditrict is about 13 maxi bags/hectare as compared to the district average of 9.6 bags/ha and 14 bags/ha for nothern region.[2]

Even though the yield of maize for smallholders in Buipe (4.7 bags/ha) and Mpaha (6 bags/ha)are lower than the district average, their counterparts in Damongo (18.1 bags/ha)and Daboya (23 bags/ha) can (boast of yields higher than

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2 District Agricultural Extension Office, Damongo, May 1990

Table 4.23: Yield of Important Crops at different Locations

Crop	Location and Yield (Bags, Tubers/ha				
	Damongo	Buipe	Daboya	Mpaha	District
Maize	18.1	4.7	23.0	6.0	13.0
Yam	1300	-	750	650	1025
Guinea Corn	10.3	3.9	20.0	5.8	11.4
Groundnut	12.8	6.0	30.5	-	16.4
Rice	20.0	4.2	-	-	12.0

Source: Author's Field Investigation, May, 1990

those of the district or the region. A number of West Gonja smallholders receive input loan in form of fertilizer and improved seed from GLOBAL 2000. This comes in a "package" deal under close supervision of agricultural extension agents, The average yield of GLOBAL 2000 farmer in the district is 46 bags/hectare of maize. It is likely therefore that some GLOBAL 2000 farmers were interviewed. At least this indicates that there is a large productivity reserve.

The relatively high yields of various crops in Damongo and especially Daboya is likely to be as a result of improved technology used in these areas as compared to the very low yields in Buipe and Mpaha. This may be explained by the relatively low

fertilizer application rates by smallholders in Buipe (2.5 bags/hectare) and Mpaha (1.8 bags/ha) and Daboya (8.1 bags/ha) and the recommended rate of 10 bags per hectare.

The most important lesson that can be learnt from this is that smallholder productivity will rise given the necessary inputs.

v. Problems of Crop Production

There are several problems facing smallholder farmers in crop production. The main ones centre around agricultural extension, marketing and storage, inputs supply and farm finance. This section discusses the problems related to agricultural extension, and marketing and storage.

- Agricultural Extension Services

The organisation of agricultural extension services has been discussed in chapter three (3.4.5) and illustrated in figure 1.

From the author's field survey all the smallholders (25) interviewed in Daboya indicated that they are visited by agricultural extension agents from the MOA. 55 percent in Damongo and 20 percent in Buipe are visited by agricultural extension agent in their area.

The study also revealed the average frequency of visit by the extension agent is once in two months. 50 percent of smallholders in Damongo, 90 percent in Buipe, 60 percent in Daboya and 75 percent in Mpaha indicated that they visit the extension agent. Aside the MOA, smallholders do not receive extension service from any other organisation.

The main problems facing agricultural extension in the area include, lack of adequate means of transport for extension agents, lack of spare-parts for the available motorbikes, lack of accommodation at stations and absence of Farmers Services Centres to stock inputs. The other problem is related to old age and high illiteracy rate among smallholders (about 75 percent - see tables 4.1 and 4.3).

All the above contribute to ineffective extension services which also result in decreased yields.

Marketing And Storage

There must be readily available market and good storage for farm produce if farmers should increase production.

A significant percentage (36 percent) of smallholders interviewed said they sold all their crop immediately after harvest and 64 percent stored some or all of their harvest for sale later when prices are higher. All respondents in Buipe, 70 percent in Daboya, 50 percent in Mpaha and 45 per cent in Damongo stored some produce in order to sell at higher prices at the beginning of the next season when prices are usually higher.

This is a direct result of farm price fluctuation. It is likely, however, that farmers incur large losses in storage which they cannot quantify because of inadequate storage facilities.

Some of the reasons cited for selling produce immediately after harvest include urgent need for money (for various reasons including:- farming being only source of income, high dependancy load and other family commitments - 78 percent);

lack of storage facilities (12 percent) and debt repayment to avoid embarrassment (10 percant) from creditors. The commonest reason cited for selling later is higher prices (95 percent), 5 percent are purely subsistent and they claim they kept the harvest to feed the family.

Table 4.24: Prices of Important Crops immediately after Harvest and later in the year

Crop	Average Price aoon after Harvest	Average Price later in the Year	Difference*
Maize	¢5000/maxi bag	¢8000/maxi bag	¢3000
Yam	¢7000/100 tubers	¢15500/100 tubers	¢8000
Guinea corn	¢5500/bag	¢7000/bag	¢1500
Ground-nuts	¢4000/bag(unshelled)	¢6500/bag	¢2500
Cowpeas	¢4000/bag	¢10000/bag	¢6000
Cassava6	¢1200/bag	¢2000/bag	¢800/

* Buipe has especially large prices difference with an average of ¢5000/bag of the grains.

Source: Author's Field Investigation, May, 1990

This practice of keeping harvest to sell later can create artificial shortages of farm produce. High enough guaranteed minimum prices and credit facility to bridge the hunger gap could reverse this habit, There is need for efficient storage facilities.

- Buyers of Farm Produce

Private wholesalers are the largest group (about 41 percent) buying from smallholders. The Ghana Food Distribution Corporation (GFDC) with 20.4 percent is the second largest buyer and direct sales on market accounts for about 18 percent of the market for farm produce.

Most of the private wholesalers are from the towns and cities. They often offer very low prices for produce becnuse of lack of storage facilities on farms and for the fact that some of them pre-finance smallholders farming operations.

Table 4.25: Market for Farm Produce

Buyer	% Respondents
GFDC	20.4
Private wholesalers	40.8
Retailers	11.4
Direct sales on market	18.2
Others	8.2
Total	100.0

Source: Author's Field Investigation, May 1990

Means of Transporting Produce to Market

25 percent of smallholders transport their produce by tractor, 20.5 percent by headload and 16 percent each by lorry and buyer collecting from farm (see table 4.26).

Table 4.26: Mode of Transporting Produce to Market

Mode	% of Respondents
Headload	20.5
Lorry	16.0
Tractor	25.0
Buyer collect from farm	16.0
Headload & Tractor	9.0
Others	13.5
Total	100.0

Source: Author's Field Investigations, May, 1990

Apart from lorry most of these modes of transport are not efficient enough to carry reasonable quantities of produce to the market in good condition.

Farmers do not use storage chemicals mainly because of high costs.

If smallholders must increase productivity then there must be efficient and adequate means of transport, marketing and storage facilities.

4.3 FERTILIZER USAGE AND QUANTITIES

4.3.1 Fertilizer Usage

The main issue of inputs supply and usuage is centred around fertilizers. This is so because it is the most visibly used improved technology farmers have been able to acquire relatively more easily. It is often in bags that the smallholders can ordinarily afford to use without wastage.

This section deals with the use of fertilizer by smallholder farmers, their sources of supply, spatial distribution of these sources of supply and problems of the supply system and suggestions for solutions to these problems among others.

The study revealed that about 58 percent of smallholder farmers apply chemical fertilizers to their crops and a significant percentage (42 percent) do not apply fertilizer. There was no indication of any smallholder farmers using organic fertilizer (manure).*

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* Author's Field Investigations, May, 1990.

4.3.2 Quantity of Fertilizer Used in 1989 By Smallholder Farmers

Smallholdr farmers constitute about 95 percent of all farmers in the district. It is therefore expected that their use of farm inputs will total up to something near this proportion. This is especially expected since for most smallholder farmers in Ghana as a whole, fertilizers are the only technologically improved farm input.

70 percent of smallholders in Damongo and an approximate percentage (68 percent) of Daboya smallholders apply chemical fertilizers. Mpaha and Buipe smallholders who apply fertilizer form 50 percent and 20 percent respectively. See table 4.27[b] for details.

In all smallholders in the localities studied consumed 212.5 bags of compound fertilizer (15-15-15 and 20-20-0 NPK) and 231.0 bags of straight fertilizer (sulphate of ammonia - S/A) totalling 443.5 bags. This quantity amounted to about ₡1,340,100 in monetary terms and was applied to a crop area of 65 hectares (ha), mainly maize. The average fertilizer application rate by smallholders is thus 6.8 bags per hectare instead of the recommended 1:1 ratio or 5:5 (5 bags compound: 5 bags straight) making 10 bags per hectare. Smallholders in Damongo, where farming practices are relatively more intensive apply fertilizers at the rate of 8.9 bags/ha. In Daboya, application rate is 8:1 bags/ha while it is 2.5 bags/ha and 1.8 bags/ha in Buipe and Mpaha respectively. Furthermore, larger quantities of the straight fertilizer, sulphate of ammonia (S/A) are used in excess .. of compound fertilizers. Smallholders in Buipe and Mpaha

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Source: Author's Field Investigations, May 1990.

Fertilizer Type	Qty (Bags)	Average Unit Price ¢	Amount ¢	Recommended Application Rate bag/ha	Crop Area (ha)	Average Applied bag/ha
Damongo						
Compound:						
15-15-15	65	3500	227500	5	31.0	
20-20-0	90	3450	310500	5	31.0	
Total	150		538000	5	31.0	4.8
Single:						
Sulphate of Ammonia	127.5	2450	312375	5	31.0	4.1
Total Damongo (All types)	277.5		850375	10		8.9
Buipe						
Sulphate of Ammonia	12	2600	31200	5	4.8	2.5
compound	-	-	-	-	-	-
Daboya						
15-15-15	30	3600	108000	5	15.0	
20-20-0	17.5	3350	58625	5	16.0	
17-17-17	15	3600	54000	5	16.0	
Total	62.5		220625	5		3.9
Single						
Sulphate of Ammonia	67.5	2600	175500	5	16.0	4.2
Total Daboya	130.0		396125	10		8.1
Mpaha						
Sulphate of Ammonia	24	2600	62400	5	13.2	1.8
1. Compound	212.5		758625	5	65	3.3
62. Single	231.0		581475	5	65	3.6
GRAND TOTAL	443.5		1340100	10	65	6.8

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applied only sulphate of ammonia.

The lower application rates and the distortion in the 1:1 (5:5) application ratio is likely to give lower yields than expected. The cheaper price of S/A (₵2600) may be a likely reason for smallholders applying more of it and sometimes not applying any compound fertilizer at all. The imbalance in fertilizer application may cause yield reduction and sometimes total crop failure may result. Probably this may account for the very low yields of Buipe and Mpaha smallholders (4.7 and 6 bags of maize per hectare) respectively, See table 4.27a.

This means lower incomes since fertilizer costs will ~~hav~~ have to be paid for.

Table 4.27b Smallholders Applying Fertilizer and Crops to Which Applied

Location	No. of Resp'dent	No. Appying Fert.	% Applying	App'tion Rate/ha	Crop
Damongo	50	35	70.0	8.9bags	maize
Buipe	20	4	20.0	2.5bags	maizee
Daboya	25	17	68.0	8.1bags	maize
Mpaha	12	6	50.0	1.8bags	maize
Total	107	62	58.0		

Source: Author's Field Investigations, May, 1990

All (100 percent) of the smallholders who used fertilizer applied it to maize including two who also applied it to rice and groundnuts in addition.

The recommended rate of application of fertilizers is (2:2 bags /acre ie. 0.4ha) or 5:5 bags/ha making 10 bags/ha or 4 bags/acre.

The quantity of fertilizer used by 58 percent of the s - smallholders could have been more if the recommended application rates were adhered to. The total fertilized area is 65 hectares. At the recommended application rate of 5:5 or 10 bags per hectare, the total quantity of fertilizer used should be 650 bags as compared to the 443.5 bags. This gives a fetilizer usage rate of about 68 percent of the recommended quantity (650)bags. This is likely to give lower yields than expected. The other implication is that farmers are likely to lose confidence in fertilizers since the actual yields would be lower than expected. The low illiteracy rate among smallholders and low incomes could be factors in the wrong application rates.

Depending on the intensity of farming at the location smallholder farmers spent various amounts on fertilizers during the last cropping season as follows:

Damongo - ¢24,296.40

Buipe - ¢ 7,800.00

Daboya - ¢23,301.50

4.3.3 Frequency of Fertilizer Application and Stages Applied During the Cropping Cycle

Generally, smallholders apply fertilizer two times during the cropping cycle. Compound fertilizers,15-15-15, NPK, 20-20-0, or 17-17-17 is applied first when the crop (mainly maize) is 2-4 weeks old. Only 25 percent out of the 40 percent smallholders who applied fertilizers at Buipe indicated that they applied a third time during the cropping cycle. The third dose was applied when the crop was 8 weeks old; only 2 weeks after the second application. All the smallholders (100 percent) who applied fertilizers applied sulphate of Ammonia as top-dressing in the second dose when the crop is 4 - 8 weeks old.

This has implications for supply. Fertilizers should therefore be in stock in the district long before the planting season begins. Since long hours are used in travelling from location to location in the district farmers are likely to feel reluctant to travel for the purposes of purchasing fertilizer if the farming season has begun and they are busy on their farms. This calls for storage facilities for fertilizer both at the Ministry of Agriculture sales points and on the farm. This would mean financing inventory which ultimately means money.

4.3.4 Timing of Fertilizer Supplies

About 63 percent of Damongo farmers indicated that they get fertilizer supplies at the right time. There is no smallholder in the other localities, Buipe, Daboya and Mpaha who get fertilizer in time for application at the right time. This group of Damongo smallholders constitute about 35.5 per cent of all smallholders who apply fertilizer in the district.

Smallholders in Buipe, Daboya and Mpaha form the bulk of the 64.5 percent who do not get their supplies in time.

This means that most smallholders (64.5 percent) purchase late and therefore apply at later stages of the cropping cycle. Applic tion at the wrong time means applying the wrong type. Smallholders may use their monies for other things and may not apply fertilizer at all or purchase only limited quantities. This may result in one dose instead of two of application. Others may decide not to farm at all or cultivate crops which may not need fertilizers under the circumstances. The result could be low productivity and decreased agricultural production. Low income results and standards of living fall.

4.3.5 Information on Source and Application of Fertilizer for Smallholder Farmers

Most (85.5 percent) of smallholder farmers obtain fertilizers from agricultural extension officers. Other farmers/ friends account for 6.5 percent, The remaining 8.0 percent get information from both agricultural extension officers and other farmers. See table 4.28.

Table 4.28: Sources of Fertilizer Information

Source of Information	No. of Respodents	%
Agric. Extension Officer	53	85.5
Other Farmers/friends	4	6.5
Agric Ext. officer and other farmers	5	8.0
Total	62	
N/A	45	
All Smallholders	107	100.0

Source: Author's Field Investigations, May, 1990

4.3.6 What Smallholders Mean by Fertilizer Delays

Smallholder farmers who do not get fertilizer at the right time (64.5 percent) advanced some possible reasons why this could be so. A good number (30 percent) attributed this to lack of money to purchase at the right time. 25 percent and 22.5 percent respectively blamed the delay on late Ministry of Agriculture supplies and slow distribution system. Table 4.29 has the details.

Table 4.29: Farmers Reasons Why Fertilizer Delay

Reason	No.	%
Lack of money to purchase at the right time	12	30.0
MOA supplies late(long after planting)	10	25.0
MOA supplies insufficient quantities	1	2.5
MOA distribution system too slow (long process)	9	22.5
Absence of local fertilizer warehouse (depot)	6	15.0
Local MOA does not supply right types	2	5.0
Total Respondents	40	
N/A	22	
Total Applying	62	

Source: Author's Field Investigations, May, 1990

4.3.6 Smallholder Farmers Reasons for not Applying Fertilizers

It is obvious from table 4.30 that the main reason for not using fertilizer is high prices. 60 percent of respondents who did not apply fertilizer attributed non-use to high prices. Unfortunately fertilizer supply is being privatized and there can be no subsidy. The implications are that if there is no special credit system for smallholder farmers to purchase inputs

such as fertilizers the soils would get exhausted and agricultural production is likely to decrease. Incomes would fall and poverty and low living standards would be the likely results.

Table 4.30: Reasons for not Applying Fertilizer

Reason	No.	%
High prices	27	60.0
Don't need fertilizers now(land quite fertile	5	11.0
Untimely availability	3	6.7
High price & fertile land	3	6.7
No money to buy fertilizers	4	8.9
No response	3	6.7
Total (non-use)	45	100.0
N/A	62	
Total smallholders	107	

Source: Authcr's Field Investigations, May, 1990

The study revealed however that about 80 percent of those who did not apply fertilizers are willing to use fertilizers but for reasons mainly high prices.

There seems to be a good potential for fertilizer usage by smallholders in the district.

4.4 FERTILIZER PRICES

4.4.1 Fertilizer Price Determination

Uniform countrywide retail prices are set by the government. In recent years, prices have been established for two categories of products: (1) compound NPK fertilizers including 15-15-15 and 20-20-0 and (2) single nutrient or striaght fertilizers including sulphate of ammonia (S/A) calcium ammonium

nitrate (CAN), single super phosphate (S/S), and muriate of potash (M/P). Prices are expressed in cedis per 50kg bag, the prevalent mode of sale. Fertilizers are sold on a cash basis.

Fertilizer prices for the years 1979-90 are given in table 4.31. Subsidy levels, as indicated by the Ministry of Agriculture, are also shown for indicated years. Actual selling prices at sub-district or zonal level sales outlets were generally ¢10/bag higher (up to and including 1987 sales) reflecting the addition of handling charges for delivery to retail points. This handling charge is now ¢30/bag.

Table 4.31: Fertilizer Prices - 1979-90

Year	Compound Fertilizer[1]	Straight Fertilizer[2]	Subsidy Level %
	(¢ per 50kg bag)		
1979	10.0	8.0	80
1980	15.0	12.0	65
1981	30.0	25.0	45
1982	30.0	25.0	45
1983	58.0	45.0	45
1984	440.0	295.0	-
1985	440.0	295.0	60
1986	780.0	490.0	42
1987	1380.0	820.0	42
1988[3]	2300.0	1600.0	30
1989[3]	3350.0	2350.0	15
1990[3]	4200.0	3100.0	-

Source: 1979-1987, CEC/MOA Sectoral Import Programme Fertilizer, 1987.

Prices are determined and put into effect when MOA fertilizer imports arrive at the port and the C & F or CIF costs are known. A Prices and Incomes Board (PIB) formula which is applied to all agricultural inputs is used for calculating fertilizer prices[4/]. This paper will not dwell on the details of this formula.

4.4.2 Steps in Fertilizer Price Determination

Table 4.32: 1987 Fertilizer Price Determination(PIB Formula)

	Fertilizer type (cedis/50kg bag)	
	Compound 15-15-15	Straight (S/A)
1. CIF cost	833.00[1/]	494.89[1/]
2. Duty (30 % of CIF)	NA	NA
3. Sales Tax (20%of CIF	NA	NA
4. Bank Charge (7%)	58.31	34.64
5. Interest on Bank loans (9%)	74.97	44.54
6. Transport and handling charges (8%)	66.64	39.59
7. Administratiwn & other overheads (7%)	58.31	34.64
8. Inland frieght, delivery expenses, selling expenses	49.98	29.69
9. Total Cost	1141.21	677.99
10. Importer margin (7.5% of total cost)	85.58	50.89
11. Wholesale price	1226.79	728.88
12. Retail margin (12% of wholesale price)	153.21[2/]	91.12[2/]
13. Retail price	1380.00	820.00

1/ (₡101 = US$)

2/ Based on 12.488 % used in MOA 1985 price calculation schedule

Source: CEC Delegation.

The prices had been established by an Agricultural Commodity Pricing Committee whose membership included, among others, representatives of the MOA and Prices and Incomes Board (PIB)

The massive price hike in 1984 was apparently due to (1) the progressive devaluation of the cedi from ₵2.75 to a level of ₵35 per US dollar in March 1984 and (2) the change over to the PIB method of determining 1984 fertilizer prices. Reportedly, PIB involvement in fertilizer pricing was based on the government's desire to remove the fertilizer subsidy in anticipation of possible privatization of the fertilizer procurement and distribution process.

4.4.3 PIB Fertilizer Price Determination Formula

Table 4.33: Current PIB Fertilizer Selling Price Determination Formula

CIF cost	
Duty (30% of cif)1/	
Sales tax (20% pf cif)1/	
Bank charges (7%)	
Interest on Bank Loan (9%)	
Transport and handling charge (8%)	
Administration and other overheads (7%)	
Inland frieght delivery and selling expenses (6%)	
Total Cost	
Plus Importers margin (7.5% of wholesale price	
Retail price	

Source: CEC/MOA SIP - Fertilizer, 1987

1/ Not applicable in the case of aid programmes.

4.4.4 Fertilizer Prices in Northen Region and West Gonja District

As mentioned elsewhere in the study, the government sets retail prices for various types of fertilizers. The MOA retails it at ¢30/bag of 50kg higher for handling charges. This was confirmed by the Regional Crops Officer, Northern Region, in Tamale during this survey.

It is pertinent to note however, that the MOA incurs ¢120/bag of 50kg on fertilizers in haulage charges from Buipe port to all parts of the northern region. This cost is not passed onto farmers. See table 4.34 for the details.

Table 4.34 Fertilizer Prices

Type	Gov't Price/ 50kg bag	MOA Handling chrges/bag	MOA retail price/ bag
15-15-15	¢3350	¢30	¢3380
20-20-0	3350	30	3380
17-17-17	3600	30	3630
SINGLE/S .... STRAIGHT			
Sulphate of Ammonia(S/A)	2350	30	2380
*Urea 50kg	4200	30	4230
*Urea 25kg	2200	30	2230

* Urea is now (1990) bagged in both 50kg and 25 kg bags, because only ½ unit of it is required to produce the same effect as 1 unit package (50kg) of sulphate of ammonia (S/A)

Source: Crops Services Department, (MOA), Tamale and Damongo.

The handling charges of only ¢30/bag of 50kg charged by the MOA can be thought of as a subsidy since this is no where near the ¢120/bag of 50kg it (MOA) pays in transport charges within the northern region. The charges from Tema through Akosombo to Buipe are not known.

4.4.5 Farm Gate Price of Fertilizer in West Gonja District

The enormous size of the West Gonja district coupled with the scattered nature of settlements and the low density and poor conditions of the road network make it a disadvantaged area. Apart from Buipe, Yapei and a few settlements on the fr first class road from Kumasi to Tamale, most settlements can be said to be inaccessible. A second class road links the Kumasi-Tamale first class road to Damongo from Fufulso junction. Transport charges are high and travel times are long and exhaustive.within the district. The combination of these often adds enormous additional charges to commodities produced in other settlements both within and without the district. See map 2. Farm inputs being industrial goods particularly have to be moved over long distances to the farm gate.

This is reflected in the farm gate prices estimated by the author as a result of his field investigations. The prices paid by smallholders even at the source are normally higher by anything between ¢20 - ¢100/bag of 50kg of fertilizer. In addition, smallholders have to incur the following expenses to get fertilizer to their farms:

i. Transport fare (return) for the farmer if the source of supply is outside his settlement.

ii. Transport charges per bag of fertilizer from the source to the farm junction on the rearest main road.

iii. Charges from the junction to farm per bag of fertilizer

iv. Smallholder farmers in Daboya have peculiar problems which makes Daboya even more disadvantaged:

a. Daboya is far from both Damongo (1o2km), the district capital, and Tamale (70.4km) the regional capital

b. It has only few important functions and services

c. There is no bridge over the Volta and travellers have to cross by small canoes. Apart from fantastic passenger and baggage fares, both life and property are constantly in danger of drowning.

d. The bridge on the Busumu-Daboya road is in a state of disrepair.

Smallholder farmers in Damongo and Buipe pay about ¢120/bag and ¢50/bag of 50kg of fertilizer respectively from the source of supply at the Ministry of Agriculture offices to their farms. For this group therefore, this could be the other extra cost for fertilizer. Mpaha smallholder farmers are probably worse of than their conterparts in Damongo and Buipe but are also better than those in Daboya in terms of costs involved in fertilizer procurement. See table 35 for probable farm gate prices of fertilizers. This is so because the source of fertilizer supply for smallholders in Mpaha is Buipe. Smallholders in Daboya buy fertilizer mostly from Tamale and sometimes from Damongo and MOA , Daboya. The Daboya depot is a temporal one in someone's house and has a low storage capacity. Very few previleged farmers therefore obtain fertilizer from MOA, Daboya, and the majority must travel to Damongo and Tamale to procure the input.

Table 4.35: ESTIMATED FARM GATE PRICE FOR FERTILIZER FOR VARIOUS LOCATIONS (¢/50kg Bag).

	MOA Price	Actual Average paid by farmers	Transport fare for farmer (Return)	Charge, Source - Farm Junc.	Ave. Charges Junc-Farms		Farm Gate Price price ofr Fertilizer
DAMONGO							
15-15-15	3380	3400	-	120	-		3520
20-20-0	3380	3400	-	120	-		3570
17-17-17	3630	3700	-	120	-		3820
Sulphate of Ammonia	2380	2450	-	120	-		2570
BUIPE							
15-15-15	3380	3400	-	50	-		3450
20-20-0	3380	3450	-	50	-		3500
17-17-17	3630	3700	-	50	-		3750
Sulphate of Ammonia	2380	2450	-	50	-		2500
DABOYA							
15-15-15	3380	3600	a-(1800)	200	100	450	4350
			b-		100		3700
			c-	200	200	400	4400
20-20-0	3380	3380	c-(1600)	200	200	400	4180
17-17-17	3630	3630	c-(1600)	200	200	400	4430
Sulphate of Ammonia	2380	2600	a-(1800)	200	100	450	3350
			b-		100		2700
			c-(1600)	200	200	400	3400
MPAHA							
17-17-17	3630	3700	(1000)	300	50	500	4550
Sulphate of Ammonia	2380	2600	(1000)	300	50	500	3450

Sources of Supply and No. of farmers (patrons)

a - MOA, Damongo	- 2 farmers	= 8%
b - MOA, Daboya	- 11 "	= 44%
c - MOA, Tamale	- 12 "	= 48%
	25	100%

Source: Author's Field Investigations, May, 1990

The idea behind the farm gate price calculation for smallholder farmers in Daboya is as follows:

i. There are three different sources of supply - MOA Daboya, Damongo, Tamale. Logistical implications vary with different sources.
   - Transportation costs are especially significant different for both passenger and bags of fertilizer.

ii. It is assumed that the smallholder goes to purchase the fertilizer either by himself or sends someone else.

iii. It is also assumed that he travels purposely to purchase fertilizer and that he buys 4 bags - the basic rate of application (2:2) for one acre (0.4 hectare).

iv. He pays a return passenger fare for himself and one way charge for each bag of fertilizer.

v. Based on the assumption the smallholder travels purposely to purchase 4 bags of fertilizer, then his return transport fare could be treated as part of the cost of fertilizer. A quarter of his transport fare is therefore added to each bag.

vi If the source of supply is Tamale, then the farmer pays for boat crossing over the Volta at Daboya (return journey) and also pays for some charge on each bag of fertilizer on his return.

vii. Having reached Daboya he hires a truck to convey t the fertilizer to his farm.

These are the inputs into the farm gate price estimation in table 4.35.

This means that permanent fertilizer depots should be built at Daboya and Mpaha and all presently inaccessible areas if farmers are to be induced to use fertilizers.

4.5 FARM INPUTS SUPPLIERS

The main issue in input supply centres around fertilizer importation and distribution. Because of the scarcity of fertilizers due to foreign exchange shortages and subsidies on fertilizers the MOA has been responsible for determining annual requirements (provisioning), importing and distributing fertilizers.

A large share of the import and distribution of inputs other than fertilizer ie. agricultural hand tools and agrochemicals is being handled by private sector trading houses (Reiss & Co, UAC, SAKABIO). Parastatals such as GNTC, Grains Development Board, FASCOM - Upper Regions and Volta Region, Tamale Implements Factory among other are important distributors of farm inputs in Ghana.

4.5.1 Fertilizer Supply OpEration

National Background

The Crop Services Department (CSD) of the MOA determines annual fertilizer requirements from consumption estimates submitted by MOA regional offices and the Farmers Services Companies (FASCOM), operating in the Volta, Upper East and Upper West Region. The actual quantities of fertilizers to be imported are determined by the foreign exchange allocated for

fertilizer imports. Imported fertilizer is allocated to regions according to requirement submittals taking into account historical use pattern and inventory positions , see table 4.36.

Fertilizer is imported in bagged form through the port of Tema. At the port it is discharged from vessels directly onto trucks for haulage to MOA national warehouses at Tema, Swedru and Kukurantumi, and to MOA regional and district depots from where it is trucked to sub-district or zonal sales outlets.

Fertilizer consignments for the regions in the north of the country (Northern, Upper East, Upper West) are normally transported by the Volta Lake Transport Company (VLTC). Fertilizer meant for these regions is by road transport to Akosombo from where it is transported by lake transport to the inland port of Buipe. See figure 3a of the fertilizer distribution system.

At Buipe the fertilizer is now in the hands of MOA .. northern region and FASCOM - Upper Region.

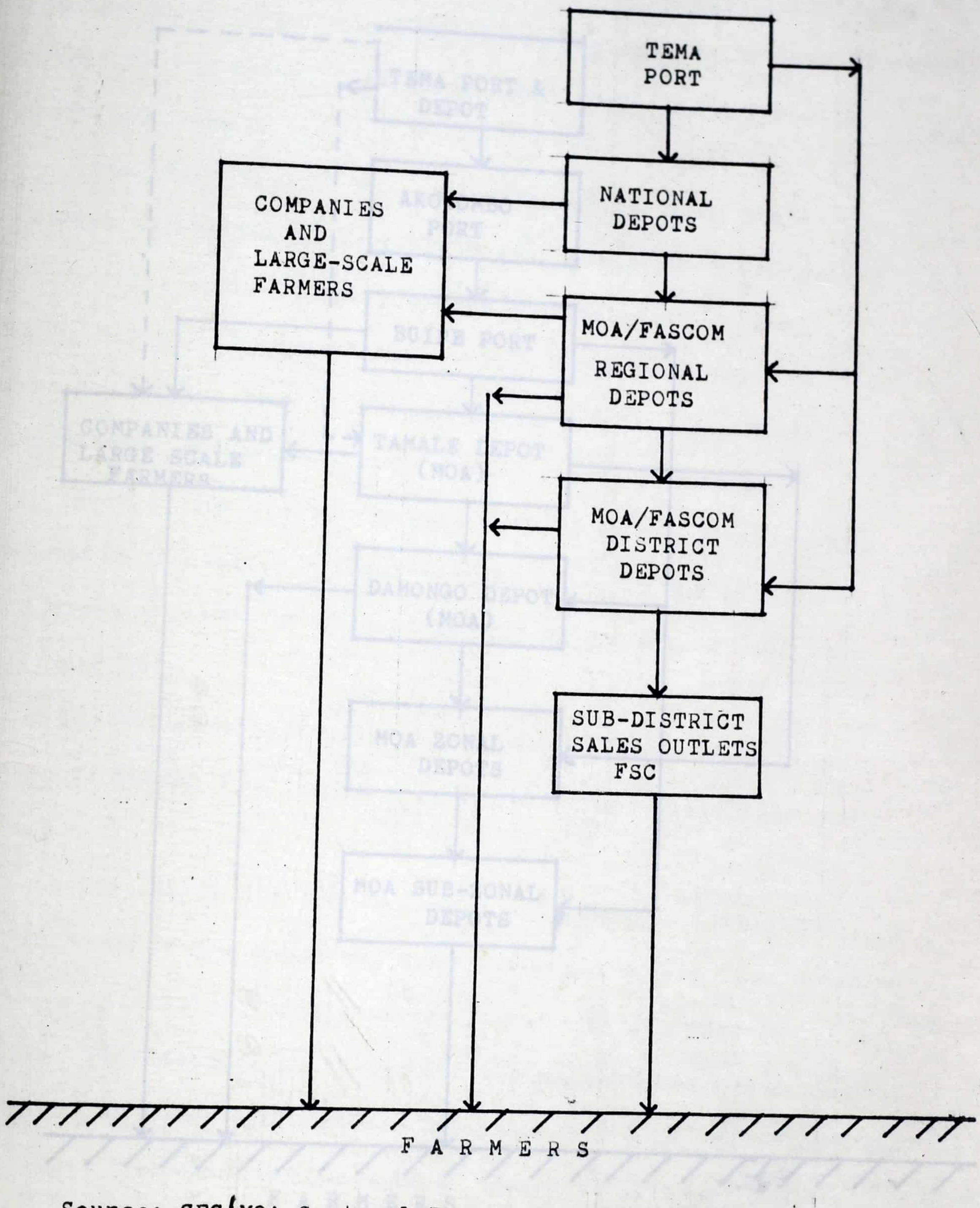
Table 4.36: CSD Fertilizer Allocation Formula

Region	% of Imported Tonnage
Upper (East & West)	20
Northern	22
Brong Ahafo	12
Ashanti	11
Volta	9
Eastern	5
Central	3
Western	3
Greater Accra	5
Companies(parastatals, private companies, large farmer)	11

"CEC/MOA, Ghana Sectoral Import Programme, (SIP) Fertilizer 1987.

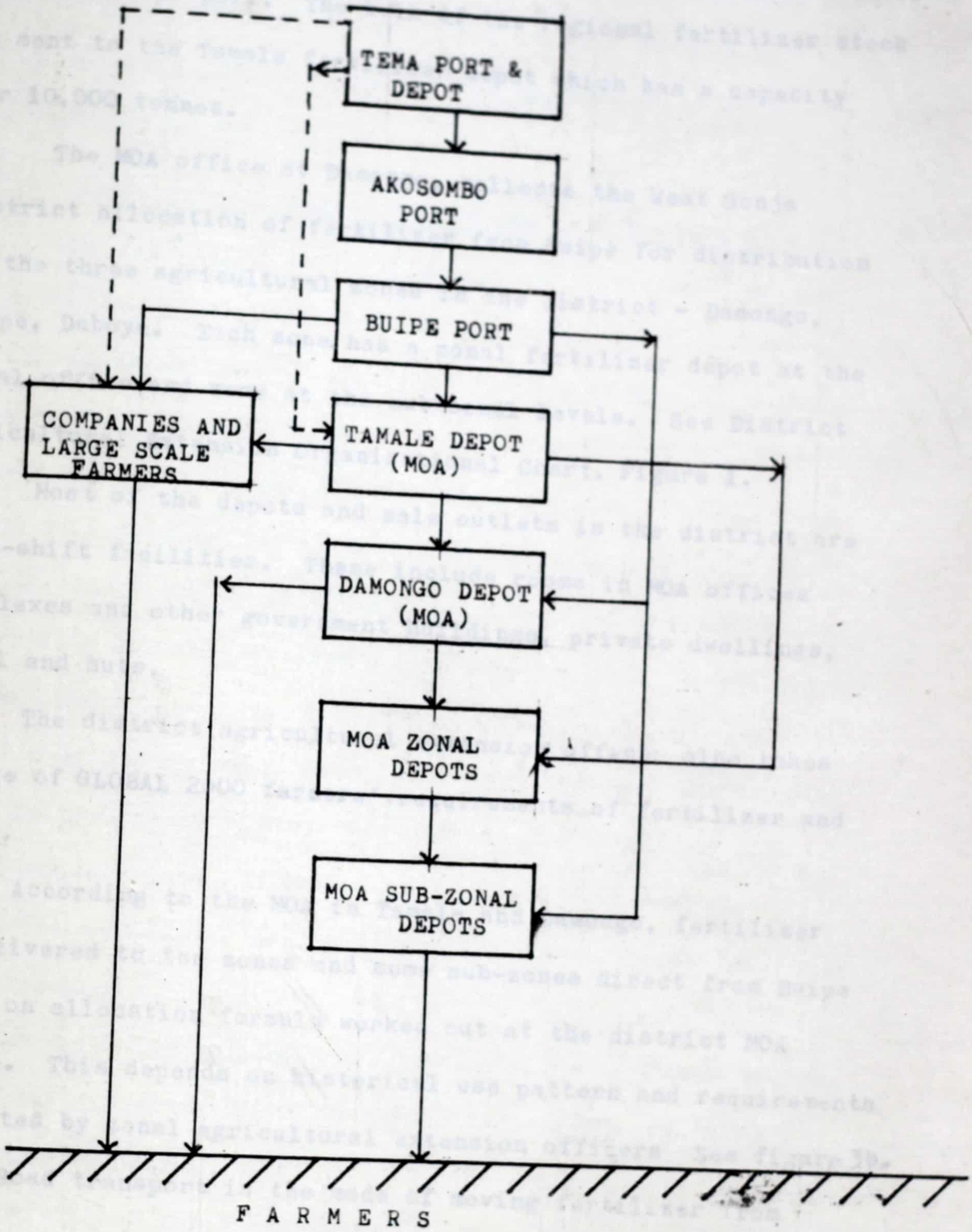
FIG. 3a <u>FERTILIZER DISTRIBUTION SYSTEM (NATIONAL)</u>

Fertilizer flow from the port to depots and sales outlets.



Source: CEC/MOA Sectoral Import Programme (SIP)-Fertilizer, 1987

FIG.3b FERTILIZER DISTRIBUTION SYSTEM (NORTHERN REGION AND WEST GONJA DISTRICT)



S o u r e: MOA, Tamale, Damongo, 1990

4.5.2 Fertilizer Distribution in West Gonja District

In the northern region fertilizer is unloaded at Buipe port by the Volta Lake Transport Company from Akosombo. All the 13 districts in the region collect their allocation directly from the Buipe port. The bulk of the regional fertilizer stock is sent to the Tamale fertilizer depot which has a capacity for 10,000 tonnes.

The MOA office at Damongo, collects the West Gonja district allocation of fertilizer from Buipe for distribution to the three agricultural zones in the district - Damongo, Buipe, Daboya. Each zone has a zonal fertilizer depot at the zonal office and some at the sub-zonal levels. See District Agricultural Extension Organisational Chart. Figure 1.

Most of the depots and sale outlets in the district are make-shift facilities. These include rooms in MOA offices complexes and other government buildings, private dwellings, stall and huts.

The district agricultural extension officer also takes charge of GLOBAL 2000 farmers' requirements of fertilizer and seeds.

According to the MOA in Tamale and Damongo, fertilizer is delivered to the zones and some sub-zones direct from Buipe based on allocation formula worked out at the district MOA office. This depends on historical use pattern and requirements submitted by zonal agricultural extension officers See figure 3b.

Road transport is the mode of moving fertilizer from Buipe and Damongo to the zonal and sub-zonal sales points. Except the main Kumasi-Tamale first class road and the second class road from Fufulso to Damongo, road conditions are poor.

This adds to transport time and wears and tears on the vehicles. Small private trucks are used for deliveries to sub-zonal level sales points. Because of the poor state of roads, private truckers are reluctant and often refuse to undertake trucking in rural areas. This is particularly problematic in the district since the MOA has virtually no trucking facility of its own.

4.5.3 Fertilizer Storage Capacity and Ware Housing Network

The fertilizer warehousing system consists of network of district, zonal and sub-zonal depots along the lines of the agricultural extension organisation. See figure 1. In addition to this the Tamale depot with a capacity of 10,000 metric tonnes serves as buffer for the whole region. Overall district storage capacity is about 30,000 bags. Of this the Damongo depot has about 28, 500 bags capacity and Daboya and Buipe have 800 and 300 bags respectively while the sub-zonal sales points have a total of about 400 bags storage capacity.

Only the Damongo depot, which has outlived its usefulness is government owned. The rest at the zonal and sub-zonal sales points are rented or borrowed (rent-free).

All the depots are in unacceptable conditions for fertilizer storage.

Fertilizers are sold to farmers at sales points in the zonal and sub-zonal sales outlets along the agricultural extension organisation.

The three zonal sales points are at Damongo, Buipe and

Daboya. In addition, there are sub-zonal sales points at Busunu, Tuluwe, Fufulso. The rest of the sub-zones Larabanga, Lingbinsi, Mpaha, Bowena and Goun have no sales outlets.

All these sales outlets at the sub-zonal level are make-shift facilities. These include rooms in agricultural extension offices which are themselves either rented or borrowed, private dwellings, stalls and huts.

The general flow of fertilizer from the Buipe port to the sales outlets is depicted in figure 3b and the district transportation network system in map 2.

- On-Farm Storage of Fertilizers

Generally, smallholders do not store fertilizer on the farm.

Almost all smallholders (98 percent) indicated that they used up all the fertilizer they bought the previous year while 2 percent kept some leftover.

Fertilizer absorbs moisture and a good moisture-protected and anticorrosive storage devise is needed to keep them potent over a period. Those farmers who stored some fertilizer might have locked up some money in the excess.

4.5.4 Seasonal Sales of Fertilizer

Fertilizer use is seasonal corresponding to the one rainy season in the district as in the rest of the northern Ghana. The unimodal rainy season lasts from March-October. The district can be described as a one-season use area with regards to fertilizer sales and usage (see table 4.38)

Table 4.39: Fertilizer Stocks and Sales for 1989

Type	Qty Stocked in Bags	Sales		Left-over	
		Qty (bags)	%	Qty (bags)	%
20-20-0	10,245	9,945	97.0	300	3.0
17-17-17	1,250	1,250	100.0	-	-
S/A	15,024	11,324	75.4	3,700	24.6
Total	26,519	22,519	85.0	4,000	15.0

Source: Author's Field Investigations, May, 1990

From the table it can be inferred that most farmers used the right proportion of 5 bags of compound to 5 bags of straight fertilizer. The sum of the quantities of stocked 20-20-0 and 17-17-17 is 11495 bags and sulphate of ammonia is 15025 bags. The quantity sold out shows that 11,195 bags of compaound (20-20-0 and 17-17-17) and 11024 bags of straight (sulphate of ammonia) respectively was purchased by farmers. At the application rate of 5 bags of compound to 5 bags of straight fertilizer or (1:1) the quantity of compound fertilizer bought can be said to be slightly in excess of 171 bags more than the quantity of straight fertilizer. This could fertilize about 34 hectares of maize.

4.5.5 Fertilizer Requirements of Smallholder Farmers in West Gonja District

The northern region is the largest fertilizer consuming region in the country. Farmers in the region use large quantities of fertilizer (22 percent of national) because of the savannal grassland vegetation with poor soils in the region.

The same can be said of the West Gonja district. The

general national rate of fertilizer application is 2 bags of the compound (20-20-0. or 15-15-15 or 17-17-17) to 1 bag of straight (sulphate of ammonia) - ie. a ratio of 2:1. In West Gonja district, however, farmers are advised by the district MOA to apply a ratio of 2 bags compound to 2 bags straight on an area of 1 acre (0.4ha). This comes to 5 bags compound to 5 bags straight per hectare (1:1), a total of 10 bags per hectare of maize.

From table427a the total land area fertilized is 65 hectares. At the recommended application rate of 5:5 or 10 bags per hectare, the total fertilizer requirement should be 650 bags instead of 443.5 bags. This is about 68 percent of the recommended rate and can result in low yields.

If all the 107 smallholders interviewed used fertilizers then the total fertilizer requirement will be 1177(bags or 588.5 metric tonnes. This quantity is about 44 percent of what was stocked for the whole district in 1989.

Table 4.40: Fertilizer Consumption - West Gonja 1989

Type	Qty Stocked (bags)	Qty Sold by MOA	Global 2000 Allocation	Balance (bags)
17-17-17(NPK)	1250	36	1214	-
20-20-0(NPK)	10246	1687	7995	304
Sulphate of Ammonia(S/A)	14875	2485	9179	3832
Total	26371	4208	18388	4136

Source: Calculated by Author based on figures obtained from Crops Services Department, (MOA), Tamale, May, 1990.

Global 2000 farmers are the major beneficiaries of the West Gonja fertilizer consignment (about 70 percent) see table 4.40 and 4.41.

This means that only 30 percent of the district's fertilizer supplies goes to other farmers. But GLOBAL 2000 farmers are supplied only 4 bags per acre per farmer. Those who have farm sizes larger than one acre (0.4ha) may not use fertilizer on the remaining cropped areas. This could lead to general reduction in production.

4.5.6 GLOBAL 2000 Project

The Project

The GLOBAL 2000 is an NGO in the field of provision of farm input loan to smallholder farmers in some selected areas in the country including West Gonja district.

The organisation has a regional co-ordinator for the northern region based in Tamale. The districts where it operates are manned by the various MOA district agricultural extension officers and assisted in the zones by the zonal agricultural extension officers. Largely therefore, the field organisation of GLOBAL 2000 is strictly alongside the organisation of the MOA agricultural extension services. The MOA pays the salaries of agricultural extension officers while GLOBAL 2000 provides them with means of transport to enable them reach beneficiary farmers in the whole district with their "packages".

Aims:

The aims of the GLOBAL 200 project are :

i. To transfer technology to smallholder farmers (1-2ha farm size) who are the target groups.

ii. To remove the credit constraint from smallholders.

These are meant to make farmers realize the potential yield of land and labour on their own farms.

- Operation of The Project

The project involves smallholder farmers (target group), agricultural extension officers, researchers and bankers. All these play their professional roles to make the project a success. The extension agents communicate farmers problems and ne needs to the researchers who then carry out experiments on fertilizers and improved seed to bring out the best result for increased yields. This result is communicated through the extension agents to the farmers. The bankers disburse cash to input suppliers (MOA-fertilizers, Grains Development Board - improved seeds) on behalf of the project. The extension staff in the district and the zones take charge of the distribution (issuing) of the inputs to the farmers on behalf of GLOBAL 2000.

- Organisation of Smallholders

Agricultural extension officers organise and register farmers in groups of 10 farmers and above (farmer Group Unit). Each farmer is to use the input supplied him on only an area of 1 acre of maize. There are, to date, 50 of such groups in Damongo, 25 in Daboya and 20 in Buipe zones. These farmers

are referred to as 'Production Test Plot' (PTP) farmers. The farmers are given strict technical advice to follow in the cropping cycle:

i. Planting rate 90cm between rows by 40cm within rows (17-20,000 plants).

ii. Planting/Weeding/Fertilize application May-June

iii. Harvesting - September- November

- Inputs

The inputs supplied to the PTP farmers are fertilizers and improved seeds. The quantity of seed per farmer is; maize (10kg/ac), sorghum (2.5kg/ac) cowpea (8kg/ac) and soya bean (25kg/ac ₵2,000/acre while that for fertilizers is 2 bags each of compound and straight (N). It is hoped that in 1990 the fertilizer ratio would fall in tune with the rest of the nation (2 bags compound to 1 bag straight). In the West Gonja district PTP farmers are allowed to produce only maize on their plots (0.4ha) with the inputs supplied by GLOBAL 2000.
It is also hoped that the number of PTP farmers would double in 1990.

- Sources of Input

The crops Services Department of the MOA supplies fertilizer and the Grains and Legumes Development Board is the source of seeds. The agricultural extension staff at various stations 'supply' their knowledge to educate and organise farmers.

GLOBAL 2000 allocation of fertilizer is about 70 percent of the district total 4.41.

Table 4.41: Global 2000 Fertilizer Allocation as Percentage of Total District Supplies (Bags) 1989

Type	District Total by MOA	GLOBAL 2000 Allocation (Bags)	% GLOBAL 2000 of District
17-17-17	1250	1214	97
20-20-0	10246	7995	78
Sulphate of Ammonia	14875	9179	62
Total	26371	18388	70

Source: Calculated by Author based on figures obtained from Crops Services Department, (MOA, Tamale, May, 1990.

GLOBAL 2000 takes vertually all the fertilizer (70 percnt) meant for the whole district.

This meant that the fertilizer supplies to the district are inadequate.

- Input Loan Recovery

Farmers are given the option to repay for the input loan either in kind (3 bags of maize) or cash(₡15,000), depending on the reigning government price for maize. In 1989 the amount of ₡15,000 was equivalent to 3 bags of maize at ₡5000/ bag (maxi). The average cost of fertilizer to the PTP farmer is ₡3250/bag. In addition to the cost of seeds (₡2000/10kg maize) the PTP farmer incurs expenses to the tune of ₡15000 on inputs.

- Maize Yields of GLOBAL 2000 (PTP) Farmers in West Gonja

Beneficiaries of the GLOBAL 2000 produce an average of 46 maxi bags/hectare of maize as against the average smallholder (8 maxi bags/hectare) of maize. This is about six times as much as the average smallholder's yield.

After loan repayment with 3 bags the PTP farmer is left with about 43 bags from which he can then deduct other costs such as farm labour. The PTP farmer is therefore financially better of than the ordinary smallholder.

- Future Plans of GLOBAL 2000

It is planned to increase the number of PTP farmers in West Gonja by 100% in 1990.

Farmers would be advised to diversify by adopting crop rotation and including legumes in the rotation. The inclusion of legumes, while improving the diet of the farm household by supplying protein also improves soil fertility. Crop rotation demands low input requirements so as to cut down on costs of use of physical inputs.

- Probelems of GLOBAL 2000

Inspite of the success story of the GLOBAL 2000 PTP smallholder in West Gonja District, there are serious problems of poor input loan repayment rate. This could jeopardise the financial base of GLOBAL 2000 leading to final collapse of the project to the detriment of the smallholder and agricultural development.

The other problem facing GLOBAL 2000 is that there is no motivation for the agricultural extension staff who organize, register and advice farmers on behalf of the project. The extension staff continue to be paid their normal civil service salaries like their counterparts in other districts who do just the ordinary extension. On the other hand, extension officers in West Gonja district have to educate both GLOBAL 2000 and ordinary farmers at the same time.

The fear of the GLOBAL 2000 organisation is that if this continues the extension staff in West Gonja will relax their e efforts and work like the "normal" civil servant. The implication is that extension staff would reduce their frequency of visists to advise farmers. The result will be decreasing yields with the same input costs.

Besides, loan recovery default is likely to increase because it is this same extension staff who follow up the loan repayment exercise. In their absence the farmers, under normal circumstances would spend the money on other things and not pay voluntarily.

The Regional Co-ordiantor suggested regular seminars and workshops, involving farmers, agricultural extension staff, bankers, GLOBAL 2000 and other concerned organisations, for education and exchange of views for better understanding of the problems and their implications as a way out to solve the problems.

Another suggestion is to strengthen self-help capacity of smallholder farmers by the formation of groups and given the opportunity to associate.

In this way smallholder farmers will be more receptive to ideas of community development.

4.5.7 SOURCES OF FERTILIZER SUPPLY FOR WEST GONJA

The Ministry of Agriculture has been responsible for importation and distribution of fertilizer in Ghana up to and including the cropping year 1989.* The MOA Tamale, the district office at Damongo, and zonal offices at Buipe and Daboya and the sub-zonal offices have been the sources of fertilizer supply to smallholder farmers in West Gonja. The sub-zones comprise Damongo, Buipe, Daboya, Busunu, Larabanga, Lingbinsi, Fufulso, Tuluwe, Mpaha, Bowena and Goun. (See district Map 2). Each zone is run by an agricultural technical officer. (See fertilizer distribution system Fig. 3b and Fig. 1)

All (100%) smallholders who applied fertilizers in Damongo mentioned the MOA, Damongo as their source of supply and all (100%) at Buipe and Mpaha obtain at Buipe. Transportation from Mpaha to Buipo is ¢500 per person. Mpaha smallholder farmers would spend more money in real terms on a bag of fertilizer than their Buipo counterparts who pay only ¢50/bag from the MOA office to their farms. Daboya smallholder farmers have a peculiar problems described earlier.

The study revealed the following aspects of fertilizer supply to smallholder farmers in Daboya as shown in Table 4.4.2 below and Appendix

Table 4.4.2 SOURCES OF FERTILIZER SUPPLY FOR SMALLHOLDER FARMERS IN DABOYA

SOURCE OF STUDY	% OF SMALLHOLDERS
MOA, Damongo	14
MOA, Daboya	29
MOA, Tamale	43
MOA, Daboya + Tamale	14

Source: Author's field investigations, May, 1990

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A large percentage (43%) of smallholder farmers in Daboya obtain their fertilizer supplies from MOA, Tamale and 14% obtain from MOA, Damongo, the district Capital while only 29% obtain from MOA, Daboya itself. A further 14% got their supplies from both Daboya and Tamale which could raise the share of Tamale to about 50% or more.

Tamale and Damongo are 70.4 km and 102 km. away respectively from Daboya. In addition one has to cross the river to and from Tamale in small canoes or boats. Time, energy and money go into these journeys. The passenger transport fare alone could be anything around ¢1,600-¢1,800 (return). Because of the long travel times smallholder farmers may have to spend a few days in Tamale or Damongo to be able to obtain their fertilizer supplies (See Table 4.42). The actual farm gate price of fertilizer increases fantastically and the time lost could have been spend in working on the farm or doing other income generating activities

QUANTITIES OF FERTILIZER SUPPLIED TO WEST GONJA 1986 - 1988.

Table 4.43 Fertilizer Supplies to West Gonja 1986-88

YEAR	NATIONAL (MT)	NORTHERN REGION 22% OF NATIONAL (MT)	WEST GONJA 12% of N.R	
			(MT)	BAGS
1986	35,000	7,700	924	18,480
1987	52,000	11,440	1,373	27,460
1988	59,000	12,980	1,558	31,160

Source: Calculated by Author based on figures obtained from Crops Services Department (CSD), MOA, Tamale, May, 1990 and; CEC/MOA, SIP, Fertilizer, 1987 - CSD Fertilizer Allocation Formula.

West Gonja is allocated 12 percent of the northern regional consignment of fertilizer (See Table 4.43). This means that more fertilizer is used in the district than in most of the other 12 districts in the region. The potential can be tapped for future agricultural development in the district.

4.5.8 AVERAVE DISTANCE OF FERTILIZER SOURCE TO FARM

Generally smallholder farmers in Damongo, Buipo and Mpaha have their farms located 5 km, 3km and about 94 km respectively from the sources of fertilizer supply. Daboya smallholders who get their supplies from Daboya are located 6 km on the average from the source. Those who obtain from Tamale and Damongo have to do a distance of not less than 100 km to their farms from the source of supply.

Mpaha and more especially Daboya smallholder farmers are a disadvantaged lot. They pay more in real terms for fertilizers. Meanwhile they are likely to pay more in transporting their produce to the market if they sell in the large towns like Buipo, Tamale and Damongo.

4.5.9 MEANS OF TRANSPORTING FERTILIZER FROM MAIN ROAD TO FARM

A significant percentage (38.7%) use bicycles, to transport fertilizer from the main road to their farms. Those who employ headload form 30.6% and use of tractors constitutes 11.3%. The combinations of tractor and headload; and bicycle and headload contribute 8.1% each while hand trucks form 3.2% as means of transporting fertilizer to the farm. (See Table 4.44.)

Table 4.44. Means of transporting Fertilizer from Main Road to Farms.

MEANS OF TRANSPORT	NO. OF RESPONDENTS	%
Tractor	7	11.3
Headload	19	30.6
Bicycle	24	38.7
Tractor + Headload	5	8.1
Hand truck	2	3.2
Bicycle + Headload	5	8.1
TOTAL	62	100.0
NA	45	
TOTAL SMALLHOLDERS	107	

Source: Author's Field Investigations, May 1990.

4.6 SMALL HOLDER FARMERS' SUGGESTIONS FOR IMPROVING THE FERTILIZER SUPPLY SITUATION

Table 4.45. Smallholders Farmers' Suggestions for Improving the Fertilizer Supply Situation

Suggestions	No.	%
1. Fertilizer must be available at sales points latest Famary/February	19	17.8
2. Reduce Prices	24	22.4
3. Stocks must be available all year round	11	10.3
4. All right types (for all crops) must be available at all centres	8	7.5
5. Construct Fertilizer depots to keep buffer stock	9	8.4
6. MOA should give input loans to smallholders	9	8.4
7. Establish Farmers' Services Centres within farm areas	10	9.3
8. Improve Transportation	16	15.0
9. Educate Farmers to make and use manure	1	0.9
Total	107	100.0

Source: Author's Field investigations, May, 1990

As portrayed in Table 4.45, 22.4% think that fertilizer prices must be reduced. 17.8% suggested that fertilizers must be available at sales points by January/February while 15% suggested improvement in transportation. Reduced prices means subsidizing which the government is rather removing by privatizing fertilizer supply operations. Making fertilizers available by January/February and stocking it throughout the years means financing inventory which could increase costs. Establishing Farmers Service Centres and constructing fertilizer depots and improving transportation mean funds for capital investiment.

4.7 PRIVATIZATION OF FERTILIZER OPERATIONS

The Governments' declared policy to privatize the fertilizer supply system is an important step towards improving the efficiency of the input supply operations.

The existing subsidy and uniform pricing policy are serious obstacles to the establishment of a free market-oriented system. The current country-wide uniform pricing policy is to be replaced by a differential pricing policy to facilitate proper functioning of the free market operations as recommended in the Ghana Fertilizer Privatization Study (July, 1986).

The internal marketing and distribution system for fertilizer will be substantially in the hands of the private sector by 1991 when direct imports by the private sector of fertilizers approved by the MOA will be permitted.

The World Bank, Agricultural Services Rehabilitation Project (April, 1987) is assisting the Government in the transfer of the importation and distribution of fertilizers to the private sectors. This means that fertilizer distribution will be done by the private sector. The fear is that if farmers are complaining about high prices of the input then there could be some danger in the future. The private sector supplies may be timely but prices may rise because of the high profits normally demanded by the sector since salaries are higher.

The other problem is the spatial distribution of sales points. It is evident in the supply of other inputs that the sales points are just in Tamale.

An evaluation of privatized system should be done after about five years of operation and compared to the present distribution system.

Table 4.46. Sources of Inputs and Percentage of Smallholder Patrons

Input		% of Farmers Using	Sources and % of Smallholders Patronising: Local Market	MOA (Local)	Own Stock	Follow Farmer	Private (Local)	MOA Tamale	Private (Tamale)
Seed		100	44	4	43	7	-	2	-
Agrochemical		20	24	24	-	-	-	14	38
Tools/ Implements	Bullock plough	3	-	-	-	100	-	-	-
	Tractor	30	-	38	-	31	31	-	-
	Hoe/Cutlass	67	88	-	-	-	-	7	5

Source: Author's Field Investigations, May, 1990

Table 4.46. reveals that significant percentages of smallholders obtain their seeds from the local market (44%) and their own stock (43%). Only 6% use improved seeds which they claim to have purchased from the local MOA, Tamale (2%). The local MOA could possibly be Global 2000. All those who use improved seeds live in Damongo (50%) and Daboya (50%). A total of 94% do not use improved seeds. This means that crop yields would remain relatively low even where fertilizer is applied because these seeds are not fertilizer-responsive varieities and even if they are fertilizer responsive they might have been contaminated and have changed genetic constitution. Fertilizer application results in higher yields only when used with improved seeds. Returns may not match costs of fertilizer and this makes the smallholders poorer. They become inclined to label the claim that fertilizer use increases yield as false. This is dangerous because they then tend to lose confidence in agricultural extension agents and improved inputs. They may stop using improved technology at all and the result is further decrease in crop yields and worsening income levels.

Agrochemical (insecticides, weedicides, fungicides) usage is relatively low (20% of smallholders). Of this local market and local NGA account for 24% each while 14% and 38% buy from NGA Tamale and private companies in Tamale. The 24% who buy from the local market are likely to have been buying from the mobile service of the Plant Protection and Regulatory Service (PPRS) of the NGA from Tamale. Tamale therefore seems to be the major if not the only source of agrochemicals for smallholders in West Gonja. The transportation costs alone would scare many smallholders from using these chemicals. Besides, the significant share (38%) of the private dealers indicates high costs of these chemicals. (See Table 4.46). Added to this is the high unit cost and oversized packages if those inputs which do not suit the smallholder. (Appendix 3).

The implications are that smallholders shy away from these inputs and the result is low yields and low income since crops are then left at the mercy of pests. Total crop failure may sometimes result.

Only 3% of smallholders use bullock ploughs and all (100%) of these are from fellow farmers. (See Table 4.46). Only small areas of land can be cultivated with resultant low production. The large smallholder household size (about 9) requires larger land areas to be cultivated in addition to the use of improved inputs for higher yields.

From Table 4.46 30% use tractors for land preparation. A significant 62% of this are from private owners while the remaining 38% is from the local NGA. All these are on rental basis. Rental costs are high (¢5,000/acre i.e. 0.4 hectare) and tractors are few. (See Appendix 2). Lack of tractors and their non-use would inhibit the expansion of land under cultivation with attendant low production leading to meagre farm incomes.

Traditional tools, hoe/cutlass predominate. 67% of smallholders use those. The main source of supply is the private sector (93%) with local market contributing the bulk (80%). (See Table 4.46). The continued use of these tools is a hinderance to the expansion of agricultural land resulting in low yields and concomittant poverty.

About 23% of respondents do not obtain these inputs easily. 40% of these live in Daboya. This could be attributed to the low accessibility of Daboya and the fact that these inputs are supplied by private dealers. There are no sales outlets for these inputs in West Gonja. High prices and lack of money are also reasons for non-use. (See appendix 3)

SOURCES OF INFORMATION ON INPUTS

A significant percentage (about 40%) of smallholders receive information through the agricultural extension services (MOA). Other sources are other farmers/friends (30%) and market (17%). There were 13% no-responses. (See Table 4.47 below)

Table 4.47. Sources of information on Inputs

SOURCE OF INFORMATION	NO. OF RESPONDENTS	%
Agric. Extension Officer (MOA)	43	40.2
Other Farmers/Friends	32	30.0
Market	18	16.8
Total responses	93	87.0
No responses	14	13.0
Total	107	100.0

Source: Author's Field Investigations. May, 1990

The implications are that the informal sources of information are very important (about 47%) in information dissemination. This means that there is need to strengthen the agricultural extension services to perform its function more effectively.

42 per cent of those who receive information through the agricultural extension services (MOA) live in Daboya. Agricultural extension services (MOA) live in Daboya. Agricultural extension in Daboya is likely to be more effective than in other localities. Accessibility problems are likely to restrict the movement of extension agents outside the district and are hence forced to stay and work. Farmers in Daboya are more likely to be receptive to innovation. They would be more progressive with resultant higher productivity and relatively higher incomes compared to other localities.

REASONS FOR NOT USING SOME INPUTS

High prices is the most important reason for not using certain inputs (See Table 4.48 for details). This may block diffusion of innovation since farmers cannot afford it. Low productivity is the result. Since farmers are poor they need some help to push them (may be credit to purchase inputs). Progress may be blocked as a result.

Table 4.48. Smallholders Reasons for not Using Certain Inputs (Excluding Fertilizer)

REASONS	NO. OF RESPONDENTS	%
High Prices	55	51.4
Respondent has no knowledge of input	13	12.1
Low quality products available	8	7.5
Lack of the input	13	12.1
Don't need	2	1.9
Total Responses	91	85.0
No Response	16	15.0
Total	107	100.0

Source: Author's Field Investigations. May, 1990

The most important problem is that of credit. They claimed that if they have sources of credit with lower interest rates than the present then they can also sell on credit to farmers.

The other one is that the packages of most posticides encourage waste in the case of smallholders who need only a fraction of it.

CHAPTER FIVE

5.0 MAJOR FINDINGS AND RECOMMENDATIONS

This section summarizes the major findings of the study and goes on to analyse their implications for planning. This will serve as basis for recommendations. The findings are discussed under socio-economic characteristics and sources of farm inputs and input distribution systems.

5.1 SMALLHOLDER FARMING IN WEST GONJA DISTRICT

Socio-Economic Characteristics

The analysis of the socio-economic characteristics of smallholder farmers revealed the following:

i. All the sampled smallholders are over 25 years of age and 48.6% are aged 45 or over.

The smallholder population can be described as relatively old. This implies that there is no incentive for young people to farm. Policies should therefore be formulated to improve the living conditions in the rural areas to encourage the youth to live in the rural areas to engage in farming.

As a person the farmer wants his family to be well cared for and he wants a respected place for himself and his family in the community. Being a farmer, he must seek to reach those goals through his farming. He must be able to produce more, and sell more so as to be able to pay his taxes or his rent, repay his creditors, if any and buy services and manufactured goods for his family. He can also be envouraged to produce and sell more if those other necessities are available locally.

ii. About 75% of small holders have had no formal education. There is also evidence of lack of geographical mobility among smallholder farmers. An encouraging 70% of smallholder households have children in school.

Increased agricultural production comes from new techniques or methods put into practice on farms. The "technology" of farming includes the methods by which farmers sow, cultivate and harvest crops as well as including the seeds, fertilisers, pesticides, tools, implements and sources of power they use. For agricultural development to proceed these must constantly be changing. To be able to comprehend and accept these new changes requires some education for the smallholders. The acceptance and adoption of innovations, such as new inputs involves a process of diffusion of innovation in time and space. Popularization of new techniques through functional public education is essential for effective adoption of innovations. The rather high illiteracy rate among smallholders is a likely constraint on acceptance and use of constantly changing technological inputs. Educational policies geared towards what is appppropriate for a society that wants to develop and making education available throughout the period that farmers remain in active service are needed here. This will enhance education for development.

Vigorous rural development policies and incentives to farmers would encourage the children now in school to take up farming.

iii. There is widespread poverty among smallholder households. The average smallholder household income is ₵52,000.00 with a per capita income of about ₵7,550.00. These are far below the figures for the district (87,357 and ₵12480); and the per capita income for the region (₵49308) and the nation (₵54,184) respectively. This may be blamed on the non-use of improved inputs with the result being very low yields. Improved inputs are expensive and so most smallholders cannot afford them. They cannot save money since incomes are low. Farm produce prices are also low.

If modern technologies, particularly the use of fertilizers and improved seeds are delivered in a "package deal" in addition to credit facilities smallholder productivity would increase several fold. Here there is the need for policies which will encourage input loan schemes for smallholder farmers; e.g. GLOBAL 2000. The generally low per capita income in the district may be blamed on the extremely low per capita income of smallholder farmers. This could be so because smallholder farmers constitute over 90% of the total farmer population while agriculture takes 62% of total employment in the district. To increase the district per capita income means that there must be a massive increase in smallholders per capita income. This implies an equally massive increase in smallholder productivity. But this can only happen if farmers can have good prices for their produce. This means efficient and low cost transportation, good minimum guaranteed prices for farm produce, timely availability of inputs at reasonable prices, local availability of improved technological inputs, establishment of rural/or farmers service centres (FSCs), good returns on investment in inputs, functional education for farmers, effective and efficient extension services, constantly changing technology (agricultural research), markets for farm products. Policies are needed to make all these work. Policies on production credit for farmers and effective national planning for agriculture would be helpful to realize this. On the other part smallholders can form groups for united action.

iv. Hoe and cutlass cultivation is the "rule". About 65% of smallholders indicated they use hoe and cutlass to prepare their land. This limits the land size cultivated since these are traditional inefficient tools. Plot sizes of up to 0.8 ha. (2 acres) constitute about 53% of smallholder plots.

Policies encouraging group tractor service would be welcome. Since farmers are poor this is one way they can increase the size of land under cultivation. The financial institutions can pioneer this. Farmer education policies are also necessary in this case to ensure maximum benefits for each group member. This would curtail labour shortage problems. The ready availability in the market and also at reasonable prices of hoe and cutlass would help.

v. Inadequate marketing and storage facilities for farm produce. Lack of improved storage facilities and scattered nature of markets leave smallholders with no option but to sell their produce soon after harvest 36% of smallholders sold their produce immediately after harvest. 70% of those blamed this situation on high dependency rate and immediate need for money even though all farmers agreed that there were price differences between selling immediately after harvest and later when the farming season begins. Here there could be state intervention in agricultural produce marketing, such as the GFDC. This would give farmers some security and they can save some money to purchase improved farm inputs for increased productivity.

vi. Smallholders Farm Household Sizes could be more than for the district average. About 40% of smallholder households have size of 9 or more persons per household. 25% and 32% smallholder households in Daboya and Mpaha respectively have size of 17 or more persons. It implies that smallholders per capita income could be lower, and it is lower (¢7,550) than the district average (¢12,000), which is itself below the poverty line ($\frac{1}{3}$ of national, ¢54,184). This is a result of low farm yields but large household sizes.

Since in addition to these findings, population in the district is growing at a relatively fast rate of about 4.2% per annum

two prong policy. Soil conservation and maintenance of soil fertility, and family planning policies are needed to stop a further deterioration of farm productivity and resultant low per capita income. Availability and use of technological farm inputs such as fertilizer, pesticides and bullock plough and tractors should be the main targets of this policy and smallholders the target group.

vii. Fallow periods are decreasing. Reasons such as "more people compete for land" (53.2%) and "new land too far away "(31.2%) together (84.4%) are more important for this than "use of new technological inputs" (15.6%).

This implies the need for new land policies as well as population control, trnasportation and input supply and distribution policies.

5:2 IMPLICATIONS OF FERTILIZER DEMAND AND SUPPLY SITUATION FOR SMALLHOLDER DEVELOPMENT

Analysis of the existing input supply system revealved the following:

i. Role of Government: The main issue in input supply in Ghana centres around fertilizer importation and distribution. Because of the scarcity of fertilizers, until 1990, due to foreign exchange shortages and subsidies on the fertilizers the MOA had been responsible for determining annual requirements (provisioning) importing and distribution. Procurement was undertaken by the Crown Agents (CA) on behalf of the Bank of Ghana (BOG) in respect of the International Development Association (IDA) and certain other donor aided import programmes. The Ghana National Procurement Agency (GNPA) in other cases imported fertilizers on behalf of the MOA. These processes were plagued by bureaucratic bottlenecks common in most government sectors. This had resulted in delays of fertilizer delivery.

Fertilizer prices were subsidized which also forced Government to determine farm prices for political reasons.

ii. Importation and Distribution: Fertilizer was imported in bagged form through the port of Tema. From here it was discharged from vessels directly on to trucks for haulage to MOA national warehouses at Tema, Swedru, Kukurantumi and to Regional and District depots from where it was trucked to sub-district sale outlets. The State Transport Corporation (STC) and private truckers were hired to do trucking. The Volta Lake Transport Company (VLTC) funded by the Government of the Federal Republic of Germany recently started transporting the fertilizer consignments of the Upper East and West Regions and the Northern Region to the inland port of Buipe.

With a few exceptions road conditions are poor, particularly in the rural areas where the bulk of smallholders do their farming. Private truckers have been reluctant and often refused to undertake trucking in the rural areas. This has been particularly problematic in the more remote areas since the MOA had virtually no trucking facility of its own. The result has been delays in importation, transportation and distribution. These resulted in late application by farmers, or total refusal to purchase and apply fertilizers. Low farm yields and fertilizer leftovers resulted leading to low farm incomes and inventory financing

iii. Farmers Services Companies (FASCOMs): With the establishment of Government-owned FASCOMs, fertilizer distribution has been transferred from the MOA to these companies in the Upper East, Upper West and Volta Regions. The FASCOMs depended on the MOA imported fertilizer but were responsible for most of their own trucking. Distribution points designated Farmers' Services Centres (FSCs) are the final sales points established by the FASCOMs in these regions. This channel of distribution has

proved more effective but inefficient. Records have shown that the FASCOMs being parastatals have the problems of inefficient management, overstaffing and bureaucracy.

In the Volta Region Smallholders get information on inputs through VORADEP field staff while in the Upper Regions it is through committees of 9 farmers representatives who represent each community and hold frequent meetings with FASCOM and URADEP. The FASCOMs distribute a variety of farm inputs to smallholders since these are their target group. (See appendix 1).

As a result of government's privatization of fertilizer supply operations the FASCOMs are expanding their sphere of influence to nearby regions and districts. FASCOM Upper Regions takes over input distribution in Northern and Brong Ahafo Regions while FASCOM Volta Region expands its activities to cover Eastern, Central, Greater Accra, Ahsanti and Western Regions as from 1990. In fact FASCOM Upper Regions already has a district sales officer for West Gonja at Damongo. The FASCOMs, it is hoped, will takeover MOA fertilizer depots in the various regions and districts and as their tradition establish FSCs dotted all over the place to afford ready availability of farm inputs in all localities.

iv. Input Distribution in West Gonja

Fertilizer - Fertilizer is transported by road from Buipe port to Damongo. Consignments for Fufulso and Busunji are discharged enroute. Zonal and sub-zonal consignments can also be taken either from Buipe port or Damongo. (See figure 3b).

Zonal and sub-zonal agricultural extension officers are in charge of fertilizer sales and pay money realized from sales to the district officer who in turn pays this to chest.

This system of accounting did not work because most of the sub-zonal and district officers embezzled the money realized from fertilizer

sales. The various MOA offices owe several millions of cedis of fertilizer money to be paid back to chest. This is a direct result of the weaknesses in the civil service bureaucracy and of government handling of commercial ventures. Most of the fertilizer import was donor funded and the sales were earmarked for counterpart funds to be credited to special accounts (e.g. EEC special accounts). The counterpart funds were to be used to finance agreed projects and programmes to support rural development and to meet basic social needs in such a way to reduce the budget deficit in these areas. The trust and confidence which these donors had in Ghana eroded and donors have become sceptical in funding further fertilizer procurements and other aid programmes in Ghana. It is the smallholders who suffer the effects of such action most.

v. The spatial distribution of fertilizer sales outlets in the district leaves much to desired. Even though there are distribution points in all the three zonal agricultural extension offices (Damongo, Buipe, Daboya) and a few sub-zonal offices (Busunu, Fufulso, Larabanga) this network is unsatisfactory. The fact that the district is very large with scattered settlement structure which in turn determines the spatial distribution of farms means that fertilizer distribution points must equally be distributed if farmers are to get it at the right time. The local availability of supplies and equipment is an essential for agricultural development. This means more fertilizer depots and officials to operate them, efficient and low cost transportation system all of which require manpower and heavy capital and recurrent expenditure. The implication is that there is the need for policies on land reforms, establishment of rural service centres, mass functional education for farmers, provision of social and technical infrastructure to serve farming communities among others.

vi. For optimum farm yields the use of fertilizer must be accompanied by the increase in use of high-yielding crop varieties and pesticides. But since farming is a business and farmers always think in terms of costs and returns what is important is the relationship between prices of farm produce and prices of purchasable inputs.

A combination of policy measures is needed to "satisfy" both the farmer and the input merchant by way of prices of produce and of inputs.

Policies on agricultural research, farmer education, farm credit for inputs, effective agricultural extension services and provision of social and technical infrastructure in farming communities are needed.

vii. More farmers use fertilizers than they use other improved technologies - pesticides improved seeds and implements. The reason is that, unlike machinery, chemical fertilizer could be purchased in amounts of almost any size, and even small amounts help yields.

viii. Pricing of fertilizer is done purely on the basis of what went into its procurement while this is not the case in farm produce pricing.

5.3 RECOMMENDATIONS

Agriculture will continue to be the "prime mover" of the economy of the West Gonja District in particular and Ghana as a whole for long time. And the smallholder farmer will remain the "engine room" of agriculture for as long agriculture remains the largest employer especially in rural Ghana and West Gonja. In West Gonja smallholders constitute over 90% of the farming population. Any programme(s) aimed at increasing agricultural production to raise the living standards of the rural poor must therefore aim at the efficiency and productivity of the smallholder farmer. But increased productivity is brought about by the application of new techniques or methods put into practice on farms. Most of the new methods that will increase agricultural production require the use by farmers of special supplies and equipment. These include seeds, fertilizers, pesticides, tools and implements, among others. Towards this end, and in the light of the constriants and opportunities cited above, the following recommendations are made with the view to improving farm input availability and use by smallholder farmers in West Gonja District.

Improved distribution and availability of farm inputs and consequent development of smallholder farming depends on the fulfilment of certain conditions. This section discusses some of these conditions and gives recommendations for smallholder development based on these;

i. Improved Transportation:

The scattered settlement structure, the vastness of the district, the very low road density

(0.02km/sq km), the poor road condition and the total absence in many areas and the remoteness of many farm plots make trasportation costs of persons, farm produce and inputs rather very high and hence a disincentive to increased production. A widespread trasnportation network which is efficient and low cost is necessary for scientific agriculture, to take improved seeds, fertilizers, agrochemicals and other modern supplies and equipment to the various production areas, and to bring agricultural produce to the market.

- Modes of Transportation Recommended

In view of the widespread poverty and inadequate transportation netwrok in the area it is recommended that the Non-Motorised Intermediate Means of Transport (IMT) as defined by Adarkwa be introduced in the area. These include Human Propelled Vehicles (HPV) including small Farm Vehicles (SFV) and Pedalled Vehicles like bicycle trailers which have loading capacities of about 1000 kilogrammes and 150 kilogrammes respectively.[1] The capacity is at least six times that of headloading and comparatively cheaper, about 2 percent less than the price of a bicycle.

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1 Adarkwa, Kwesi; June 1989 (A Pilot Project to Improve Rural Mobility and Access Using Low Cost Roads and Non-Motorised Transport) p. 48-51.

Bicycles and bicycle trailers are also recommended for use. Animal Powered Transport (APT) with a payload capacity of between 300 and 500 kilogrammes is also recommended.

The Tamale Implements Factory should be commssioned to manufacture trailers and carts for this purpose.

In addition to the above the few motorised vehicles already plying some of the existing roads especially on the Kumasi-Tamale primary road portion through Buipe, Fufulso, Yapei and Sankpala and the second class road linking Fufulso through Busunu to Damongo could be maintained for longer distance and faster travels.

In addition to movement of agricultural produce and farm inputs these will enhance the mobility of smallholders to centres of innovation to upgrade their knowledge and skills. Individual and collective welfare will become more closely linked which will also enhance the formation of cooperatives and the mobilization of rural labour to create roads, health posts, irrigation systems, and other parts of rural infrastructure.

- More feeder roads should be constructed with existing ones regularly maintained and others upgraded to all-weather status. The following

are also recommended:

Road/Track	Dist/Length (km)	Present Class	To be Upgraded
Fufulso-Damong-Larabanga-Grupe	76.8	2nd	1st
Larabanga-Mole National Park	9.6	2nd	resurfacing
New Buipe-Old Buipe	14	feeder	2nd
Larabanga-Kadeju-Murugu	36.8	feeder	resufacing
Damongo-Kpiri	7.4	feeder 6	2nd
Damongo-Old Buipe Junction	48	fedder	2nd
Domeabra-Mpaha	52	feeder	2nd
Busunu-Daboya		feeder	2nd
Busunu-Daboya Bridge		collapsed	reconst.
Mankarigu-Daboya		feeder	2nd
Bowena-Daboya		feeder	resurfacing
Murugu-Bowena		track	feeder

To achieve this end, it is recommended that rural labour be mobilized especially during the lean/off farming period, December/January-March/April to provide labour for road construction. Socio-political organs such as the CDRs, Mobisquads, June 4th Movement, December 31st Women's Movement, Farmers Organisations, and local leaders can help in mobilizing labour for road construction and/or maintenance. Technical and other inputs can be requested from the PAMSCAD Secretariat and the Department of feeder Roads, and the Ghana Highway Authority both of the Ministry of Roads and Highways.

11. Improved and diversified Agricultural Extension Services:

Agricultural extension services have the following objectives:

- stimulation of a framework of farmers attitude and aspirations condusive to acceptance of technological change.

- dissemination to farmers of results of research on the increase of production and t the conserving of produce
- reporting the farmers' problems in implementing innovations back to the research stations
- training and guiding farmers in decision-making i.e. farm management
- preventive and curative treatment of animal diseases (for veterinarians-livestock)

Achieving these objectives is not only dependent on the functioning of the extension service itself, the training of extension workers, and the methods employed. Other factors like the timely availability of inputs, the existence of profitable marketing opportunities and the availability of credit, are pre-requisites for successful extension work. Agricultural extension should not be merely production oriented, but also assist farmers in handling and storing their produce, two stages which at present often account for major crop losses in the district.

For the purpose of smallholder development in West Gonja the 'group approach' to agricultural extension is recommended for achievement of desired results. Courses in farmers training centres, field days, demonstration plots in the villages and rural service/or Farmers Services Centres (FSCs), meetings at village level are some of the recommended means to be employed. Visits to individual farmers should be restricted to those farmers with some special problems.

Because of the scattered nature of settlements and poor transportation, extension workers must be provided with motor bikes while the district agricultural extension officer at Damongo should be provided with a four wheel drive vehicle for effective co-ordination.

- Use of package programmes

  Because agricultural extension is part of the "circulatory system" special package programmes are recommended to ensure good results. The GLOBAL 2000 project in the district is a good example of this. A package of treated improved seeds, fertilizer and pesticides in recommeded quantities for a small plot, say 1 acre (0.4 ha) should be provided for a nominal fee. GLOBAL 2000 (PTP) farmers in the district produce about 46 maxi bags of maize per hectare. Repayment is 3 maxi bags of maize or ₵15,000in cash, for the package of 4 bags of fertilizer (₵13,000) and 10 kilogrammes of treated seed maize enough for 1 acre (0.4ha) for ₵2,000. GLOBAL 2000 should be given the necessary encouragement to continue its good job. To achieve this extension agents should be motivated in the form of extra field allowances, prompt payment of T and T and night allowances as well as the provision of means of transport, like motor bikes. Master Farmers or chief farmers should assist extension agents to make loan repayment rate more successful. The following are also recommeded:

- include provision of credit and marketing facilities in packages.

- Hierarchy of services as in administration:
  - A Regional Extension Officer for co-ordination and administration as follows:-
    - Close liaison with Nyankpala Agricultural Experiment Station for dissemination of information in both directions.
    - Up to date statistics of all agricultural activities, especially food production.
    - Training and up-grading of local extension workers.
    - Monitoring and evaluation.
    - Establishment of farmers training centres at Damongo, Buipe, Daboya and all service centres that have been recommended - Tuluwe, Mankarigu, Larabanga, Sankpala, Mpaha, Busunu, Fufulso, Lingbinsi, Bowena, Goun .
  - A district extension officer at Damongo as presently obtains with duties as follows:-
    - Supervising all activities and passing information from sub-districts or zones and sub-zones and from Tamale (the region)
    - Provide short courses to farmers in crop husbandry and storage of produce.
    - set up a demonstration plot each at the farmers training centres. (above).

- Visit field staff to keep them informed and to boost their morale.
- Provide four-wheel drive vehicle to district officer, motor bikes to field staff.

- A sub-district or zonal extension co-ordinator supervising activities of extension staff in village service centre or Farmers Services Centres (FSC).
- A sub-zonal extension supervisor based at the Farmers Services Centres (FSC) and co-ordinating activities of extension workers in clusters of villages.
- Village extension workers to announce to farmers when demonstrations will be conducted and advising farmers at close range.

The Agricultural Institute at Damongo can be used as a farmers training centre.

iii. Rural Service Centre Development.

The distribution of farm inputs (fertilizer) and extraction of farm produce to market will be ineffective without service centres and market towns. For effective distribution and storage and for efficient use of social and technical infrastructure, the following recommendations are offered for the development of selected settlements into rural service centres to service the hinterland.

- Select and upgrade the following settlements to serve their hinterland more effectively - Buipe, Daboya, Tuluwe, Mankarigu, Larabanga, Sankpala, Mpaha, Busunu, Fufulso, Lingbinsi, Bowena, Goun.
- Construct more modern and larger capacity fertilizer depots in Damongo, Buipe and Daboya with capacities 40,000 bags, 16,000 bags and 20,000 bags respectively.
- Construct modern but effective fertilizer depots of 1,000 bags capacity in each of Tuluwe, Mankarigu, Larabanga, Sankpala, Mpaha, Busunu, Fufulso, Lingbinsi, Bowena, Goun.
- Construct warehouses for produce and input collection points in each of the above centres.
- Establish Bullock-ploughing training centres in each of the centres and expand the training facilities already in Lingbinsi.
- Establish Farm machinery pool for hiring and repairs at Damongo, Daboya, Kusawgu, Mpaha and Mankarigu.
- Establish Tractor Operator Training and Maintenance Centre in each of the above centres.
- Revitalize the pipe-borne water supply in Damongo and Daboya and provide 10 additional stand-pipes in Damongo and 5 in Daboya with an extension to Lingbinsi.

- Provide boreholes in Buipe, Yapei, Busunu, Larabanga, Fufulso, Mankarigu, Sankpala, (Sankpala can get piped water extended from Tamale).
- Provide wells in Mpaha, Kusawgu, Tuluwe, Adape, Bowena and Goun.
- Establish health centres at Buipe, Yapei, and revitalize the one at Mpaha, and clinics in Mankarigu, Sankpala and Busunu.
- Establish vehicle repair workshops in each of the service centres above.
- Construct landing platform at Buipe.
- Dredge Volta at Daboya to enable bigger boats to ferry passenger and goods for safety.
- Establish community bank with branches and agencies in all service centres above.
- Construct community centres in Damongo, Buipe, and Daboya using contributions from the people in form of self-help labour and materials.
- Construct neighbourhood centres in Tuluwe, Mankarigu, Lingbinsi, Mpaha, Larabanga, Sankpala, Busunu, Fufulso and Bowena.

iv. Improved water availability by means of irrigation systems.

Water is the third key component of the biological package in addition to high-yielding varie-

. . .

ties and the use of chemical fertilizers. To reap the maximum potential of improved input use in a bid to increase agricultural production requires the timely use of water in adequate quantities. Irrigation projects require high capital investments. Unfortunately they are constructed with fun fare only to realize that they have become "white elephants". The main reason is that farmers are not involved in the process of decision-making which brings these schemes into being. With this in mind, the following recommendations are made for the establishment of mini-irrgation schemes through the mobilization of rural labour for public works projects:

- The socio-political organs mentioned earlier should be mobilized and they in turn mobilize labour in the off farming season (December/ January - March/April for public works projects in constructing irrigation dams and canals as was discussed under roads.
- The socio-political organs and farmer groups should be involved in all stages of the planning of irrigation projects.
- Explain and discuss the gains that could be reaped from such a project to representatives also.

- Organise field trips for these representatives to see the benefits other communities are reaping from such projects through community-community interaction.
- With enough labour, farmers can use shovels, pick-axes, head pans and baskets to carry earth. This can accomplish much the same purpose as buying and using buldozers and other heavy equipment. Farmers already have s shovels and other tools needed for this or can easily make them.
- Damongo, Buipe, Yapei, Mpaha, Daboya, Adope should have this kind of labour mobilization to construct small irrigation schemes.
- Extend water in dam at Damongo Agricultural Institute to farms by mobilizing labour during the off-season to construct canals.
- Seek technical and financial assistance from PAMSCAD and the Irrigation Development Authority (IDA).
- Extend the water distribution network with well-designed network of secondary and tertiary canals and on-farm outlets. In addition to this canals should be lined to decrease seepage losses to provide more reliable and secure water supplies for efficient management.

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In the ideal situation, therefore, unemployed workers can first be put to work making crude construction tools, after which they can begin to create roads and canals, The end result is a major expansion in the rural capital stock at little or no cost to society other than the reduced leisure time of rural workers. Smallholders or farmers in general can then cultivate their land all year round and a can grow vegetables and crops which require constant watering, With timely and adequate availability of water, higher yields are the result if improved seeds and chemical fertilizers are used. Farm incomes will rise leading to higher standards of living since farmers can now afford other essential goods and services for themsleves and their families.

Generally, however, communities should organise food for work programmes in the areas of agriculture, construction, water supply and infrastructural development. Some NGOs such as ADRA and Amasachina are ready to organise these programmes to help communities who are ready to take advantage of this.

v. Land Tenure Reform.

Behind the use of better techniques and more inputs there must be a land tenure system that provides farmers with the incentive to introduce those new techniques and inputs, and then use them efficiently.

Five kinds of government action may be necessary to assure farmers effective control of their land to enable them farm more efficiently.

- Survey of land and registration of ownership titles. Farmers right either to keep the land or to be repaid for the effort and expense that they put into improving it would be enhanced by this.
- Consolidation of holdings. Fragmented, small holdings, as obtains in the area are inefficient to operate. This is important for protection from stray animals and pilfering neighbours and installation of an irrigation system to serve whole farms. Application of pesticides and use of modern implements become more rewarding when farms are located at one place and of optimum size.
- Redistribution of land to provide management units of efficient size. A land policy in this direction would enhance cultivation of new land which is now too far away while a few own large plots nearer to settlements but which they cannot manage efficiently. This would enhance irrigation projects since land is needed for dams and canals. With improved transportation more new lands could be cultivated.

- Redefining the conditions of tenancy. For this to be satisfactory, it must (i) involve a reasonable rental and (ii) insure the farmer. It is recommended that the District Council in consultation with the chiefs, who are the custodians of the land, and with the concern of the people and the socio-political organs, have a common forum to discuss this at length to come out with meaningful ammedments to the present terms of land ownership.

vi. Formation of Farmers Buying and Selling Groups - Co-operative Associations.

This is important for the spirit of interdependence and self-help through the establishment of multi-purpose organisations for the procurement and provision of inputs and credit. A large number of small input orders can be concentrated into a large one while payment is more prompt than w with individual buying. By working through the group secretary it may be possible to increase contact with individual farmers. Extension packages are easier to deliver and diffusion of innovation is facilitated within groups. Marketing of farm produce should also be done on group basis. This makes mobilization for public works easier.

vii. Improved Access to Farm Credit.

Improved seeds, pesticides, fertilizers and implements are costly. But in order to produce more smallholders must use these inputs. The wide spread poverty among smallholders is a constraint.

To remove this in order to increase production through more use of improved inputs, the following recommendations are made:

- Encourage sale of supplies and equipment to be repaid in farm produce. The GLOBAL 2000 example should continue and smallholders should be encouraged to register for this service. Agricultural extension agents who visit these farmers to supervise the efficient use of inputs should be given extra field allowance and provided with motor bikes.

- Establish a Farmers Services Company (FASCOM) which would in turn establish Farmers Services Centres (FSC) for efficient input distribution. Alternatively, The FASCOM Upper Region could be empowered to take over the supply of farm inputs in the area.

- Establishment of Rural Banks in Damongo, with field agencies in Daboya and Buipe. A mobile unit of this bank should serve settlements with important market centres on market days. This bank should be encouraged to advance supervised credit to smallholder farmers. The security for the bank should be the estimated value of the harvest since farmers hardly save any money. It should be possible for the bank to include comsumer credit if a smallholder household

should need this during the period of cropping to make it unnecessary for the family to turn to other lenders. The bank should have highly-skilled agents who really know the problems of farming in the district and who can realistically assess the need for, and the probable returns from using new inputs. The supervision should be competent and frequent if it is to justify the extra cost that is involved.

- A community bank should also be established to operate on similar lines like the rural bank to offer competition.
- Encourage the formation of farmers credit unions as the link between the banks and the farmers.
- Loans should be advanced to smallholders in January/February to enable farmers purchase inputs and assemble these at the farm before the start of the farming season in April/May. If the loan is in cash then it must be given just before the operation for which it is required. eg.

Farm Operation	Period of operation	Time of Loan
Land preparation	March-April	January/Feb
Planting	May-June	March/April
Weeding Fertilizer Application	May-June	March/April
Harvesting	September-November	July/August

(viii) Improved Access to Markets and Improved Distribution Systems:

Access roads leading to the major market centres mentioned earlier should be improved as recommended in the section dealing with transportation. The communities should mobilize labour with the help of the District Council, various Area Councils, socio-political organs and Non Govenmental Organisations like ADRA, Amasachina and the Church Agricultural Project (CAP) for public work projects like roads and markets construction.

- The Ghana Food Distribution Corporation (GFDC) should be encouraged to provide central storage facilities in major centres like Damongo Buipe, Daboya to serve as collection points. This will reduce losses as well as stabilizing farm prices all year round. It will reduce the rush by smallholders to sell all their produce soon after harvest at very low prices. The GFDC must have efficient transportation system by the use of large trucks to collect farm produce from Farmers Services Centres to the zonal centres where the central storage facilities should be provided. This policy would increase farmers income resulting in better standard of living.

- The Government should discourage the importation of food crops for which Ghana has comparative advantage.
- Increased agricultural production results in the production of various types of crops including perishable crops. Methods of processing such as drying, canning or tinning of perishables like vegetables should be encouraged.
- The GFDC should have good financial standing to finance its marketing operations of grading, transporting and assembling.

(ix) Privatization of Fertilizer Supply.

If the fertilizer supply operation as being pursued by the Government becomes operative as from 1990 then government must keep buffer stocks of the input at the Tamale and Damongo depots to forestall any artificial shortages caused deliberately or otherwise by private suppliers.

- The Ministry of Agriculture should determine the types of fertilizers that could be imported by the private sector. The packaging should also be determined by the MOA.
- Private persons who do not have secure, sound warehouses, protected from the weather should not be allowed to distribute fertilizers.

- The MOA fertilizer depots should continue to sell to farmers.
- The private dealers should be given discounts on certain quantities bought from the MOA.
- Anyone should be free to import fertilizer but intentions should be decleared in advance to the MOA.
- There should be no credit sales except with a written authorisation from the PNDC Secretary for Agriculture.
- The MOA should come to terms with the FASCOM and any private dealer for use of the MOA fertilizer warehouses.

(x) Timing of Supplies.

Timely availability of inputs is very important. The cropping season in the district starts in March/April with land preparation. Planting/ Weeding/Fertilizer application are done around May/June and harvesting falls in September-November for the major crops. Farm input supplies must therefore be tied to this cropping calender. Fertilizer supplies must therefore arrive at Buipe port by November/December of the preceding year. It should be transported to reach the depots in the district by January/February. Farmers should procure and have fertilizers at their farms by February/March.

(xi) To reap the maximum effect of fertilizer usage it is recommended that distributors of other complementary inputs such as improved seeds, pesticides and implements also have distribution outlets in the district for easy availability and on time.

The other way of getting all necessary inputs to smallholders is in form of "packages" embracing all inputs needed for the production of particular crops in the right amounts per unit area of crop.

- Packaging of inputs - All agro-chemicals especially weedicides, insecticides, and fungicides should be in one (1) litre containers and the powder ones should be in small sachets to meet smallholders pockets and for convinience to avoid wastage.

Urea fertilizer should be in 25kg bags since it contains twice as much nitrogen (N) as an equal quantity of sulphate of ammonia (S/A) which is now in 50kg bags to avoid waste.

(xii) Multiplication of Seeds.

Provide small amounts of improved seeds to one or two farmers in each rural/Farmers Services

Centre for them to multiply for use by other farmers in the vicinity. This brings transportation costs of seed distribution down to a minimum. It also reduces the problem of maintaining purity of seed since the multiplication of the seed is carried on where the potential users can see it. Farmers can observe how the seed is handled and are stimulated by its growth habits to try it themselves.

(xiii) Agricultural Research.

The Nyankpala Agricultural Experiment Station should be encouraged to extend its research activities to the West Gonja District. The agricultural institute at Damongo can be the pilot station. Research is important because agricultural technology must be constantly changing if agricultural development is to proceed. In collaboration with the Crops and Agricultural Extension Services Departments of the Ministry of Agriculture, adaptive trials should be performed to recommend the appropriate production technologies for the area instead of just taking on anything.

CHAPTER SIX

6.0 CONCLUSION

The West Gonja District has abundant resources for agricultural development. The area offers unlimited opportunities for modern agricultural activities for the fact that there are fertile soils, large bodies of water (the Black and White Volta), a relatively flat land which is good for mechanical cultivation, patches of thicket which favour the cultivation of crops typical of the forest zones of sourthern Ghana, an inland port, large tracts of land with a low population density and an agricultural institute. Above all, the people have shown shear determination to feed themselves by producing most of the staple food and the district has even earned the accolade "Maize Capital of the North" because of the large quantities of this most important grain it exports to other areas.

There is, however, a very serious problem of low agricultural productivity. The use of traditional production technology has been the most important factor contributing to this low productifity of land and labour. The large number of smallholders who have had no formal education, the high percentage of old farmers, the large sizes of their households and inadequate marketing and storage facilities are variously responsible for this situation.

The poor transportation network, coupled with the scattered nature of settlements, and the long distances of farms from the village are also part of the problem. Fertilizer depots are few and very far from most settlements. Besides, fertilizer consignments for the district arrive long after planting when most crops have passed the stage of fertilizer application. The availability of supplies and the high prices at which fertilizer is sold were repeatedly cited by respondents as the principal limitations on the use of chemical fertilizer. Most smallholders also use sacks for storing their produce

This will lead to increased agricultural production and increased smallholder income. Agricultural development would have been set on a sound footing in the district.

Finally, there are indications in the district that the privatization of fertiliser operations is taking firm grounds. This is manifested by the presence of a FISCOM Upper Regions representative at Damongo ready to take over fertiliser distribution from the Crops Services Department (CSD) official at Damongo.

It is advisable that a study be conducted in the future to compare the present distribution system to the privatised one since most of the delay in the past was attributed to inefficiency in the civil service (MOA).

APPENDIX 1

FARM INPUTS SUPPLIERS

Institution/Organisation	Inputs Supplied	Sales Points	Remarks
A. GOVERNMENT			
1. Agric. Ext. Dept., (MOA)	Animal traction equip. and spares, Fertilizer: (for Global 2000)	Damongo, Buipe, Daboya, Busunu, Yapei, Tamale & all 13 districts in northern region.	
2. Crops Services Dept.(MOA)	Fertilizers	Damongo, Buipe,Daboya, Busunu, Yapei, Tamale & all 13 districts in northern region.	Handing over to FASCOM in 1990
3. Plant Protection and Regulatory Services (PPRS), MOA	Agrochemicals - weedicides insecticide, rodenticides, storage	Damongo, market days, at Daboya, Buipe, Yapei, Busunu, Mpaha(mobile). Tamale & all 13 dists. in northern region	
4. Agric. Mech. Dept. (MOA) now Agric. Eng. Services (MOA)	Farm machinery hire services.	Damongo, Buipe	Services to be privatized in 1990.
B.. PARASTATAIS			
1. Ghana Seed Company (GSC)	Improved seeds - rice, maize, groundnuts, vegetables	Tamale	Defunct, to hand-over to Grains Dev. Board.
2 Grains Dev. Board	Improved seeds - maize. Cowpeas.	Tamale, Bolgatanga, Wa	Taking over functions of GSC
3. Farmers Services Company (FASCOM)-Upper Regions (UER & UWR)	Fertilizers, fungicides, weedicides, insecticides, storage, cutlasses, hoes, bullock-ploughs, manure, forks, etc.	UE & UWRs, Now in NR - All 13 dists. including Damongo, FSC to be estab.	As from 1990 cropping season to take over supply func. of all MOA units.
4. Ghana National Trad. Corp. (GNTC)	Agrochemicals - weedicide insecticide, rodenticides	Tamale	

..Tamale Implements Factory	Bullock-ploughs, ridgers, cultivators, carts, hoes, spades, shellers, water tanks and their spare parts	Tamale	Relies on agric ext. and operations & CAP to distribute inputs local farmers.
C. PRIVATE			
1. Reiss & Co. (GH) Ltd.	Weedicides for rice, cowpeas, maize, groundnuts, vegetable.	Tamale	
2. SAKABIO Ltd, Tamale	Agrochemicals - weedicides, insecticides, fungicides, Tools - hoes, cutlasses, watering cans.	Tamale	Farmers from various parts of the region buy from here.
D. NON-GOVERNMENTAL ORGANISATIONS (NGOs)			
1. GLOBAL 2000	Fertilizers, improved seeds, means of transport - Bicycles, motorbikes, vehicles to Agric. Ext. staff on the project.	Tamale district MOAs - Damongo, Daboya	As input package loans to small-holder farmers through Agric. Extension.
2. Church Agric. Projects (CAP)	Almost all inputs to local farmers on behalf of main agents.		

APPENDIX 2

Other Inputs used by Smallholders and their Sources of Supply

		SOURCES OF SUPPLY / NO. OF PERSONS						
		Local Market	MOA (Local)	Own	Fellow Farmer	Private (Local)	MOA Tamale	Private Tamale
DAMONGO								
SEEDS								
Maize	40	25	5	8	2			
Yam	13			8	5			
Guinea Corn	13	5		8	3			
Groundnuts	10	10			3			
Rice	3							
AGROCHEMICALS								
Insecticide	3		3					
Weedicide	3							
TOOLS/IMPLEMENTS								
Bullock-plough (Hired)	3							3
Tractor (Hired)	18		8		3			
Hoe/Cutlass	29				5	5		
MPAHA								
SEEDS								
Maize	12	3		9				
Yam	6			6				
Guinea Corn	3			3				
AGROCHEMICALS								
Insecticide	3	3	Mobile PRS					
TOOLS/IMPLEMENTS								
Hoe/Cutlass	12							
BUIPE								
SEEDS								
Maize	16							

Yam							
Guinea corn	16	16					
Groundnuts	16	16					
Rice	4	4					
Beans	2				2		
AGROCHEMICALS							
Insecticide	2		2				
TOOLS/IMPLEMENTS							
Tractor (Hired)	4		4				
Hoe/Cutlass	16	14					
DABOYA							2
SEEDS							
Maize	25	2	5	18			
Yam	5			5			
Guinea corn	2			2			
Groundnut	18	3		12	3		
Beans	8			5			
Cassava	20	5		15		3	
Millet	5			5			
AGROCHEMICALS							
Storage (Actelic)	10	2					
TOOLS/IMPLEMENTS						3	5
Tractor (Hired)	10						
Hoe/Cutlass	15	8		5	5		
				5		5	2

APPENDIX 3 Unit Packages, Average Prices and Dosage of Selected Farm Inputs

Type of Input	Normal Unit Package	Average Unit Price (1989)	Crops Recommended	Dosage/ha for Gonja District
A. FERTILIZERS				
1. Compound - NPK (eg. 15-15-15 & 20-20-0	50kg bag	3380	Cereals	5 bags
b. 17-17-17	50kg bag	3630	Cereals	5 bags
2. Single/Straight Sulphate of Ammonia	50kg bag	2380	All	5 bags
b. Urea	50kg bag	4230	All	2.5 bags
Urea	25kg bag	2230	All	5 bags
B. AGROCHEMICALS				
1. Weedicides	1 gal(5L) & 20L packs	8000-15000/gal.	Maize,rice, G'nut	3-4 litre/ha
2. Insecticide - Emul. Conc. (EC)	Litre bottle	2400-5430	Cereals	1 litre/ha
- Powder (storage & seed Treatement)	Sachets	310-500	cereals & legumes	1 sachets for 1 bag
3. Fungicides	5kg bag	8000-12000	Vegetables & cereals	
4. Nematicides(Furadan)	1kg sachet	450-550	Rice & vegetables	
5. Rodenticides	pkt.	650-950	Rodents anywhere	

c. IMPROVED SEEDS			
Rice	68kg bag	7500	1 bag/4ha
Maize	45kg bag	7500	¼ bag/ha
Groundnuts	36kg bag	3800	¼ bag/ha
Vegetables	28g sachet	400-500	
Cowpeas	1 maxi bag	28000	1bag/4ha
D. TOOLS/IMPLEMENTS			
Tractor (Hiring Service)	o.4ha	5000-5500	5000-55--/0.4ha
Tamale Implements - see attached list			
Hoe	1	400	
Cutlass	1	700	

APPENDIX

PROBLEMS FACED IN OBTAINING OTHER INPUTS AND SUGGESTED SOLUTIONS

Problems	No. of Times Mentioned	Rating	Suggested Solutions
No Problem	15	11	
Lack of money	82	4	Banks, Global 2000 MOA to give more input loans at lower interest rates for smallholders. Increase produce price. Farmers have to increase production to make more money
No Tractors	55	7	MOA should supply on credit to farmer groups or bring more to dist.
High prices	97	1	Reduce input prices or increase produce prices
Lack of Improved seeds	87	2	MOA should increase production and supply at several sales points.
No sales point in locality	85	3	Establish sales points several locations
Lack of hoes/cutlasses	30	9	MOA and Global 2000 should supply
Low quality supplied	45	8	MOA must inspect all inputs before being certified for use
Source of supply too far	70	5	Establish local sales points or mobile sales on market days
*Crossing river at Daboya with load	23	10	Construct bridge over Volta at Daboya
Lack of transport	67	6	Improve roads and give more credit to transporters. Establish local sales points

REFERENCES

1. Barker, J.W. Agricultural Marketing. (Oxford University Press)

2. Baum Warren, C. and Tolbert Stokes M., Investing in Development; Lessons of World Bank Experience. (published for The World Bank. Oxford University Press).

3. Castle, Emery, N. et al, 1972. Farm Business Management: The decision-making process (New York, The Macmillan Company).

4. CEC and MOA, 1987, SIP (EDF) Fertilizer Importation Project.

5. Economic and Social Commission for Asia and the Pacific (ESCAP) 1979, Guidelines for Rural Centre Planning - (New York, United Nations).

6. Fiadjoe, Felix, Y.M., 1987. "Socio-Cultural Factors that Farmers with Limited Resources consider in Making Choices when faced with Problematic Situations in their Farming Enterprise" (A Doctor of Education Thesis submitted to the Graduate Faculty of North Carolina State University.

7. Gilis, Malcolm, et al, Economics of Development. (W.W. Norton and Company).

8. IFAD/GOG, Smallholder Rehabilitation and Development Programme; Bi-Annual Progress Report, September, 1988 - February, 1989.

9. IFDC, 1986, Ghana Fertilizer Privatization Study.

10. Kotler, Philip, 1976; Marketing Management: Analysis, Planning and Control. (London, Prentice-Hall International Inc.)

11. Lewis Arthur, W. 1966, Development Planning: The Essentials of Economic Policy. (london, George Allen and Unwin Ltd.).

12. Lipsey, Richard G. 1983, An Introduction to Positive Economics. (London, ELBS and Weinderfeld and Nicolson).

13. Ministry of Agriculture, Ghana Oct. 1978. The Ghana Farmer. Focus on Small-Scale Farming (Information Support Unit of the Ministry of Agriculture)

14. Morgan, W.B. "Peasant Agriculture in Tropical Africa," in Environment and Land Use in Tropical Africa by M.F. Thomas and G.M. Whittington, 1969 (metumen and Company Ltd., p.234

15. Mosher, A.T., 1969, Creating a Progressive Rural Structure: To Serve a Modern Agriculture. (Ndw York, The Agricultural Development Council, Inc.).

16. Mosher, A.T. 1966, Getting Agriculture Moving: Essentials for Development and Modernization. (New York, Frederick A. Praeger, Inc; Publishers, for the Agricultural Development Council Inc.

17. MORRIP-GTZ, October, 1989, Programme for Rural Action (Baseline Survey - West Gonja District, phase 1).

18. RUTHENBERG, Hans, 1983, Farming Systems in the Tropics (New York, Oxford University Press).

19. SPRING Development Workshop Report - 1990.