AN EVALUATION OF THE NATIONAL ACCELERATED POOD PRODUCTION PROGRAMME STRATEGY FOR INCREASED SORGHUM PRODUCTION IN THE ZARIA LOCAL GOVERNMENT AREA, KADUNA STATE

By

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CERTIFICATION

This thesis entitled 'AN EVALUATION OF THE ACCELERATED FOOD PRODUCTION PROGRAMME STRATEGY FOR INCREASE SORGHUM PRODUCTION IN THE ZARIA LOCAL GOVERNMENT AREA, KADUNA STATE' by Mohammed Barau ZARIA meets the regulations governing the degree of Master of Science of Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge and literacy presentation.

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DEDICATION

This Thesis is dedicated to the memory of my friends and colleagues in the AERLS/ABU: Alhaj Garba ABCD (best known as "Nomau Dan Takarda"), Alhaj Saidu Kera, Mr. J.T. Sokomba and Mm Zubairu Mohammed.

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ABSTRACT

The broad objective of the study is to evaluate the effect of the National Accelerated Pood Production Programme (NAFPP?) as an extension strategy for increasing the production of Sorghum in the Zaria Local Government Area. To this end, four objectives were specified and examined.

The first specific objective examined was the farmers' personal characteristics and the effect those characteristics had on their adoption behaviour. The second objective examined was the extent of adoption of the NAFPP improved sorghum practices by the farmers who had been exposed to the new production technology in the study area. The third objective of the study examined the operational problems faced by the extension workers in the process of implementing the NAFPP Sorghum Programme in the area. The fourth objective of the study is to make suggestions for the improvement or otherwise of the new extension approach.

Two types of questionnaires (one for the farmers and one for the extension workers) were designed to fulfill the objectives of the study. The main questionnaire was used to gather appropriate data from a sample of 180 randomly selected farmers. ' Fourty farmers who served as NAFPP sorghum demonstrators in the area were included among the samples.

The data was analysed and percentages and means were used in reporting the farmers personal characteristics as well as their level of awareness and extent of adoption. The pearson Correlation

procedure was used to test the hypotheses postulated, while the Stepwise Multiple Regression analysis procedure was used to further isolate the relative contributions of the variables. The .05> level of significance was used in reporting the significance of relationships between variables.

The findings on personal characteristics showed that most farmers (68%) in the area were relatively young, with a mean age of 45.6 years. The average household size was 10.3 persons while size of holdings averaged 5.2 hectares. Nearly all the respondents (9 0 %) had attended koranic schools and nearly two-thirds of them (61%) were literate in the Hausa (Ajami) script. On the other hand only a few of the respondents *(14%)* had any formal primary education. Although farming is a primary occupation in the area, all of the respondents reported practising secondary and even tertiary occupations all the year round. A substantial number of them were holding community leadership positions such as Village Head, (13%), Political Party Officials (8%), among others. It was found that only a few of the respondents belonged to any voluntary farmers organisations.

Knowledge level or awareness of improved farm practices among the respondents was found to be fairly high, while the actual adoption of the practices was comparatively low. The highest level of knowledge was in respect of planting date (96%) and the lowest was close spacing (37%). On the other hand, most of the sorghum recommended practices attracted only very low rate of adoption. Close spacing, use of improved varieties, monocropping, use of storage chemicals, and thinning were adopted

by only 19% 21%, 22% 24% and 33% of the respondents respectively. It was however observed that all of the respondents used fertilizers on that crops.

It was concluded that the extent of adoption of improved practices varied from one practice to another, depending on their relative advantages, complexity and compatibility with farmers traditional practices, and other socio-economic factors. Desire for higher crop yields was found to be the most important motivating factor for adopting certain recommended practices such as the use of fertilizers and improved varieties. Non-availability of certain production inputs and incompatibility with existing practices were among the most important reasons for non-adoption of certain practices.

The farmers were found to be facing a number of problems in adopting improved farming practices. The most important ones (in order of importance) are insufficient fertilizers, lack of tractor service, shortage of manpower, lack of credit/loan facilities, inadequate supply of improved seeds, poor crop marketing arrangements, lack of extension advice; and lack of storage and other agro-chemicals.

Extension workers too, were faced with some operational problems that limit their success in implementing the NAFPP programme in the area. Among the most important ones are too many assignments to cope with; delay in receiving demonstration materials; lack of transportation to supervise trials, delay in settlement of allowances and claims: inadequate training and lack of cooperation from farmers.

Statistically, a strong relationship was found ("both positive and negative) between the various personal characteristics studied and the adoption of the NAFPP sorghum innovations by the farmers exposed to such innovations in the study area. The characteristics of leadership} membership, level of living, participation in extension activities; use of various sources of information, additional occupations and formal education; were all found to be positively and significantly related to the adoption behaviour of the respondents. The variables of leadership, literacy, sources of information and size of farms were however, found to have more influence on the adoption behaviour.

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Chapter 1

INTRODUCTION

1.1: Nigeria's Agriculture and Food Production

In Nigeria, as in many other 'Third World' or developing countries, agriculture remains the predominant industry - the discovery of oil not withstanding. It has been estimated that no less than 75 percent of the country's nearly 80 million people live in the rural areas and are engaged in agricultural production and other related occupations, (Omazi, 1978).

Geographically, the country is as diversified as its inhabitants. The south, bounded by the sea, is wet for most of the year, while the north, bounded by the Sahara Desert, is dry for most of the year. While some northern boarder areas receive less than 500 mm (20 inches) of rainfall for only about three months of the year, some parts of the south receive more than (8750 mm) (350 inches) of rain nearly all the year round.

With so much climatic diversities in the country, the types of crops grown, the way they are grown, and the general agricultural system obtaining within the country differ so much from one vegetation zone to another. In the north where the rainfall is lighter, the main food crops are the "grass" type of grains such as sorghum, millet and maize, with rice, sugar-cane, wheat and vegetables grown in the seasonally flooded riverine areas or the irrigated river basin development schemes. The main cash crops are groundnuts, cotton, soyabeans, cowpeas

ginger, and beniseeds, Cattle, camels, sheep, goats, and poultry rearing is another prominent feature of the agricultural system in the north.

In the southern forest areas, the basic food crops are tubers, especially yams and cassava usually grown on mounds and interplanted with maize and rice. The cash crops are mainly tree crops the most important of which are cocoa, coffee, cola, oil palm, rubber and timber.

So far, no accurate census has ever been taken to determine the exact number or size of farms in the country, but according to Okezie (1971), there may well be over 8.8 million hectares (22 mil. ac.) of cultivated land out of a total of about 80 million hectares (200 mil. ac.) of arable land available. As for the size of farms, they range from about 1.0 to 2.0 hectares in the south to about 2.0 to 4.0 hectares in the north (Onazi, 1978, Olayide, et. al. 1972, and Norman, 1972). Compared to the size of farms in places like the United States of America, where average farm size is 140 ha. (350 ac.) the typical farm in Nigeria is no more than a garden plot. These small plots of farms, however, have for generations been the hub of economic activities in Nigeria. The Nigerian farmer not only grows crops for his own consumption, he also grows them for internal markets and in some cases for exports. Until the late 1960s and early 1970s, when the tide turned against agriculture and in favour of petroleum, the efforts of the small holder have been keeping the country virtually self-sufficient in foodstuffs. Until then, food imports were

only about 10 percent of the total import volume. And even those imported food items were only the type considered as 'nutritionally superior'. These food items included fish, milk, cream, sugar and wheat flour.

1.1.1: Declining Agriculture

Before the advent of oil in the economy, agriculture was the largest single contributor to the Nigerian Gross Domestic Product (GDP), contributing about 55 percent of the GDP in 1966-67 (Onasi, 1978). However, the picture has now changed drastically. Today - agriculture accounts for only 5 percent of the total export earnings. The discovery of oil in Nigeria has ushered in the rapid decline of agriculture in the country; in effect since then the annual increase in agricultural production has averaged only about 2 percent. It is a well known fact that the production of some of the country's premier export crops (groundnut, cotton and oil palm) decline so much that the country is now forced to resort to importing such crops for its own consumption. By the same token the production of general food items has declined so much that the country has to spend a substantial amount of its petro-income on the importation of food items. Such food imports include rice, maize, wheat, beef, poultry, dairy, fish, tea, coffee, tomatoes and such other food items that had previously been produced locally and in sufficient quantity to adequately meet local demand (Awoyemi, 1980). In 1975 alone food imports amounted to nearly ₦300 million; the figure shot up to about ₦400 million in 1976 (Abdullahi, 1978) and it stands at well over ₦1,000 million in 1980 ("New Nigerian", 4/8/80).

The "New Nigerian" (19/1/83:1) also reported the Chairman, Nigerian National Supply Company (NNSC), as having disclosed that the Federal Government had issued ₦20 million worth of import licences to his company for the purchase of rice alone this year (1983).

In an address to the Nigerian Agricultural Extension Conference (1980) the Emir of Zaria lamented that in Nigeria the contribution of agriculture has been on the decline. He declared, "... it would not have made too much difference if agriculture plays a second role in relation to oil industry so long as our basic need for food and agricultural industries are fully met", (AERLS, 1980:3).

Regarding the heavy dependence on oil as the main foreign exchange earner and the consequent neglect of agriculture, Isong (1977) issued a note of warning that petroleum would be-exhausted one day and the country would again have to rely upon agricultural exports. Yazidu (1980:1) pointed out that "all is not well with our agriculture, and unless drastic measures are taken to reverse the situation, the country may face serious food shortage which would cripple its development after the oil wells must have dried up".

As a measure to improve the agricultural situation priority was given to its development in the country's second (1970-74) National Reconstruction and Development Plan, yet the general shortages and soaring food prices in the country had continued throughout the plan period. Even the unprecedented

capital investment of over ₦3 billion in the Third Plan Period (1975-80) could not halt the declining trend in the production of many important staples.

Surveys on Nigeria's food supply and demand have shown that if the trend continued, supply will be incapable of meeting the demands during the decade 1975 through 1985 (Olayide, et. al., 1972).

Table 1.1: Projected local demand and supply of sorghum for the year 1975-85 (in 1,000 metric tonnes).

Year	Demand	Supply	Deficit
1975/76	3821,328	2,866.00	955,328
1980/81	4686.624	3,282.00	1,404.624
1984/85	5917.456	3,838.00	2,079.456

Source: Olayide, et. al., (1972)

The annual growth rate of the food sub-sector in the country, which was estimated to be 2.5 percent while that of the population stands at 3.0 percent, indicates an inbalance (Famoriyo, 1980).

The food versus people inbalance in the country has been attributed to a number of factors. Chief among these factors are low crop yields as a result of low soil fertility and the use of unimproved crop varieties and breed of livestock (Third National Development Plan, 1975-80). Other oft mentioned reasons for the decline of agricultural production include high

cost of farm labour due to inflation; rural to urban migration by farm youth thereby leaving mainly the older people to till the soil; inadequate and late supply of necessary farming inputs (such as fertilizers), poor marketing system in which farmers are not able to obtain the guaranteed prices for their crops; and inadequate or limited number of extension workers who have the cardinal responsibility of disseminating agricultural technology to the farmers (Ajakaiye, 1978).

Other factors partially responsible for the decline in agricultural production are natural catastrophies and disasters such as droughts and pest outbreaks. First, there was the intermittent droughts experiencedduring the 1971-1975 cropping seasons. Then there was the famous three-year (1975-1978) aphid outbreak that nearly wiped out groundnut as a cash crop in the northern states (AERLS, 1980).

1.1.2: Strategies to improve agricultural production

The critical situation of the rapid decline in agricultural and food production was seen as constituting a grave threat not only to the economic progress of the country but to her social well-being as well. Therefore, it became one of the major preoccupations of the government to find ways and means to reverse the trend and to produce sufficient quantity of food and cash crops for internal consumption and for exports. The first major step taken was the setting up of the National Accelerated Food Production Programme (NAFPP) in 1972. This was followed by the launching of the Operation Feed the Nation (OFN) campaign by the then Military Administration in 1976.

Other measures introduced to improve agricultural production include the intensification of efforts to harness the country's water resources by establishing large scale irrigation schemes known as the River Basin Development Authorities (RBDAs). There are also the World Bank assisted Integrated Rural Development Projects (IRDP) and the national grains and root crop companies. Others still are the Agro-Service Centres (ASC) set up for the supply of production inputs; the seed multiplication schemes (SMS), and finally we now have the "Green Revolution" programme launched in 1979 by the Shagari Administration.

Despite the concerted extension efforts of the Federal, State and Local Governments and the agro-related parastatals towards the development of agriculture in Nigeria, it was observed that there were insignificant changes in the lot of farmers. The extension worker to farmers ratio remained low thereby minimising the intensity of contact with the farmers (except in pioneer projects like the I.A.D.Ps). Correspondingly, the adoption of innovations by the farmers did not accelerate to any appreciable level. Production has not only continued to grow at a very slow rate, but has in many cases stagnated or even dropped. As a result of this short-fall in production, the country has been forced to spend a big part of its income on the importation of essential food commodities (hitherto locally produced).

It was in view of these problems, that programmes, schemes and projects such as the IADPS, the OFN, the RBDAs, etc., were introduced by the Federal Government in order to remedy the

prevailing food situations in the country.

Of all the extension strategies that have so far been tried in the country (Package Result Demonstration, crop commodity extension among others, the NAFPP system has been appraised as the most promising. In an address Liman (1978) refers to the NAFPP as becoming "the thrust" of the country's agricultural extension strategy". Liman observed that "... although this programme started barely a few years ago, it has (given the enthusiasm it has generated amongst farmers and extension workers alike) literally swept through the country and in quite a number of cases has replaced the previous extension approach used by the States' Ministries of Agriculture which in retrospective must now be regarded as inefficient", (AERLS, 1978:8).

The primary objective of this study is the evaluation of the NAFPP system as an extension strategy thought to be capable of making Nigeria self-reliant in food production. In pursuance of this objective, it is appropriate at this stage to discuss this new extension strategy in some detail.

1.2: The National Accelerated Food Production Programme (NAFPP)

The NAFPP was launched in 1972 after a team of Nigeria Agricultural experts toured some "Green Revolution" countries (Mexico, India, and the Philippines) with the primary objective of studying the "Green Revolution" Strategies of these countries and with a view to implementing same in Nigeria.

The NAFPP was set up with the general objectives of making Nigeria self-sufficient in five of her major staple food crops, namely; sorghum, millet, rice, maize and cassava and to substantially increase the production of wheat (Williams, et. al., 1975). The specific objectives of the programme are:

(1) to dramatically increase the production of food crops in Nigeria with the ultimate aim of increasing farmers' income and improving their standard of living;

(2) to organise research and extension efforts on commodity (crops) basis;

(3) to speed up transfer of research results to farmers;

(4) to encourage rapid spread of improved seeds and cultural practices from farmer to farmer;

(5) to develop and improve training system for staff involved in the programme;

(6) to encourage improved planning in food production at State, Divisional and Local levels;

(7) to promote co-operation among research agencies with the production agencies;

(8) to improve food storage facilities throughout the country;

(9) to ensure the availability of vital farm inputs at the correct time and at reasonable prices to the farmer and

(10) to promote food processing industries (AERLS NAFPP Record Books, 1979).

The NAFPP approach to increased agricultural production has three separate but interrelated components. They are research, Farm Service Centres and Extension.

The research component is organized into three national centres located ecologically at three principal research stations (Ibadan, Zaria and Umudike). Each centre is responsible for specific crops as follows:

National Rice/Maize Centre, based at the National Cereal Research Institute, Ibadan; National Cassava Centre, based at National Root Crop Research Institute, Umudike; and National Sorghum/Millet/Wheat Centre, based at the Agricultural Extension and Research Liaison Services, Ahmadu Bello University, Zaria.

These research centres are responsible for carrying out adaptive research and developing new technologies relevant to the needs of the farmers. They are also responsible for evaluating the new package of practices (e.g. weed control, plant spacing, fertilizer use and other practices) under farm conditions. The research centres work with the extension service of the State Ministries of Agriculture "to speed up the transfer of research results to Farmers". They provide technical guidance to the State Steering Committees, back up the extension effort, conduct training for the extension workers and plan for the supply of inputs.

The Farm Service component involves the establishment of input/output centres in strategic locations at the village level to make inputs (seeds, fertilizers, herbicides, insecticides and machines) available when and where needed; and to provide market outlet which might channel the produce to agencies such as the National Grains Company and others. The idea behind the setting up of the Farm Service Centres is to bring production inputs close to the farmer, such that he would not have to travel more than 16 km (10 miles) to buy such inputs and /or market his farm produce. The input supplies at the Centres are handled by commercial people thereby releasing the extension worker to devote his whole attention to the teaching, demonstrating, and persuading the farmer to adopt farming innovations. The Farm Service Centre in effect seeks to make the extension worker more effective by not saddling him with too much responsibilities (IITA, 1977).

The primary objective of the extension component is to establish an effective communication strategy that would enhance the adoption and diffusion of improved technologies (Edache, 1980). These technologies range from an integrated use of improved agronomic practices such as judicious use of fertilizers and high yielding crop varieties to crop protection, improved storage techniques and marketing systems (AERLS, 1980).

The NAFPP seeks to achieve its goals through the introduction of a three-step teaching method, the first of which is the "Minikit" followed by the "Production Kit" and finally the "Mass Adoption Kits".

The Minikit: is a package of improved practices containing from 4 to 6 improved crop varieties or lines (including one local variety) which can be tested on the farmer's own field. A minikit package contains sufficient quantity of each variety to plant approximately 58 sq.m (25 feet square). All the inputs needed to make the varieties perform to maximum are supplied free. All field operations are however, done by the farmer himself so as to involve him personally and emotionally in the process of identifying and chosing the best variety. The extension worker visits the plot at the time of all the important field operations so as to give necessary guidance in carrying out all the operations correctly. The Minikit trials afford the researchers the unique opportunity to observe the performance of their varieties under farmers' own farming conditions. This allows the researchers to get feedback from farmers, extension workers as well as the consumers. After a variety has been identified and selected by the farmer through the Minikit Trial, it is then promoted for mass adoption through the production kits and demonstrations.

The production kit trial: is the next step from the Minikit. It is to the farmers the highest possible yields they can obtain on their farms using the variety they selected from the varietal minikit trial. The variety will be raised on 0.2 hectare (or $\frac{1}{2}$ acre) under optimum fertilizer and optimum management level. Since production kits are closer to field scale than are minikits, farmers should be more able to estimate costs and problems involved with the methods (AERLS, 1980).

Unlike the minikit trials, the seeds and all the production inputs in a production kit trial will be sold to the farmers at a minimum cost.

All the field operations are carried out by the farmer himself under close supervision of the extension agent. The success of the production trials should convince farmers of the superiority of the new technology and will form the basis for launching an accelerated campaign. The production kit serves as a demonstration as well as seed multiplication plot.

The mass adoption stage: being the final stage the NAFPP extension trials, the Mass Adoption phase is considered to be the most important (Edache, 1980). This stage is designed to translate all the lessons taught through the Minikit observation trials and the production kit package demonstrations into mass production. It is the phase whereby the farmer fully adopts the NAFPP package of improved practices after having been fully convinced of its superiority over the previous practices. At present many States have attained this third and final phase of the NAFPP programme.

The NAFPP extension system has two unique advantages over the other extension systems that have been in use. Firstly, the wide spread use of the kits can reduce the time lag between the introduction of proven agricultural innovations (research findings) and its final adoption by the farmers from eight or more years to approximately two or three years (IITA, 1977). Secondly, by involving the farmers emotionally in the selection of the new crop varieties in the Minikit stage, the chances of

rejection of the new planting materials by the farmers are minimised (Edache, 1980).

It is envisaged that if the three component parts of the (Research, Extension and Agro-service centres) are implemented simultaneously as a complete system rather than as separate units, the impact of the programme on Nigeria's agricultural development would be dramatic.

The NAFPP project is executed jointly by the Federal Department of Agriculture (FDA), the National Crop Research Institutes and the States' Ministries of Agriculture and Natural Resources (MANR). The extension component is an integral part of the agricultural extension programme of the States' MANR.

1.3: Statement Of The Problem

It has been observed that the NAFPP and the other strategies (such as the River Basin Development Authorities (RBDAs) the Integrated Rural Development Projects (IRDA), the Agro-Service Centres (ASC) among others that are designed to harness the potentialities of agricultural development, have been in operation for several years; and that during the past decade production efforts have been intensified by both the government and the agricultural development agencies. In effect to give greater emphasis to agricultural production the government substantially increased allocation to the agricultural sector (to the tune of N3 bil.) during the Third National Plan Period (1975-80).

Despite all these efforts, the importation of food commodities, notably rice, wheat, sugar, beef, etc. has been on the increase. Correspondingly, the food import bill has been escalating, starting with merely ₦58 mil. in 1970 to well over ₦1 bil. in 1980.

It has been pointed out that agricultural research and extension have been going on since the early 1920s, yet research findings have "had very little influence on the traditional farming system across the country" (Onazi, 1973:3). The adoption of modern farming techniques by the generality of Nigeria's small holders has been a rather slow process. Most farmers are still farming in the same old way as their ancestors, planting the same unimproved seeds, keeping the same unimproved breeds of animals and using mainly the same type of primitive tools. They put so much human labour into and reap so little out of the land. Mosher (1966:16) warned that "it is simply not possible to get much increased by using the same old plants and the same old soil in the same old way".

One of the most noticeable impacts of the extension effort has been the adoption and use of inorganic fertilizers by the generality of Nigerian farmers. In a case study of sorghum farmers in Kano, Edache, (1980:8) found that ninety percent of the farmers used fertilizers. This according to him, makes it "the most widely adopted of the innovations". The wide acceptance of the use of fertilizers is also indicated by "the long queues one sees in various villages where fertilizers are being sold" (AERLS, 1980:6). Another noteworthy achievement of

the extension effort has been the wide adoption of Cocoa Spraying by Cocoa Farmers of Western Nigeria (Kidd, 1968).

On the other hand getting farmers to adopt certain innovations such as early planting and spraying of cotton by farmers in the north (Davies, 1980); planting of the improved Alleyn J26 Cotton and NSI Maize seeds by farmers in the west (Williams, 1978); close spacing of sorghum and planting only one crop in a plot (monocropping) and some other innovations have for one reason or another been an uphill task. These facts seriously question the effectiveness of the extension strategies so far implemented in the country.

However, the NAFPP strategy has been appraised as the one extension system that can provide a broader framework for solving the long standing extension problems of the country. The NAFPP has by and large replaced the conventional extension approach, the Result Demonstration, which has been in use by the Ministries of Agriculture since the early 1960s and which Liman (1980) describes as "inefficient".

Although the NAFPP has been in operation for more than a decade, there has so far been very little systematic study done to evaluate its effectiveness as an extension strategy. The first emperical study on this programme was conducted by Edache (1978) during its pilot phase in Kano State. But before Edache's work, Williams et. al. (1975) had conducted a sorghum Bench Mark Survey also in Kano during the 1975 cropping season. The William's Bench Mark Survey was aimed at assessing the impact of the NAFPP and its contribution to increasing sorghum production in thePilot area.

Similarly, Edache's work had the primary objective of investigating the motivational factors related to the adoption of the NAFPP improved sorghum production technology. It is to be noted that Kano is one of the original States concerned with Sorghum/Millet/Wheat Programmes (Williams, et. al., 1975).

As in the case of these two studies and essentially Edache's, the present study will focus on the adoption of new improved practices for the production of sorghum as introduced by the NAFPP in the study area (Zaria Local Government Area).

Sorghum has been chosen for this study because according to an AERLS/NAFPP Report (1978), it is the most widely grown staple cereal crop in Northern Nigeria. Norman (1972) also showed that sorghum occupies about one-third of the total area devoted to cereal production in the Northern Guinea Savanna Zone. According to Norman, compared to other grain crops, sorghum is by far the most widely grown traditional grain crop in the Zaria Local Government Area (the study area).

Observations of the cropping trend indicates that most farmers in the area have within the past three or four years tended to increase the production of grain crops (Sorghum, Maize and Millet) in place of the traditional "cash" crops (Groundnut and Cotton). The General Manager, Nigerian Grains Board (NGB) was quoted as saying that "all available data indicate that the 1981/82 season witnessed an unprecedent record crop of coarse grains (sorghum, millet, maize and paddy rice) ever harvested" (New Nigerian, 28/2/83 p.1).

One of the cardinal problems that need to be critically looked into is the yield aspect of sorghum grown in the study area. It is a well known fact that sorghum yields in developing countries are comparatively much lower than yields obtained in developed countries. For example, an FAO report (june, 1981) shows that the average yields of sorghum in Nigeria is 650 kg/ha while that of the USA is 3.5 tonnes/ha.

There is also a considerable yield differential between what the Nigerian small-scale farmer gets using his traditional methods of production and what he could obtain using the improved practices. For example, Yazidu (1983) noted that while a farmer can only produce slightly over half a tonne of sorghum by using his traditional techniques, he can produce nearly two tonnes using improved technology (Table 1.2). Yields obtained from Minikit and Production kit trials in Kaduna State reveal that considerable yield improvement could be achieved using appropriate recommended production technology (Table 1.3).

To achieve any significant increase in Sorghum production in the study area, the appropriate production technology must be successfully transferred to and adopted by the farmers. The extension workers through the NAFPP Project are faced with the responsibility of diffusing the new sorghum innovations to the farmers. This is largely achieved by siting Minikit and/or production kit demonstration plots on the farmers' farms. The demonstration plots help to convince the farmers of the practicability and viability of research recommendations. Farmers may not be readily convinced by mere verbal claims of the

Table 1.2: Gains from use of improved technology for Cereal Food Crops in Nigeria.

Cereal Food Crop	Yields of Farmer's level using traditional methods (in metric tonnes/ha)	Yields at Farmer's level using improved technology (in metric tonnes/ha)	Percentage gain from use of improved technology
Sorghum	0.78	1.78	115
Millet	0.71	1.34	89
Maize	1.90	3.50	84
Rice	2.00	5.00	150

Source: Adapted from Yazidu (1983:16). The Importance of Agricultural Information to the Rural Farmer.

Table 1.3: Average sorghum grain yields (kg/ha) in Minikits and production kits trials in Kaduna State (1977-80).

Year	Minikits	Production Kits
1977/78	2,108	*
1978/79	1,466	1,260
1979/80	2,400	1,760

Source: NAFPP Reports of National Centre, AERLS/ABU, 1977-80.

* Records not available.

superiority of the new technology, but they cannot argue with actual results from trials they helped to perform (Gana, 1974).

Although the NAFPP approach to sorghum production has been going on in the study area for the past six years, there has not been any systematic study to evaluate its effectiveness. The present study seeks to find out whether or not the stated objectives of the programme are being met and to what extent.

1.4: Objectives Of The Study

The general objective of the study is to evaluate the effect of the NAFPP as an extension strategy for increasing the production of sorghum in the study area. The specific objectives of the study are as follows:

1. To examine the Sorghum Farmers' personal characteristics (age, education, social status, level of living, size of farm, additional occupations, etc.) and their effects on the adoption of the NAFPP Sorghum package in the study area.

2. To determine the extent of adoption of the NAFPP Sorghum recommended practices by the participating as well as non-NAFPP participating farmers; and to find out if there were any problems (social, economic, etc.) associated with the adoption of the recommended practices.

3. To examine the operational problems faced by the extension workers in implementing the NAFPP Sorghum Programme in the study area, and to determine those extension functions which should be given specific attention as perceived by the extension worker.

4. To make suggestions for the improvement or otherwise of this new extension approach.

1.5: Justification

In view of the importance of sorghum as a staple food crop, especially in northern Nigeria as highlighted earlier, it becomes necessary to look into the details of the production aspect and its bottlenecks. The yield differential between the farmer's traditional methods of production and the research recommended methods is very vast. The NAFPP programme was started about a decade ago with the cardinal objective of dramatically increasing yields per unit area. However, the extent to which success in this respect has been achieved has not been monitored in detail, especially in Kaduna State. The only noteworthy empirical work done within the framework of the NAFPP was on Sorghum production in Kano State by Edache (1978).

Because Sorghum is a very important food crop to the farming communities of the study area, it has been singled out for the present study. The study is designed within the framework of the NAFPP, to ascertain the extent to which the approach has been successful as an extension strategy to enhance sorghum production as well as the adoption of the NAFPP package of technology. The NAFPP approach has been claimed to be superior to the 'Result' Demonstration as practiced by the Ministries of Agriculture and Natural Resources (Liman , 1978). It is envisaged that after studying the situation, it will be possible to make some suggestions for the improvement or otherwise of this new extension approach.

Chapter II

REVIEW OF LITERATURE AND THEORETICAL FRAMEWORK

2.1: Review of Related Literature

The Central theme of this study is to evaluate the effect of the National Accelerated Food Production Programme (NAFPP) as an extension strategy for the adoption of improved sorghum practices in the study area. In this chapter an attempt is made to review the appropriate literature on the adoption and diffusion studies conducted in Nigeria and elsewhere and which are thought to have particular relevance and applicability to the present study.

There has been quite a number of diffusion and adoption studies undertaken in various countries including Nigeria. However, up to the last one and half decade only about one-third of the total number of diffusion studies (1,084 as of June, 1968) conducted all over the world have been done in the developing countries. All the others were in the developed countries (Rogers and Shoemaker, 1977).

Efforts in diffusion and adoption studies have largely been concentrated in finding whether there exists any relationship, and to what extent, between the adoption, of innovations and its characteristics and the personal characteristics of the adopters and other socio-cultural and economic variables. For example, Brandner and Kearl (1964) and Fliegal and Kivlin (1966) have established that the variables associated with certain innovations (complexity,

message content, for example), were related to the adoption decision of farmers. Correspondingly, studies by Wilkening (1958), Hess and Miller (1958), Copp (1956) and many others have shown that personal characteristics (age, education, size of farm, social status, etc.), are related to adoption behaviour of farmers.

2.2: Personal Characteristics of Farmers and Adoption

The personal characteristics of farmers that affect their decisions on adoption have largely been found to include age, farm size, family size, mental flexibility, farm ownership, other occupations, participation in voluntary organisations, level of education, awareness of recommended practices, frequency of agents - farmers contact, social status, level of living, exposure to mass communication media, and other socio-economic factors.

Many researchers have linked innovativeness with young age. Younger persons are thought to be more receptive to modern ideas than older ones. For example, studies by Wilkening (1952), Hess and Miller (1954), Lionberger (1959), Marsh and Coleman (1954), Wilson and Gallup (1955), Copp et. al. (1958), Voh (1979), Olorunnipa (1981) and many others have shown that elderly farmers seem to be somewhat less inclined to adopt new ideas and farm practices than younger ones.

Studies by Gross and Taves (1952) showed results that support the argument that elderly farmers would hesitate to adopt any new farm practices or change that could jeoperdise

their security and prestige. They found that adoption was highest among the middle-aged farmers. Basu (1969) and Edache (1978), on the other hand, did not find any significant relationship between age and the adoption of recommended farm practices.

There is a universal assumption that formal education facilitates learning and as such those farmers who have attended schools would under normal circumstances have a more favourable attitude towards the adoption of improved farming practices (Lionberger, 1964). Lionberger, however, reported no clear relationship between years of schooling and adoption. Similarly, Williams (1969) and Basu (1969), both in western Nigeria, found no significant relationship between formal education and the adoption of new farm practices. But on the contrary, Bose's (1961) and Rahudkar's (1961) works, both in India, showed a significant relationship between formal education and adoption.

Literacy was found to be positively and significantly related to agricultural innovativeness in India and Columbia. Similarly, Edache's (1978) and Voh's (1979) work in Nigeria showed that literacy is strongly and positively associated with adoption. Edache (1978) reported that literacy (in both Roman and Ajami Scripts) influences adoption behaviour.

In his study of Columbian farmers, Rogers (1969:258) found that "one partial indicator of excellence in farming is farm size, whether measured in land units or labour inputs". He found that there were low but positive correlations between

farm size (in land units) and adoption. Similarly, Lionberger (1964), Basu (1969), Bose (1961), Okafor (1979), Edache (1978) among others, all found size of farm operations to be positively related to the adoption of new farm practices.

A person's social standing in the community is an important factor in his acceptability of new farming practices (Lionberger, 1964). Rogers (1969) noted that social status is partial indicator of farming excellence and that efficient farming is one of the primary means of earning higher status. Rogers (1958), and Coughehour (1960) found that early adopters of farm innovations are of higher social status and that they possess more favourable attitude to change. Other researchers who found positive relationship between farmers' social status and adoption of farming innovations included Obibuaku and Hursh (1977), Williams (1969), Patel and Ekpere (1978), Rogers and Myren (1965), Sawhney (1966), Edache (1978), Voh (1979) and many others.

Level of living as measured by the possessions of status conferring materials (cars, radio, television, etc.) is an indicator of excellence in farming (Rogers, 1969). Fliegal (1956) found level of living to be positively correlated with rate of adoption of new recommended farming practices. Voh (1979) found in his Giwa study that socio-economic status is strongly and positively related to the adoption of new farm practices. Another survey in Funtua by D'Silva et. al. (1981) showed similar results.

Due to the seasonality of farming in Nigeria, most farmers in the northern States find additional occupation, especially during the long dry season. Studies by Williams et. al. (1975), Edache (1978), both in Kano and Voh (1979) in Giwa have shown that more than half of the farmers studied did not solely depend on farming even during the rainy seasons. They have been found to engage in other additional occupations ranging from petty trading in food and cash crops and other goods, to barbaring, black-smithing, building and other traditional occupations. Most adoption studies have, however, shown a positive but weak relationship between practicing an additional or subsidiary occupation and the adoption of recommended farm practices.

Personal contact or face-to-face communication between extension worker and the farmer has been described as "the most important instrument for arousing interest and for teaching the related farming skills" (Dube, 1972:161). Rogers and Niehoff (1967), Williams (1978) and Kincaid (1968), all found that face-to-face visits were the most frequent means of contacting the farmer by the extension staff. According to Williams (1978) a study of farmers in western Nigeria revealed that farmers first learnt of some recommended practices through the extension workers (32%) secondly by radio (29%) followed by fellow farmers (15%) and farmers' organisations (6%). Similarly, Daniels (1966) found that the extension workers, farm demonstrations and fellow farmers (in that order) rank highest as the farmers' initial acquaintance with improved farm practices. Edache (1978) and

Voh (1979) found a highly significant and positive relationship between the frequency of extension agents' visits and the adoption of recommended practices.

Radio on the other hand has been shown by many diffusion studies to be one of the most effective sources of farm information in developing countries. In Nigeria radio is second only to extension worker in disseminating new agricultural ideas to the farmers. In effect, studies by Yazidu (1973), Bogunjoko (1983), D'Silva, et. al. (1981) and many others, have identified radio to be the number one source of farm information in Northern Nigeria.

Similar studies carried out in the USA and Sweden (Hakansson, 1953), the Netherlands (Van de Ban, 1962), and Japan (Lindstrom, 1958) showed that even in the developed countries radio is one of the most important means of disseminating farm information. Radio is therefore, significantly associated with the adoption of new farm practices.

Because man is a social being, he does not exist in isolation; he is surrounded by social systems that govern his whole existence. Numerous diffusion studies.(For example, Bailey, 1964; Katz, 1960; Okafor, 1979; Rogers and Burdge, 1972; Basu, 1969, and Voh, 1979), have repeatedly shown that various social groups (such as friends and neighbours, members of family, social cliques, locality groups among other) serve as referents or consultants to the individual adopter in his decision making process.

farmers who participated in farm demonstration were significantly different from other farmers in the neighbourhood with respect to income, leadership, use of source of information, etc. at the conclusion of a demonstration programme. Gallahan and Santopolo (1967) advised that farmers should be involved in programmes meant for them because they will more readily accept innovations they see as relevant and that they have a hand in planning. Rogers and Shoemaker (1971:383) hypothesised that "satisfaction with collective innovation decision is positively related to the degree of participation of members of the social system". French, et. al. (1958), Morse and Reimer (1956) among others found support for this generalization.

2.3: Farmers and Response to Change

The behaviour of the peasant farmer and his attitudes to change has for long been the subject of intensive study by sociologists all over the world. In Nigeria, as well as in other developing countries, studies have been undertaken with a view to finding what factors are responsible for motivating the peasant farmers to readily accept and adopt certain

innovation and to reject others even when such innovations appear to be superior to the farmer's age-long practices.

The peasant farmer all over the world, and especially in the developing countries of Asia, Latin America and Africa, has often been described in such negative terms as "ultra conservative", "illiterate", "resistant to change" and such other stereotyped attributes. For example, in his study of Columbian peasants Rogers (1969:40), describes the sub-culture of the peasants in that country as resistant to change.

The Nigerian farmer has often been depicted by observers in the same negative light as his Columbian counterpart. Onazi (1973:4) pointed out that "the farmer has often been accused of being too conservative, illiterate, culturally oriented and unwilling to accept change". Similarly, Prawl (1969) observed that the Nigerian farmer has been portrayed as a highly conservative person, resistant to change and lacking in innovation. For example, in his study of the small scale farmer in south-eastern Nigeria, Okafor (1979:253) claimed to have found "a deeply ingrained attitude of conservatism among the farmers, and that all change is viewed with skepticism and caution".

On the other hand, there are quite a number of researchers who see the Nigerian farmer in a more positive light Edache (1980:6) for example, asserts that "the Nigerian farmers are by nature not resistant to change per se", and that they appear unresponsive to new ideas only when the social, economic and physical environment in which they operate dictate it.

Jones (1960:72) sees the Nigerian farmer as "a rational economic man". This view was shared by Agbonifo (1974:13) who believes that the farmer is prepared to accept innovations "provided he is sure he can earn more money by doing so"; and Williams (1979:5) who wrote that the farmer is making an effort in many ways to improve his economic well-being. He acknowledges the fact that "if the Nigerian farmer rejects an innovation, he generally has very sound reasons for doing so".

2.4: Reasons for Farmer's Rejection of Innovations

From his experience in five Asian countries, Byrnes (1972:4) was able to deduce that farmers by and large resist some changes "due to some failure of the extension system itself". He contends that "more frequently what the farmers seem to resist is not the change itself but the manner in which the change is presented or what they perceive the change to be".

Most often the farmers may reject the innovations because such innovations are inappropriate or unrelated to their problems and needs. For example, in Nigeria, some research recommendations have been rejected by farmers simply because such recommendations run counter to their traditional system or may have economic implications or some other limitations that makes it difficult for them to adopt the new innovations.

The practice of mixed versus sole cropping, for example, is one important area in which messages have not been relevant to the farmers' needs. Davies (1980:74) disclosed that in

the 1950s and 1960s researchers in the Institute for Agricultural Research, largely based their trials and recommendations on sole cropping, contrary to the farmer's traditional system of multi-cropping. This, according to Davies, resulted in the extension workers encountering resistance when attempting to recommend sole cropping. Supporting this view Williams (1978:43) wrote that most of the recommended practices by our researchers are found to be "not technically feasible, economically viable and culturally compatible with the farmers' practices and hence are often rejected".

Onazi (1973:4) charged that "there has been some conscious or unconscious efforts to transplant foreign values and systems into Nigeria's predominantly rural society with little or no adaptation to local cultures, values and systems". Lerner and Schramm (1972:103) remind us that "some traditional values are simply incongruent with some goals of modernization". Agbonifor (1974:13) advices that any new practices being introduced to the farmer "must not only be compatible with his existing farming traditions but also with existing social structures and institutions in the community". Frutchey (1956) also advised that "extension teaching must be consistent with the values people have unless those values can be changed or new ones developed."

Among the many reasons advanced by researchers for farmers resisting some innovations are lack of available resources, the seen and proven ineffectiveness of the practices, lack of anything to gain from the change, fear of risks and

uncertainties, the fear of the consequencies, desire to preserve traditional ways and general unwillingness to change (Byrnes, 1968:5). Williams (1978) also reported that farmers in western Nigeria refused to grow the new higher yielding Alleyn J26 Cotton Seed because of its costly demands and low returns. This cotton was recommended as a sole crop whereas most farmers grow their crops in mixtures.

Castillo et. al. (1963) identify other reasons associated with farmer resistance to some innovations as being unaware of alternative sources of information, difficulty in comprehending cause and effect relationship and loss of confidence in the extension worker. According to them some farmers may develop "learned resistance" after encountering some unfavourable experiences with the professional workers.

Guzman (1964) advanced yet other reasons for farmers' rejection of some innovations: the farmer may resist when he does not have any need for the change (rational non-adopter); when he lacks confidence in the idea (justified skeptism); when he sees that the risks involved in adopting the idea are not worth the trouble (fear of risks and uncertainties); when he fails to see and understand how the practice will benefit him (sensible reluctance); and finally he may be willing to try the idea but encounters barriers beyond his control. For example, supplies or other resources may not be readily available when he needs them. Lionberger (1964) found that adherence to traditionalism in farming is apparent in the persistent use of antiquated farm practices even when better ones are available. In an earlier study Spencer (1952) found

that adoption was negatively but significantly associated with high emphasis on security and traditionalism.

Psychological characteristics such as rationality, mental flexibility or rigidity, dogmatism and many other traits have all been found to be associated with adoption. According to Lionberger (1964) a mentally rigid farmer will tend to resort to traditionality, while a flexible one will be capable of making adjustments to changes. Studies by Rogers (1957) indicate that some people are more prone to change than others.

In Nigeria, the various reasons advanced for non-adoption by farmers include among others, non-availability of inputs at the right time, non-profitability, lack of knowledge of the recommended practices, lack of suitable market for products, lack of capital resources, and many more. For example, Edache (1978) found that one-fifth of farmers in Kano rejected close spacing of the new sorghum variety because of several reasons: lack of information or knowledge of the practice; difficulty in measuring the spacing; and problems associated generally with inter-cropping in fields so closely spaced.

Kidd's (1968) study in western Nigeria revealed that those farmers who failed to adopt some recommended farm practices did so for several reasons, among which are: no access to extension agents; no market for expanding products, no credit facilities, inadequate materials and supplies at proper time, lack of demand for the products (e.g. consumers not in favour of the yellow colour of NSI maize); lack of extension worker supervision to ensure proper use of new

techniques; and low level or lack of profit (in connection with maize and poultry recommendations).

In another study in western Nigeria, Williams (1969) found that half the farmers who failed to adopt the recommended practices on rice and cotton production and use of fertilizers, did so because no one else in the village adopted the practices; they did not believe there would be any economic advantage; they could not afford it; they could not understand the recommendations; and that their farms were too small.

In his adoption studies of Minna Division, Gana (1974) also found a number of reasons responsible for farmers failing to adopt recommended farm practices. The most important reasons for non-adoption included inadequate farmers - extension worker contact; unco-operative attitude of farmers, delay in receipt of materials and supplies; lack of capital to purchase inputs; no confidence or faith in recommended practices; unpreparedness to give up old ways; lack of sufficient knowledge of new practices; low level of education or literacy; non-participation in extension activities; and failure of some demonstration plots and other extension programmes.

Onazi (1973) found similar reasons for non-adoption by farmers in northern Nigeria. Among the most important barriers to adoption are lack of capital resources to invest in production; non-involvement of farmers in the planning of extension programmes; reluctance of farmers to give up old ways; lack of frequent contact with extension workers; lack of

suitable market and unfavourable producer prices; and unco-operative attitude by farmers. Oloruntoba (1978), Alao (undated), Ige (1974), among others, found similar reasons for non-adoption of recommended farm practices by farmers.

2.5: Reasons For Farmers' Acceptance Of Innovations

The acceptability by farmers of new improved farm practices depend on many factors such as the attitude of the farmers to the extension worker and his messages; the validity of the message; the complexity of the message, and the compatibility of the message with the existing farmers practice (Williams, 1978:93).

Hundreds of adoption studies (Rogers, 1954 has reviewed over 500 such studies) have shown a consistent trend that five major characteristics of innovations, as perceived by potential adopters, affect the acceptability of such innovations; they are: (1) Relative advantage; (2) Complexity; (3) Compatability (4) Trialability; and (5) Observability.

Relative advantage:- when the farmer perceives the change as better than the idea it superseded, he is most likely to adopt it. The greater the relative advantage of the new practices, the quicker its chance of being adopted. "The relative advantage of a new idea, as perceived by members of a social system, is positively related to its rate of adoption" (Rogers and Shoemaker, 1971:143).

Complexity:- If the farmer perceives an innovation as being difficult to understand and use, he is most likely to reject it. According to Rogers and Shoemaker (1971:154) "the complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption". Studies by Kivlin (1960), Singh (1966), Petrini (1966) and several others have shown similar results.

Compatibility:- If the new practice is perceived by the farmer as being consistent with his existing values, past experience and needs, it stands a much better chance of being adopted. The more compatible a practice is with the existing farming operations, the more likely it will be adopted quickly and vise-versa (Lionberger, 1964). It has been stated that "the compatibility of a new idea, as perceived by members of a social system is positively related to its rate of adoption". (Rogers and Shoemaker, 1971:351), Brandner (1960), Feliciano (1964) among others found support for this generalization by Rogers and Shoemaker, while (Carlson 1965), Kivlin (1960), among others did not find support for it. Obibuaku (1962), and Adegboye and Alao (1972) found significant relationship between compatibility of an innovation and its adoption by farmers in Nigeria.

Trialability:- If the farmer can try the idea instalmentally, he is more likely to adopt it more quickly than if it were indivisible. "The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (Rogers and Shoemaker, 1971:52).

They also cited nine other studies that reported similar results, and four others that were not in support of the generalization.

Observability:- When the farmer is able to observe the result of the innovation, he is more likely to adopt it. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (Rogers and Shoemaker, 1971:156). Fliegal, et. al. (1968), Havens and Rogers (1961), reported similar results; while Carlson, (1965) and Tucker (1961) reported contrary views.

Feliciano (1964) outlined several reasons for accepting new farming innovations among Philippino farmers. They include: the seen and proved effectiveness of the practice, novelty of the practice, ease of doing the practice, availability of needed resources, influence of neighbours and friends, and the compatibility of the practices with the farmers' needs and goals.

Williams (1979) also outlined several factors associated with the acceptability by Nigerian farmers of new farming practices. According to him, the factors include among others, the attitude of the farmers to the extension worker and his information, the validity of his information, the complexity of the information and its compatibility with the farmers' existing practices.

2.6: Extension Worker Characteristics And Adoption

Not all the variables leading to the farmers' decision to adopt or reject innovations could be attributable to the

farmers and/or the extension organization alone. Some other factors affecting the success or failure of the extension programme may rest squarely on the extension worker himself. The extension worker carries with him to his job several attributes such as the quality of his training, his attitudes and motivations, his social network of relationships (Alao, undated). Other characteristics of the extension worker that contribute to the effectiveness of his job include, among others, credibility; knowledgebility; mobility; and positive attitude to work.

Byrnes (1972) stresses credibility as being highly essential for the success of an extension agent. Fett (1974:9) pointed out the fact that "messages are judged and accepted not only on the bases of their content but also on (the credibility of) their source". Hoveland, et. al. (1953) postulated that "trustworthiness" and "expertness" are the two principal dimensions of source credibility. One very important factor that sometimes vitiates the Nigerian extension workers creditibility in the eyes of their clients is their inability to keep their promises to the farmers (Williams, 1978:94). "Quite often the fertilizer and seeds do not arrive on time thus making the farmer to lose confidence in the extension worker as well as the government".

In his study of factors associated with farmer resistance to change in Asia, Byrnes (1972:4) found that the farmers resisted because of "the perceived or actual technical inadequacies of the agent". According to him, many an agent

did not have farm background and possessed only "a book or garden knowledge of farming". In another study in India, Murthy (1965) found that village level extension workers were frustrated because of their inability to influence farmers and that they felt deficient in practical knowledge and information of agricultural improvement.

In Nigeria, Onazi (1973), Williams (1969), Ajakaiye (1969) and Alao (undated) all pointed out the fact that the hard-core extension service is manned by people who by training and technical skills are at the very bottom of the extension organization, and are the least trained for their important job. Most of them are primary school leavers trained only in rudimentary scientific agriculture. Furthermore, most of them are young and therefore incapable of grasping the complexity of agricultural technology let alone transfer same to farmers. There must be a substantial knowledge gap between the extension worker and his client or else the extension worker would have little or no credibility.

One other problem that renders the Nigerian extension worker less effective is excessive work-load. The village-level extension workers have the onerous task of executing myriads of activities in their extension areas. Williams (AERLS, 1980), Onazi (1973), and Ajakaiye (1979) all enumerated the different tasks performed by the extension worker. According to them the extension workers combine educational as well as supply activities. They include such duties as organizing farmers councils (FC), rural youth organisation (YFC), organizing and conducting method and result demonstrations, and farm tours

and field days. They are also responsible for management and supervision of farm centres and maintain seed multiplication and supply services. They are also responsible for conducting field experiments for research workers of the Universities and for collecting crop data and meteorological reports. Added to these and many other activities, some extension workers have the assignment of conducting other programmes such as the NAFPP. The involvement of the village-level extension worker in all these activities tend to render him less effective in his duties.

In Nigeria the limitation of resources and personnel compels the extension service to operate in an "extensive", rather than in an "intensive" basis (Williams, 1978) and as such the extension worker has often an extensive area to cover. And the nature of their duties requires them to be mobile. Gana (1974) found that the capacity of extension workers to conduct effective farm demonstrations in Minna Division was hindered by lack of adequate transportation facilities to carry out effective farm visits. Onazi's (1973) findings agreed with Gana's in that he found lack of transportation facilities to be the most critical problem confronting the extension workers in the execution of their duties.

Personal contact between the change agent and his clients has been identified as the most effective means of affecting adoption. In Nigeria, however, the number of the hard-core extension staff is grossly inadequate to have the desired impact on the clients. The ratio of extension worker to farm

families in Nigeria was from 1:2,000 and up to 1:5,000 in some areas; whereas in some developed countries the ratio was as low as 1:400 (Rowat, 1965:17). The working ratio then recommended for Nigeria by Rowat for the period 1965 to 1980 was a target of one extension worker to every 1,000 farm families. But even this is considered to be unsatisfactory ratio.

Another attribute of extension staff that constitutes a serious shortcoming to their effectiveness is the negative attitude to work posture adopted by many of them. In a study of attitude to work of Indian village-level workers to community development programmes, Phillon and Sumundri (1951) found that the attitude of every third village worker to the programme was unfavourable. On the attitude of the Nigerian extension workers to their job Williams (1978:91) wrote that "they have the illusion that they know everything about farming and therefore, have nothing to learn from any illiterate farmer - and they feel hurt and humiliated if the farmers raised objection to their advice".

Beside the insufficient number of extension staff, lack of mobility, their inadequate professional skills, excessive work-load among other problems, lack of social amenities in the rural areas discourage them from performing well. Generally, they operate under difficult conditions in villages where facilities like good roads, electricity, good drinking water, health care and other incentives that can motivate them to work more dedicatedly are either inadequate or non-existent. An extension worker who lives in this kind of environment cannot

but feel a sense of deprivation and isolation and a constant urge to move out at the earliest opportunity.

2.7: Theoretical Framework

The above review of related literature on the adoption of farm innovations clearly shows that adoption behaviour by farmers whether in Nigeria or anywhere else, is a function of a number of characteristics. Such characteristics of the farmer include his age, the size of his holdings, the level of his education, the tenure status of his farm, his socio-economic status, his mental flexibility, his exposure to mass-media and his contact with the extension agent, among others.

The literature review has also shown the various reasons for adopting or not adopting any improved farming technology. Among the many reasons for accepting and adopting new farming ideas by farmers are such as the relative advantage of the new practice, and its compatibility with his existing practice (Rogers and Shoemaker, 1971); other reasons include the seen and proved effectiveness of the practice, the novelty of the practice and the availability of needed resources (Feliciano, 1964). It was noted that farmers in Nigeria adopted many new farming ideas mainly for high yields, profitability and availability of needed resources (Gana, 1973; Onazi, 1974; Williams, 1978; Voh, 1979; Edache, 1978; Clark and Akinbode, 1968; and many others). Reasons for farmers rejecting new ideas have variously been given to include incompatibility of the innovation with existing practices, lack of needed resources,

fear of risks and uncertainties, nothing to be gained from the change, lack of suitable market for products, lack of capital resources, among others (Byrnes, 1972; Castillo, 1963; Edache, 1978; Onazi, 1973; Gana, 1974; Kidd, 1968; among others).

The literature review also indicate that the characteristics of the extension worker are important factors in understanding the adoption process and how it relates to the success or failure of some extension programmes in Nigeria. The primary characteristics that affect the effectiveness of the Nigerian extension worker are such as the quality of his professional training, his attitude to work, his creditibility in the eyes of his clients, his mobility, his motivations, his work-laod and condition of work. (Byrnes, 1972; Alao, undated, Williams, 1978; 1979, 1980; Onazi, 1974; Fett, 1974; Ajakaiye, 1979, among others).

Theoretically, one would then expect that in a planned change, like the National Accelerated Food Production Programme (NAFPP), all the above mentioned variables (pertaining to the farmers as well as the extension workers) would affect the adoption behaviour of the farmers negatively or positively.

In view of the related literature reviewed, the framework upon which the present study will be based, therefore, is that the Nigerian farmers in general and the farmers in the study area (Zaria Local Government of Kaduna State) in particular, are capable of and willing to embrace new recommended farming practices provided such new practices are profitable and are compatible with their existing farming practices and do conform to their norms and values.

Famoriyo (1970 and 1980), and Abalu and D'Silva (1979) have pointed out the fact that farmers will adopt a recommended farm practice if that practice is found to be technically feasible, economically worthwhile and socially acceptable. In his study of Latin America peasant farmers Myren (1962) found that even the small-holders do on their own seek information on new recommended farming practices. According to him, they appear to have a considerable desire to produce more efficiently and are interested in getting information on how this could be done. Studies by Tiffen (1968) in Gombe and by Antony and Johnson (1968) in Katsina proved the fact that farmers in less developed countries are equally responsive to new farming ideas and practices provided they perceive the new practices as useful and relevant to their needs. The farmer's readiness to accept new useful farming practices is examplified by the "dramatic" use of fertilizers (Anthony and Johnson, 1968:71) which Yazidu (1983:12) noted also as "phenomenal". According to Yazidu, when fertilizers were first introduced in the 1950s, the farmers were using it as whitewash and as insecticides against termites but "we have now reached the stage where farmers buy fertilizers in the black-market at prices of 200 percent over and above the guaranteed prices approved by the government".

2.8: Operational Indices

In this section an attempt is made to define the various variables investigated and to state how they have been measured in the study.

Age:- is an important determinant of seniority among traditional societies. In Nigeria the aged and the elderly persons hold a special position of leadership, prestige, respect and reverence among their communities. As such age may play a significant role in the decision making process in the adoption of new farm practices in the study area.

In this study the variable is measured by the age given in years by the respondents during the time of the interview.

Size of holdings: is defined as the size of land holding measured in hectares. In Nigeria, according to many sources (Voh, 1980; Olayide, 1969; Onazi, 1978; Edache, 1978, among others) the average size of holding by the small farmers is about 2 hectares.

Due to the fact that very few farms in Nigeria have physically been measured, it is almost impossible to find out from a farmer the exact size of his holding. This variable can only then be measured indirectly through other means such as (1) estimating from the yields obtained from a piece of land and (2) calculating from labour inputs (which has been used with some degree of reliability by other researchers such as Goddard, et. al., 1971 and Edache, 1978 in Kano).

In this study the variable was measured using the latter method. To find out the approximate size of their holdings, the respondents were asked to state the number of days it would take a person to ridge a piece of land using a hand plough. It is from the number of man-days given that the size of holding is estimated.

Additional occupation:- is defined as the subsidiary or additional occupations claimed to be engaged in by a respondent. Because of the seasonality of farming in northern Nigeria, most farmers (except those in the river basin and fadama areas where irrigated farming is possible during the dry season) tend to engage in other off-farm or supplimentary occupation. The other most frequently mentioned occupation by farmers, according to some researchers (e.g. Yazid, 1973; Edache, 1978; D'Silva, and others, 1981) include trading. cattle rearing, tailoring, black-smithing among others.

This variable was measured in this study by asking respondents to state any other additional occupations they engage in both during the rainy and the dry seasons. The respondent's score was the total number of such additional occupations mentioned. If the respondent had only one additional occupation, his score is one, and if he had two, his score is two, and so on.

Participation in extension activities:- is defined as the degree of active participation in such agricultural extension activities and programme as the Young Farmers' Clubs, Farmers' Council Meetings, Farm Demonstrations, Farm Tours, NAFPP Trials and any other extension activity that may expose the farmer to new farming ideas.

The variable is measured by asking the respondent to state whether he participates in such extension programmes and to what extent. His score was the total number of times he participated in any one or more extension activities. Each activity participated in had a score of 1.

Level of formal education:- refers to the type of education acquired through the regular or formal attendance of schools (including Koranic) and colleges. Level of education was measured by asking the respondents to state the number of years they spent attending schools, whether Koranic, Primary, Secondary or other kind of educational institution. The variable was scored as follows: those who never had any formal education had a score of zero; those who had one year of formal education had a score 1; those who had two years had a score of 2, those who had three years had a score 3; and so on.

Level of literacy:- refers to the ability by the respondent to read and write Roman (boko) and/or Arabic (Ajami) scripts in English or in the Hausa language. Level of literacy was measured by asking the respondents to state the degree to which they were able to read and write the Roman and/or the Ajami scripts. The variable was scored as follows: those who were not able to read and write had a score of zero; those who were able to read and write a little, had a score of 1; those who could adequately read and write had a score of 2; and those who could read and write very well had a score of 3.

Contact with extension worker:- In this study the variable refers to the act whereby the extension worker pays a working visit to the farmer at his farm or home to offer on the spot advice. Contact with extension worker was measured by asking the respondents to state how often they were visited by the extension worker at farm or home during the present and the last three seasons.

The variable was scored as follows: no visit had a score of zero; one visit had a score of 1; two visits had a score of 2; three visits had a score of 3 and so on.

Exposure to various sources of information:- The sources of information an individual farmer comes in contact with for farming ideas are such as friends and neighbours, extension agents, radio, television and newspapers among others.

In this study the exposures to sources of farm information was measured by asking the farmer to state the various sources of his information on a number of improved farm practices such as use of improved seeds, seed dressing, use of fertilizers, close spacing and weed control among others.

The variable was scored by adding up the number of sources mentioned by the respondent. Each source mentioned had a score of 1; and no source had a score of zero.

Social status:- refers to the social and functional position an individual farmer holds in his locality. He may hold such functions and prestige positions as Ward Head, Village Head, Imam (religious leader) and head of compound among others. Social status was measured by asking the respondent to state the functional role he performs in the community.

The variable was scored by adding up the number of status positions held by the individual in the community. Each position mentioned had a score of 1; and no position held had a score of zero.

Level of living:- is more of a function of the material possessions (wealth) owned by the farmer. The variable was measured by asking the farmer to enumerate the type and quantity of his durable consumer goods (wealth indicators) such as iron beds, rubber matresses, radio sets, sewing machines, livestock, farm implements among others, From these data, an estimation of the respondents' personal wealth was made by assigning each item indicated a monetary value (based on the market costs at the time of the interview).

The variable was scored by adding up the monetary value of the possessions owned by the individual respondents.

2.9: Hypotheses

2.9.1 General hypothesis

There is a relationship between the various personal characteristics (age, education, social status, level of living, etc.) and the adoption of the NAFPP Sorghum innovation by the farmers exposed to such innovations in the study area.

Empirical Hypothesis 1:- Age of the farmer in the study area is negatively related to the adoption of the NAFPP Sorghum innovation. The older a farmer is the fewer the number of new farming ideas and improved sorghum practices he is likely to adopt.

Empirical Hypothesis 2:- There is a positive relationship between size of holding and adoption. Those farmers with larger size of holdings are more likely to adopt the NAFPP Sorghum innovations than those with smaller holdings.

are more likely to accept and adopt the NAFPP Sorghum innovations than those that have less contact.

Empirical Hypothesis 8:- Exposure to various sources of farm information is positively related to adoption. The better exposed a farmer is with various sources of farm information the more he is in a position to accept and adopt new farm practices.

Empirical Hypothesis 9:- There is a positive relationship between social status and the adoption of improved farm practices. The farmers who have higher social status are more in a position to adopt the NAFPP Sorghum innovations than those farmers with lower social status.

Empirical Hypothesis 10:- Level of living is positively related to the adoption of improved farm practices. The higher the level of living of an individual farmer , the more likely he will be in a position to accept and adopt the NAFPP Sorghum innovations.

Chapter 3

METHODOLOGY

3.1: Constructing The Questionnaire

In developing the design and procedure for this study, the structured "Questionnaire" and personal interview approach were thought to be the most appropriate instruments for collecting the required data. This is because in Nigeria, most farmers are illiterate and cannot therefore, be asked to fill out and return questionnaire forms as is usually done in similar studies in societies where literacy is near one hundred percent.

Two types of questionnaires were evolved for the study:

(1) a comprehensive nineteen-page questionnaire for the farmers and,

(2) a six-page questionnaire filled out by full-time extension workers (A copy each of the questionnaires used is found in Appendices A and B).

The main questionnaire (Appendix A) was designed to accomplish the objectives of this study by seeking responses from both the NAFPP sorghum demonstration participating farmers and from non-participating farmers but who were residing within and around the demonstration villages. This set of questionnaire was constructed in such a way that immediate response could be obtained from the farmers with a simple "yes" or "no" or by checking a blank space in providing

one or more alternative answers. In some sections predetermined multiple choice answers were provided in order to aid the interviewer in asking the relevant questions and getting the correct response more efficiently. But in some cases more than one answers were required. The interviewers were specifically instructed not to read out the list of the expected responses but to allow the respondent to express their opinions freely and independently, thus providing valid and reliable information. The provision of "other" response category was intended to allow the farmer to supply information that has not been anticipated.

The interview questionnaire was constructed in English and translated into Hausa by the author. It was necessary to translate the questionnaire into Hausa because it is the language used by the farmers in the study area. They will have to understand the questions clearly in order to respond. The enumerators also spoke the same language as the respondents.

The questions were constructed in such a way as to reveal all needed information about the dependent and independent variables considered in this study.

Data were collected on the following:-

1. Personal characteristics of the farmers including age, size of family, education, size of family holdings, other occupations, social status in the community, farm labour organization, wealth and possessions, among others.

2. Exposure to extension communication - contact of farmers with extension workers, farmer participation or exposure to extension guineacorn result demonstration plots, guineacorn "minikit" and/or "production kit" plots, sources of information on new farming ideas.

3. Production inputs - fertilizers, improved seeds, seed-dressing and grain storage chemicals, labour saving devices (use of tractor and/or ox-plough).

4. The adoption of the improved and recommended guineacorn production practices - use of improved seeds, timely planting, seed-dressing chemicals, use of fertilizers, seed-rate, thinning, control of weed monocropping, close spacing and use of storage chemicals.

5. The problems associated with the adoption of improved guineacorn production practices as demonstrated in the NAFPP Trials.

The second set of questionnaire (Appendix B) was designed to identify some of the village socio-economic variables that may have relevance to the success or failure to the effort in getting the farmers to adopt the new NAFPP Sorghum innovations. The information about the villages included in this study were provided by the full-time extension workers assigned by the Kaduna State Integrated Rural Development Project, Zone III, to work in the villages. A questionnaire form was developed and administered on the extension workers. The information sought on this form dealt with the workers'

personal experiences during their assignments in these villages. The information covered social, economic and educational aspects of the inhabitants of the villages. A section of the form sought information about the conduct of NAFPP Minikit and Production Kit trials, the farmers' inclination to adopt or reject the NAFPP Sorghum production practices. It also solicited the extension workers' opinions on factors that might have limited the success of the NAFPP sorghum programme and what could be done to improve the matter.

3.2: Presenting The Questionnaires

The two types of questionnaires were pretested in order to eliminate difficult and ambiguous questions. The questionnaire intended for the extension workers was tested among the AERLS local extension staff to find out whether there was any difficult and ambiguous questions. The questionnaire was revised and re-written in simpler English for easy understanding of the village-level extension workers.

The farmer's questionnaire was translated into Hausa and pre-tested in three villages (Hunkuyi, Kubau and Dutsen-Wai) in the former Ikara Local Government Area. The pretesting was carried out in August, 1982. The aim of the pretesting was to identify questions that farmers might have difficulty in answering and also to eliminate questions that may be considered too personal or embarrasing to the farmers. The questionnaire was revised and retranslated into Hausa.

3.3: Selecting and Training of Interviewers

In a survey of this nature it is not practically possible for the researcher to single handedly administer the questions and collect all the required data. It was therefore imperative that suitable and reliable persons be enlisted to assist in collecting the data. To this end, it was decided to use the services of:

1. Two of the AERLS Local Extension Staff who carry out extension activities within the University Community and the villages around Samaru. They are also responsible for conducting NAFPP Minikit and Production Kit trials in some of these villages.

2. A team of five Higher Diploma vacationing students from the College of Agriculture, Samaru. The students have considerable experience in extension work and all of them have participated in running NAFPP trials in Kaduna State. All of these students are in fact indegenes of the study area (Zaria Local Government) and possess first hand knowledge of the villages and the farmers in the five districts.

3. The author, who apart from supervising the collection of the data from the five districts, participated in the actual interviewing of farmers in some villages. He also personally administered the questionnaire designed for the extension workers.

Before the enumerators were sent out to the field to collect data, a three-day induction course was organized during the second week of September, 1982 at AERLS. The training period was originally planned for one week but due to the fact that all of the enumerators were well-trained extension workers and that most of them have had some experience in rural socio-economic surveys, it was decided to cut the training period to only three days.

The purpose of the training was to acquaint the enumerators with the objectives of the study and the roles they were called upon to play in achieving those objectives. The questionnaire was discussed point by point; so also was the method of conducting and recording the interview.

3.4: Selection Of The Survey Villages And Samples Size

The survey area comprised five administrative districts (Soba, Giwa, Igabi, Sabon-Gari and Zaria City) which have a total of 108 major villages. A major village is the administrative seat of the Village Head. There are satellite villages, hamlets, and wards ruled by Hamlet and Ward Head; (Magajis and Mai-Anguwas) who are under the village head. According to the list obtained from the Kaduna State IRDP Zone III and the NAFPP Sorghum/Millet/Wheat National Centre, AERLS, there were altogether forty (40) NAFPP Sorghum demonstrations (Minikits and Production Kits) conducted in 31 of the 108 villages since the inception of the programme in 1976. Because of the relatively small number of the NAFPP Sorghum demonstrations, it was decided that all the participating

farmers in the demonstrations will be included in the interview, plus about 4½ times their number randomly selected from within the same 31 NAFPP villages. The original plan was to use all the NAFPP Sorghum participants plus an equal number of randomly selected non-participants from within the same villages, plus a corresponding number of other farmers from an equal number of non-NAFPP villages. Howevever, due to limited time, paucity of funds and sampling period, the idea was dropped in favour of using the NAFPP demonstration villages only as these villages were sited in accessible places.

The method used in selecting the total number of respondents (samples) and their geographical locations is outlined below:

1. The total number (40) of the NAFPP Sorghum demonstrators and their locations in the 31 villages was established as per AERLS and IRDP Zone III records. All of the 40 demonstrators were included in the sampling (see Table 3.1).

2. To determine the size and geographical distribution of rest of the sample (unknown at this stage) the latest (1979) Zaria Local Government Area Tax Return (TR) was used. According to the TR (1979) there was a total number of 20,082 taxable males distributed within the 31 villages in which the NAFPP demonstrations tookplace.
   (a) Recent adoption studies in the area and elsewhere in northern Nigeria (e.g. Norman, 1974:6; Mijindadi, 1974:29; Gana, 1974:61; Voh, 1969:5; and D'Silva, et. al.,

1981) reveal that there was an average number of seven (7) persons making up an average farm family in the study area and other rural areas in northern Nigeria. Therefore, to compute the approximate number of farm families in the 31 demonstration villages, the total number of taxable males (20,082) is divided by the factor 7. This gives us approximately 3,000 farm families.

(b) Because of the homogenoous nature of the farmers' characteristics in the area, 6 percent was considered a big enough sample size to represent the 3,000 farm families. Therefore, our target sample will be drawn from one hundred and eighty house-holds ($^{6}/_{100}$x3,000=180) within the 31 villages. And since we already have 40 households or farm families representing the NAFPP Sorghum demonstrators, the remaining 140 samples will come from the non-NAFPP participating families. The distribution of the 140 samples per district is worked out according to the percentage of the total number of taxable males in the 31 villages. For example, the number of taxable males in the 6 demonstration villages of Giwa District is 13 percent of the total number of taxable males in the 31 villages. This means that Giwa District will have a total sample of 23. But since the number of NAFPP demonstrators in Giwa District is 9, the District then will have 14 samples out of the original 140 to share among the villages (See Table 3:2).

The same formula was used for distributing samples among the villages. Gangara village in Giwa District has a total

Table 3.2: Distribution of Farmers Interviewed in the Zaria Local Government Area by Districts.

No.	District	Total population of taxable males	% Population of Total taxable males	Total Samples	Number of Farmers Interviewed	
					Demonstrators	Non-demonstrators
1.	Giwa	2,730	13	23	9	14
2.	Igaba	2,787	11	21	4	17
3.	Soba	6,969	33	59	13	46
4.	Sabo Gari	6,207	30	54	7	47
5.	Zaria City	2,629	13	23	7	16
	TOTAL	20,822	100	180	40	140

population of 554 as taxable males. This is 20 percent of the total population of taxable males of Giwa District. It worked out then that Gangara village will have a total of 5 samples. And since there were already 2 demonstrators, the number of non-demonstrators to pick is only 3. These three remaining samples were then picked from the farmers residing in the major village or in the outlying villages, hamlets, and wards according to the procedure outlined herebelow. The same formula was applied for selecting all other samples in the rest of the 30 other village areas (see Table 3.3).

3.5: Selecting The Respondents

The 180 respondents were selected using the following procedure:

As indicated earlier, the names of each of the 40 NAFPP Sorghum demonstrators were obtained from the Kaduna State IRDP, Zone III and the AERLS. The demonstrators were identified with the help of their village heads and extension workers.

The non-demonstrators were randomly selected based on the following procedure:.

1. Names of all farmers in the demonstration villages and the outlying wards and hamlets were obtained from the village heads.

2. Each name was written in a small piece of paper. All the papers were squeezed into small balls and placed in a Calabash and shaken thoroughly.

Table 3.3: Distribution of samples taken from NAFPP (Sorghum) Demonstration villages by District.

District	Village	Total No. of taxable males	% of Total No. of Taxable males	Tatget Samples	No. of Farmers to be interviewed	
					Demonstrators	Non-Demonstrators
1. Giwa	Gangara	554	20	5	2	3
	Mujedawa	610	22	5	2	3
	Madara	533	20	4	2	2
	Shika	331	12	3	1	2
	Biye	319	12	3	1	2
	Gadagau	383	14	3	1	2
Sub-total	6	2,730	100	23	9	14

Table 3.3 (Cont'd)

District	Village	Total No. of taxable males.	% of Total No. of Taxable males	Target Samples	Number of Farmers to be interviewed.	
					Demonstrators	Non-Demonstrators
2. Igabi	Rigachukun	829	36	7	1	6
	Kwaro	527	24	5	1	4
	Turunku	514	22	5	1	4
	Panshanu	407	18	4	1	3
Sub-total	4	2,287	100	21	4	17

Table 3.3 (Cont'd)

District	Village	Total No. of taxable males.	% of Total Number of taxable males	Target Samples	Number of Farmers to be interviewed	
					Demonstrators	Non-Demonstrators
3 Soba	Soba	1,701	24	14	3	11
	Maigana	921	13	8	2	6
	Fagaci	791	11	6	1	5
	Kinkiba	624	10	6	1	5
	Awai	671	9	5	1	4
	Takalafiya	629	9	5	2	3
	Taba	545	8	5	1	4
	Danwata	342	5	3	1	2
	Gurbabiya	745	11	7	1	6
Sub-total	9	6,969	100	59	13	46

Table 3.3: (Cont'd)

District	Village	Total No. of taxable males	% of Total Number of taxable males	Target Samples	Number of Farmers to be interviewed	
					Demonstrators	Non-Demonstrators
4 S/Gari	Ang. Fulani	2,053	33	18	1	17
	Dogarawa	600	10	5	1	4
	Hanwa	733	12	7	1	6
	Zabi	606	10	5	1	4
	Shika Dam	625	10	5	1	4
	Romo	1,139	18	10	1	9
	Basawa	451	7	4	1	3
Sub-total	7	6,207	100	54	7	47
5 Zaria City	Bogari	444	17	4	2	2
	Dambo	480	18	4	2	2
	Tukur-Tukur	767	29	7	1	6
	Pammadina	445	17	4	1	3
	Dakaoe	493	19	4	1	3
Sub-total	5	2,629	100	23	7	16
GRAND TOTAL		20,822	180		40	140

3. The first paper was drawn and the name and address of the farmer recorded down. The process is repeated until the required number of the particular village area was selected. Two or three extra names were picked as reserves just in case some of the farmers were not available for the interview.

3.6: Conducting The Interview

The enumerators were each assigned to particular village areas in a district to collect data. But before proceeding with the data collection the co-operation of the District and Village Heads had to be sought. This is the traditional governmental channel of communication with the farmers throughout northern Nigeria. Failing to observe this protocol a researcher may not be able to establish the desired rapport.

Before each interview the enumerator explained to each respondent the objectives of the exercise. The aim was to secure the respondents' full co-operation in answering the questions willingly and truthfully. The enumerator met each subject privately either at home or on the farm. In some cases it took the enumerators several repeated trips before they were able to locate and interview the subjects. At other times, some of the subjects would request the interviewer to see them at a more convenient day and time. There was considerable difficulty in locating three of the NAFPP Sorghum Demonstrators in three of the Districts (Giwa, Igabi and Zaria).

One demonstrator (used in 1978) at Fagaci (Giwa District) had migrated to a neighbouring village, while another one at Kwaro (Igabi District) was away from the village for more than 2 weeks. It took up to four different trips to finally get him to interview. The third demonstrator at Dakace (Zaria City District) had his proper name on record when the trial was earlier conducted on his farm, but is now known and addressed by his traditional title of "Waziri". But they were at last tracked down and successfully interviewed.

All the enumerators were instructed to check the questionnaires after interviewing every subject and before taking their leave. This was to allow for some possible mistakes to be corrected on the spot before it was too late.

The researcher was able to accompany the enumerators in some of their outings in order to observe closely how accurately the questions were being administered and recorded. It was also to afford the researcher the opportunity to observe and examine, on first hand bases, some of the crop production methods as practiced by the farmers. Of special interest are such practices as use of improved variety of guineacorn and maize; sole cropping versus mixed cropping; close versus wide spacing of guineacorn and timely versus late planting of guineacorn and maize, farm labour problems, procurement and use of fertilizer and many such other information that might be useful to the researcher in assessing the current farming situations in the study area.

3.7: Data Analysis

To report on the respondents' personal characteristics thought to be associated with adoption, percentages and means were used as appropriate. Percentages were also used to report the level of knowledge and the extent of adoption of the NAFPP sorghum innovations among the respondents. The Pearson Correlation Coefficient Statistical Analysis was used to test the hypotheses for ascertaining factors associated with the adoption of the recommended farm practices. The Multiple Regression Analysis was used to further isolate the relative contributions of the variables both individually and taken together. The .05 level of significance was used to report the significance of relationships between the selected personal characteristics of the respondents and adoption.

Chapter 4

RESULTS AND DISCUSSIONS

The findings from the data collected in this study are presented in this chapter in two parts. The first part deals with the findings based on the first and the second objectives of the study. The first objective examines the personal characteristics of the respondents with a view to finding how these characteristics affect the NAFPP Sorghum innovation introduced to the study area.

The second objective of the study on the other hand seeks to determine the extent to which the NAFPP Sorghum recommended production technology was adopted by the 180 farmers sampled in the study area.

The second part of this chapter deals with the findings based on the third objective of the study which attempted to examine the problems faced by the village-level and full-time extension workers in their efforts to implement the NAFPP Sorghum programmes in their areas of operation.

4.1: Personal Characteristics of Respondents

The data revealed that the size of families in the area varied from 2 to 20 persons, with a mean of 10.3 persons per household. Investigations on sources of farm labour showed that labour was provided largely from family and hired sources. It was interesting to note that almost all family labour on the farm was provided by the male members. This is expected

because in the traditional moslem areas all over northern Nigeria, the housewives are strictly under purdah (seclusion), as such they rarely perform any labour directly on the farm.

Some more selected personal characteristics of the respondents are presented on Table 4:1 (I - VI).

Table 4.1: Some selected basic characteristics of respondents

No	Characteristics	Mean	Standard Deviation	Variance
i)	Age (in years)	45,637	11.143	124.165
ii)	Size of holdings (in ha.)	5.247	2.674	17.878
iii)	Level of formal education (years of schooling)	0.850	2.142	4.586
iv)	Level of Koranic education (years of.)	8.306	7.283	53.040
v)	Level of living (assessed and valued in ₦)	452.111	422.799	178,759.049
vi)	Contact with extension workers (number of visits)	22.867	38.982	1,519.558

4.1.1: Age

It was found that about two-third (68%) of the respondents were under 50 years of age. This corresponds closely with results obtained from similar studies done in the area and elsewhere in northern Nigeria. For example, Voh (1979) in his Giwa study found 63% of his farmers to be under 50 years

of age. In the same vein Williams et. al. (1975) in their Kano study, Edache (1978) also in Kano; Gana (1974) in Minna found 67%, 72% and 78% of their farmers, respectively, to be under 50 years of age.

The findings of the study suggest that most household heads in the study are relatively young with a mean age of 45 years, thus ranging from 22 to 72 years (Table 4.1(i)).

4.1.2: Size of land holdings

When asked to give the sizes of their sorghum farms, most of the respondents could not do so as it has not been their practice to have their farms measured.

For this reason, labour input was used to estimate the approximate size of their holdings. By this method the respondents were asked the number of days it would take a man using a hand-plough to ridge up his sorghum fields. It was found that the man-days required varied from 2 to well over 100, with a mean of almost 37 man-days. When converted into hectarage, the sizes were found to be within the range of between 4 to 11.6 hectares, with a mean of 5.2 hectares (Table 4.2).

Almost two-third (68.9%) of the respondents were operating on land holdings ranging from 1-5 hectares in size, while about 18% had land ranging from 6-10 hectares. Only 9% of the farmers were found to be operating on lands larger than 11 hectares. The average size of land holding is 5.2 hectares.

It was also found that most of the farmers had more than one farm located in different places. The mean number of farm sites in the area was 5.9.

Table 4.2: Size of land holdings operated by the respondents.

Size of land	No	%
No information	7	3.9
1 - 5 ha.	124	68.9
6 - 10 ha.	32	17.8
11 and over	17	9.4
	180	100.0

4.1.3: Level of formal education

It was found that most (84.0%) of the respondents have never received formal (primary or secondary education). Only a small proportion (14.5%) of them had up to between four and seven years of primary education. The mean level of formal (primary) education for the respondents was less than one year (0.8 years). An earlier study by Voh (1979) had shown similar results in Giwa District. He found that more than 87% of the farmers had not received any formal (primary) education.

On the other hand the level of Koranic (Islamic religious) education was comparatively high. It was found that only a few (10%) of the respondents had not attended Koranic schools. Almost two-third (68%) of them had up to 10 years of Koranic education. This finding was expected since the study area is

mainly populated by the moslem Hausa people who under all circumstances must have to learn to read the Koran and other religious instructions right from a very early age in life. The mean level of Koranic education in the area was found to be 8.3 years (Table 4.1(iii), and the range of years of Koranic education was from 1-15 years (Table 4.3).

Table 4.3: Distribution of respondents according to levels of primary and Koranic education.

Level of education (in years)	Primary		Koranic	
	No	%	No	%
Not applicable	151	83.9	18	10.0
1 - 4 years	16	8.9	35	19.4
5 - 7 "	10	5.6	51	28.3
8 - 10 "	2	1.1	36	20.0
11 and more years	1	0.6	40	22.2
	180	100.0	180	100.0

4.1.4: Level of literacy

Literacy level among Nigerian farmers remains quite low because the vast majority of them have had no opportunity for formal education. However, many of the farmers are found to be attending adult literacy classes set up in the villages to teach them how to read and write.

The respondents were asked to state how well they were able to read and write in four language forms - English, Arabic, Hausa (Roman) and Hausa (Ajami). It was found that only about

4% of the respondents said they could read and write English very well or adequately, but up to one of seven farmers (15%) said they could read and write the Arabic language very well or adequately. It was also found that slightly more than one-fourth (25.6%) of the respondents could read and write the Hausa - (Roman or Boko) script very well or adequately. On the other hand almost two-third (60.6%) of the respondents said they could read and write the Hausa Ajami (Arabic) script very well or adequately, as compared to only 7% of the respondents who said they could neither read nor write the Hausa - Ajami script at all (Table 4.4).

Table 4.4: Percentage of respondents according to language literacy.

N = 180

Proficiency in reading and writing	English	Arabic	Hausa(Roman)	Hausa(Ajami)
	%	%	%	%
Very well	1.7	2.8	12.8	28 ?
Adequately	2.2	12.2	12.8	31.7
A little	20.6	34.4	28.3	30.0
Not at all	71.1	45.6	41.7	7.2
No information	4.4	5.0	4.4	2.3

As was confirmed by many investigations, (Voh, 1979; Gana, 1974; Yazidu, 1973; Bdache, 1978, among others) quite a sizeable proportion of the farmers in the moslem areas of northern Nigeria were very proficient in the Hausa (Ajami) written form. This revelation has given rise to the popular suggestions that extension organisations such as the AERLS/ABU

could explore this advantage to enhance their written communications efforts with the generality of farmers in the affected areas. Extension posters and leaflets could effectively be produced in the Hausa (Ajami) scripts and they would be sure to be read and understood much more than in the conventional Hausa (Roman Script).

4.1.5: Social status

When the respondents were asked to state whether they held any official title or position in the village or community, it was found that there were among them 10 village heads (5.6%), 13 Hamlet Heads (7.2%), one Alkali (Judge), one Imam (Religious Leader) and one LGA Councilor. Other traditional and prestigious positions held included 4 Chief Farmers, (Sarkin Noma), 8 Koranic Teachers, 4 village scribes and 15 (8%) political party officials. The vast majority of people however, said they were the Heads of their compound. It was found that one person may hold as many as three or four status positions in the community. For example, the Iman (religious leader) was also a koranic teacher, and so was the Alkali (Table 4.5).

Many studies, for example, Edache's (1978) revealed that a higher proportion of farmers who had social status positions in the community adopted improved practices more than those without any status position.

Table 4.5: Distribution of social status (positions) held by respondents

N = 180

Position held	Yes		No	
	No	%	No	%
Hamlet Head	13	7.3	167	92.8
Village Head	10	5.6	170	94.4
Alkali (Judge)	1	0.6	179	99.4
Religious Leader (Imam)	1	0.6	179	99.4
LGA Councillor	1	0.6	179	99.4
Chief Farmer (Sarki Noma)	4	2.2	176	97.8
Koranic Teacher	8	4.4	172	95.6
Village Scribe	4	2.2	176	97.8
Political Party Official	15	8.3	165	91.7
Compound Head	170	94.4	10	5.6

4.1.6: Level of living

Respondents were asked to state the number of items or durable consumer goods (such as radio sets, television, bicycles, iron beds, farm implements and livestock) that they and people in their household possessed at the time of the interview. The items were then assigned monetary values and the relative wealth or possessions of each household was determined from the total number of items listed. About 87.8% of the respondents reported possessing household items (in the compound) worth (₦1 - ₦3,500). The mean monetary value

for household item possessed was ₦2,188.6. Almost two-third (62.8%) of the respondents said they had livestock assets worth from ₦1 - ₦1,500 in their compound. More than two-third (86.7%) had farm implement and tools worth between ₦1 - 500. The mean monetary value for livestock possessed was ₦1,749.2, while that of farm implements was only ₦481.4 (Table 4.6 and 4.7).

Table 4.6: Distribution of assets possessed by the respondents (valued in ₦).

Value of Assets (in ₦)	Household items		Livestock		Farm Implement	
	No	%	No	%	No	%
1 - 1,500	61	33.9	111	62.8	165	91.7
1,501-3,000	82	45.6	31	17.2	1	0.6
3,001-4,500	26	14.4	21	11.7	11	6.1
4,501 and above	11	6.1	15	8.3	3	1.7
	180	100.0	180	100.0	180	100.0

4.1.7: Additional occupations

Respondents were asked to indicate whether they had any other additional occupation beside farming during both the wet and the dry seasons. Their responses are presented in Table 4.7

wet season, more than one-third of them (36%) were petty traders during the dry season. Likewise, while only about 4% of the farmers were labourers or civil servants during the wet season, more than one-fifth of them (23%) became labourers or civil servants during the dry season. Again, there was an increase of about nine percent on the number of those who engaged in local handicrafts during the dry season. In the other areas of occupation (village head, koranic teaching, and cattle rearing) the proportion remained constant during both seasons.

It could be concluded from the results that farming is the primary occupation in the area, and that farmers find other additional occupations to engage themselves during the dry season. It was also observed that one person may engage in one or more additional occupations beside farming.

4.1.8: Contact with extension workers

Respondents were asked to indicate the number of times they were visited by the extension worker at their sorghum farms during the previous cropping season. The responses are summarised on Table 4.8.

Most of the respondents said they received a number of visits by the extension workers to their sorghum farms during the previous cropping season. About one-half (51.7%) reported having been visited between 1-5 times during the previous season. One of every 9 farmers (10.6%) reported having been visited from 6 - 10 times, and one of every five said he was

visited 11 or more times. The mean number of visits received was 22.9 (Table 4.8).

Table 4.8: Frequency of visits made by the extension workers to the respondents' farms last season (1981/82).

Frequency of visits made	No	%
Can't remember	27	15.0
1 - 5 visits	93	51.7
6 - 10 "	19	10.6
11 or more visits	41	22.7
	180	100.0

4.1.9: Best source of information

The respondents were asked to indicate their best source of information on some selected sorghum recommended practices. First they were asked to state their best source of information on the use of seed-dressing chemicals, then on fertilizers, and finally on all other improved sorghum practices. Their responses are shown on Table 4.9(a) and 4.9(b).

The results show that for both seed-dressing chemicals and use of fertilizers, the best source of information are the extension workers, and the radio mentioned by 51% and 41% of the respondents respectively. The next popular source of information on the two types of recommended practices are Friends and Neighbours mentioned by 11% of the respondents in the case of seed-dressing, and by 13% in the case of fertilizers.

The least mentioned sources of information in both cases are traders (3%) and television (2-3%).

Table 4.9(a): Distribution of respondents according to their choice of best source of information on use of seed-dressing chemicals and fertilizers.

N = 180

Best source of information	Seed Dressing		Fertilizers	
	No	%	No	%
Extension worker	98	54.4	79	43.9
Radio	80	44.4	70	38.9
Friends and Neighbours	20	11.1	24	13.3
Agricultural Shows	9	5.0	8	4.4
Films and Slides	8	4.4	5	2.8
Posters and Leaflets	7	3.9	7	3.9
Newspapers	6	3.3	5	2.8
Village Leaders	4	2.8	6	3.3
Television	5	2.8	4	2.2
Traders	3	1.7	3	1.7

When the respondents were asked to name in order of importance the sources of information on all improved sorghum practices, the extension worker was named first by more than one half (52%) of the respondents. This was closely followed by radio, mentioned by just about half (48%) of the respondents. The next best source mentioned was friends and neighbours (18%) followed by Agricultural Shows (12%), and films and slides (9%).

The least mentioned sources were the village leaders (4%), television (3%) and traders (2%) (Table 4.9(b).

Table 4.9(b): Best sources of information on all sorghum practices in order of importance.

N = 180

Source of information	No	%
Extension workers	94	52.2
Radio	87	48.3
Friends and Neighbours	32	17.8
Agricultural Shows	21	11.7
Films and Slides	17	9.4
Posters and Leaflets	12	6.7
Newspapers	11	6.1
Village Leaders	7	3.9
Television	5	2.8
Traders	3	1.7

The findings on the best source of farm information in this study corresponded closely with those obtained by Voh (1979) who found in Giwa District that the extension worker was the best source of information followed by radio. On the other hand the results differ slightly from those obtained by Bogunjoko (1983) also in Giwa District; D'Silva and others (1981) in Funtua; and Yazidu (1973) in other parts of northern Nigeria. They all found radio to be the best source of farm information followed by extension worker.

The result as obtained was very much expected as most farm information in most part of northern Nigeria is diffused mainly through these two channels - the extension worker and the radio. The personal contact provided by the extension worker, through farm and home visits, is the most important instrument for teaching new farming skills, while the radio is the most effective sources of farm information at the awareness stage.

4.1.10: Participation in extension activities

Three types of questions were designed to determine the extent of respondents' active participation in agricultural extension activities involving their communities. One question dealt with their participation (membership) in farmers voluntary organisations such as Young Farmers' Clubs and Farmers' Co-operatives. Another question dealt with their participation, during farm tours or open-days, in such group extension activities as method demonstrations at sorghum Result Demonstration Plots, NAFPP Sorghum trials, or any other farms where improved sorghum practices were demonstrated. The third question dealt with the respondents' active involvement in extension activities by having been a demonstrator in the old Package Result Demonstration Programme on the NAFPP trials.

When asked to state their participation in voluntary farmers' organisations, only a few of them said they belonged to any such organisation. It was found that only one of seven

farmers (14%) was a member of farmers' village council and that a mere 9% and 8% were members of the Young Farmers' Clubs and Farmers' Co-operatives respectively (Table 4.10(a)

Table 4.10(a): Distribution of respondents according to membership of farmers voluntary organisations.

N = 180

Organisation	Yes		No	
	No	%	No	%
Farmers' Village Council	25	13.9	155	86.1
Young Farmers' Clubs	17	9.4	163	90.6
Farmers' Co-operatives	14	7.8	166	92.2

The poor membership in the three farmers' organisations in the area is most probably due to inadequate number of extension staff in the area to effectively organise farmers into such organisations as the Young Farmers' Clubs and Farmers' Co-operatives.

To determine the extent of their participation in demonstrations, whether the result or the NAFPP type, respondents were asked to state where such participation took place. Their responses are summarised in Table 4.10(b).

Table 4.10(b): Distribution of respondents who participated in sorghum result demonstrations and/or NAFPP trials.

Response	Result Demons.		NAFPP Trials	
	No	%	No	%
Not sure	2	1.1	21	11.7
Not participated	26	14.4	63	35.0
In own village	109	60.6	73	40.6
In neighbouring villages	32	17.8	23	12.8
Other	11	6.1	-	-
	180	100.0	180	100.0

The results show that most of the respondents (85%) had participated somewhere in sorghum result demonstrations. More than three-fourth (78%) of them said they participated either within their own villages or in neighbouring villages. A small proportion of them (6%) said they participated in farm tours in government farms.

On the other hand, nearly one-half of the respondents (47%) were either not sure or have definitely never participated in any NAFPP Sorghum programme. Slightly more than one-half of them (53%) claimed to have participated in the trials either within their own villages or in neighbouring villages.

To find out those among the respondents who were involved as demonstrators in one or both types of demonstrations, they were asked to indicate accordingly. Their responses are shown on Table 4.10(c).

Table 4.10(c): Distribution of respondents who were involved as demonstrators in sorghum package result demonstrations and/or NAFPP sorghum trials.

Type of demonstration	Yes		No	
	No	%	No	%
Package Result Demonstration	86	47.8	94	52.2
NAFPP Trials	40	22.2	140	77.8

Just about one-half (48%) of the respondents said they were involved as demonstrators in sorghum package result demonstrations, while only about one-fifth (22%) of them were involved as demonstrators in the NAFPP Sorghum Trials.

4.2: Extent Of Adoption Of Improved Sorghum Practices

As earlier stated, the second objective of this study was to determine the extent of adoption of the sorghum production technology as introduced by the NAFPP in the study area. It is pertinent at this stage and before discussing the practices adopted, to examine the package of improved sorghum practices being introduced by the NAFPP to the area.

The NAFPP improved sorghum practices included the use of improved sorghum varieties that possess such desirable characteristics as high yielding, early maturity and better response to fertilizers, among others. There are three new sorghum varieties also recommended for the area, they are the cream coloured "B.E.S."; the yellow L187 and the white L1499.

The package also include all the agronomic practices necessary for the best performance of the new sorghum varieties. These practices include the preplanting treatment of the seeds with anti-fungul anti-pest chemicals (Aldrex T or Farnasan D); planting of the seeds as early as the rains become well established; and judicious use of seeds (at the rate of 11-14 kg/ha). Other recommended practices in the package include the use of appropriate fertilizers (phosphetic and nitrogenous) to be broadcast before land preparation (for the phosphate) and/or applied as side dressing, as the case may be. The recommended phosphetic fertilizer for sorghum is in the form of straight or single superphosphate while the nitrogenous fertilizers are in the form of urea, calcium ammonium nitrate and sulphate of ammonia. It is however, to be noted that the use of sulphate of ammonia had been discontinued in the State due to its soil acidifying property.

Other agronomic practices in the sorghum package include timely weed control, thinning of the germinated crops to two plants per stand, and the planting of the crops closely spaced (30-45 cm apart on 90 cm ridges for the dwarf varieties and 60 cm apart on 90 cm ridges for the tall varieties).

Along with close spacing was the recommendation that the improved sorghum varieties be planted as a sole crop rather than in mixtures (as traditionally practiced by the farmers. Finally, it was recommended that the harvested crop be properly stored against insect damage by using such insecticides as Aldrin dust or Gammalin A. (AERLS Extension Bulletin No. 1, 1978).

4.2.1: Major grains produced

Before determining the extent of adoption of the sorghum practices, it was thought appropriate to start by establishing the extent of the production of sorghum and other major grain crops in the area. The respondents were therefore asked to name the four most important grain crops they had been growing during the three seasons. Their responses are presented in Table 4.11.

Table 4.11: Percentage of respondents who grew major grain crops during the past three seasons

N = 180

Season	Sorghum	Millet	Maize	Cowpea
1978/79	90.0	81.1	85.0	42.2
1979/80	90.6	87.8	86.7	52.8
1980/81	89.3	90.6	97.8	54.4

It was observed that the proportion of the respondents growing sorghum during the three seasons has been highest (90% in all cases) except the 1980/81 season when the proporti

of the farmers growing maize shot up by 10% thus surpassing that of sorghum producers by 9%. The "unprecedented" record harvest of maize and other coarse grains of the 1981/82 season (New Nig. of 28/2/83:p.1) confirms the findings regarding the upsurge in maize production. It also confirms an earlier assertion made in Chapter I (p.17) of this thesis to the effect that farmers in the study area have within the past few seasons tended to reduce the production of some traditional cash crops (cotton and groundnuts) in favour of more grain crops, notably maize and sorghum.

The findings were further supported by the results obtained from questions put to the full-time extension workers. When asked to state which traditional cash crops were grown less in favour of grain crops, most (66%) of the extension workers mentioned cotton, about 10% of them listed groundnuts. When they were further asked to suggest possible reasons for the change in the production behaviour, more than two-third (68%) of the extension workers attributed it to poor marketing arrangement for cotton. Slightly more than one-fourth (27%) of the extension workers however, believed it was because cotton is less profitable and requires more production inputs than grain crops.

In general terms, therefore, the main reason for for the upsurge in the production of grain crops (particularly maize) appears to be the result of a corresponding drop in the production of traditional cash crops (especially cotton). And this was due to comparative advantages enjoyed by the grain crops over the traditional cash crops.

When extension workers were asked to suggest reasons for farmers in their area growing more grain crops, nearly three-fourth of them (73%) said they believed the farmers were using some of the grains as cash crops. About one-fifth (23%) believed that the farmers just wanted to grow more food crops.

4.2.2: Level of Knowledge of Improved Sorghum Practices

To determine the level of knowledge of the improved sorghum practices learnt through participation in one or both kinds of sorghum demonstrations, the respondents were asked specific questions on all the sorghum package of demonstrations. A summary of their responses is presented in Table 4.12.

Table 4.12: Distribution of respondents who had some knowledge of improved sorghum practices.

N = 180

Improved practices	Know		Don't Know	
	No	%	No	%
Improved varieties	157	87.2	23	12.8
Fertilizers	167	92.8	13	7.2
Planting date	127	95.6	9	4.4
Seed dressing chemicals	161	89.4	19	10.6
Seed rate	134	74.4	46	25.6
Close spacing	66	36.7	114	63.3
Weed Control	171	95.0	9	5.0
Thinning	152	84.4	28	15.6
Monocropping	131	72.8	49	27.2
Storage chemicals	132	73.3	48	26.7

The kwowledge level of the sorghum practices was found to be relatively high among the respondents. The highest level of knowledge was in respect of planting date (96%) closely followed by knowledge of weed control (95%). The next best known practices were the use of fertilizers (93%) and the use of seed dressing chemicals (89%), followed by the use of improved sorghum varieties (87%) and the practice of thinning to two plants per stand (84%). The least known sorghum production technology, on the other hand, was found to be the practice of close spacing for sorghum (37%). The practice of monocropping was known by 72% of the respondents, while that of grain storage with chemicals was known by 73% of them.

4.2.3: Improved sorghum practices adopted

To determine the extent of adoption of the known practices, the respodents were further asked to state which of the ten improved sorghum practices they were actually using as part of their farming practices at the time of the investigation. Their responses are presented in table 4.13(a)

It was found that certain recommended sorghum practices were highly adopted while others were not used to any appreciable extent. The highest level of adoption among the respondents was in respect of the use of commercial fertilizers. All of the farmers interviewed (100%) claimed to be using fertilizers on their crops. This was followed by the practice of weed control (91%), and observance of timely planting date (87%). The next important sorghum practices adopted was the

use of seed dressing chemicals (43%) followed by judicious use of seeds during planting (36%).

It was observed that the least adopted of the sorghum recommended practices was the practice of close spacing of sorghum which less than one-fifth (19%) of the respondents was found to be using at the time of investigation. This was closely followed by the use of improved varieties and sole cropping of sorghum. practiced only by 21% and 22% of the respondents respectively.

Table 4.13(a): Distribution of respondents practicing improved sorghum technology during the 1981/82 cropping season.

N = 180

Improved practices	Using		Not Using	
	No	%	No	%
Improved varieties	37	20.6	143	79.4
Fertilizers	180	100.0	Nil	Nil
Planting date	150	86.7	24	13.3
Seed dressing chemicals	77	42.7	103	57.2
Seed rate	64	35.6	116	64.4
Close spacing	34	18.9	146	81.1
Weed control	164	91.1	16	8.9
Thinning	60	33.3	120	66.7
Monocropping	40	22.2	140	77.8
Storage chemicals	44	24.4	136	75.6

Looking at the overall results of the two levels of activity (knowledge versus application of the knowledge), it could be deduced that the level of knowledge of the sorghum practices was relatively high while the level of application of the knowledge was relatively low in seven out of ten cases. (Table 4.13(b) shows a comparison of the two levels.

Table 4.13(b): Comparison of knowledge level versus application of improved sorghum practices among the respondents.

N = 180

Improved Practices	Percent that know	Percent that use
Improved varieties	87.2	20.6
Fertilizers	92.8	100.0
Planting date	97.6	86.7
Seed dressing chemicals	89.4	42.8
Seed rate	74.4	35.6
Close spacing	36.7	18.9
Weed control	95.0	91.1
Thinning	84.4	33.3
Monocropping	72.8	22.2
Storage chemicals	73.3	24.4

The trend of high knowledge level cum lower level of adoption of the sorghum practices among the respondents has one remarkable exception — that of the inorganic fertilizers. Whereas some of the respondents were not knowledgeable about

the uses of such fertilizers, one hundred percent of them have been found to be active users of the fertilizers. The use of fertilizers, therefore, appears to be the single most important innovation adopted by the respondents. This corresponds closely with the result obtained by Edache (1978) where he found ninety percent adoption of fertilizers among Kano farmers.

4.3: Reasons For And Against Adoption Of Sorghum Practices

While determining the extent of adoption of the improved sorghum practices among the respondents, it was thought appropriate to simultaneously discover the factors that motivated them to either adopt or reject the innovations. All of the respondents were therefore, requested to account for their decisions one way or the other.

4.3.1: Improved varieties

For those who adopted the improved sorghum varieties, the most important motivational factor for their action was to obtain higher yields from the new varieties as mentioned by 10% of the farmers. Other farmers (8%) liked the new varieties because of their early maturing property, while others (3%) wanted them because they taste better than the local types.

The most important reasons given for non-adoption by those who did not use them was non-availability of the seeds mentioned by 26% of the respondents. A few of them (3%) did not use the new seeds because they were not aware of them.

When asked to name their main sources of improved seeds, most of the users (18%) mentioned the Ministry of Agriculture and Natural Resources, the NAFPP (6%), other farmers (3%) and the National Seed Service (3%).

4.3.2: Fertilizers

To find out why farmers were so much sold to the idea of using inorganic fertilizers, the respondents were asked to state the most important effect fertilizers had on their sorghum crops. Most of the respondents (96%) stated that the fertilizers suostantially increased their crop yields. No other reason was given.

To determine which types of fertilizers were used most by the farmers, they were asked to list all the various types of fertilizers they used during the previous cropping season. Their responses are summarised in Table 4.14(a).

Table 4.14(a): Percentage of various types of fertilizers used by the respondents on their sorghum crops during the 1981/82 cropping season.

N = 180

Types of fertilizers	Used		Not used	
	No	%	No	%
Compound (NPK)	173	96.1	7	3.9
Supersphosphate	132	73.3	48	26.7
Urea	70	38.9	110	61.0
C.A.N.	54	30.0	126	70.0
Ammonium Sulphate	11	6.1	169	93.9
Organic (Taki)	109	60.6	71	39.4

The results revealed that most of the respondents (96%) used compound (NKP) fertilizers. About three-fourth of the farmers (73%) used superphosphate fertilizers, while about two-fifth (39%) of them used Urea and CAN (30%). The least used fertilizer in the area was found to be Ammonium sulphate which only a few (6%) of the respondents claimed to have used. The low level use of this brand of fertilizer was expected in that it is no longer recommended to the farmers of the State due to its soil acidifying property. Some farmers were however, able to obtain small quantities of it from outside the State.

It was noteworthy that nearly two-third of the respondents (61%) said they used some form of organic manure on their sorghum crops. This is contrary to the generally held belief that most farmers have stopped using manures in favour of inorganic fertilizers. The tendency for more farmers to use manure during that season could be due to the fact that nearly one-half of them (47%) were not able to procure sufficient quantities of the commercial fertilizers to use.

The respondents were further asked to give the main reasons why they were unable to use sufficient quantities of the required fertilizers. Their responses are presented in Table 4.14(b).

Slightly more than one-third of those who did not use enough fertilizers said they were unable to find enough of it to buy. Other respondents (7%) said they did not have enough money to purchase enough, while a few of them (3%) said they

could not get it at the right time. Only one farmer said he was not able to get the right type of fertilizer when he needed it.

This inability by the respondents to procure sufficient quantities of the commercial fertilizers probably explains why they resorted to using more of the inorganic ones.

Table 4.14(b): Reasons given by the respondents for their inability to use sufficient amount of fertilizers during the 1981/82 season.

Response	No	%
Not applicable	96	53.3
Could not get enough to buy	65	36.1
No money to buy enough	12	6.7
Could not get in time	6	3.3
Could not get the right type	1	0.6
	180	100.0

4.3.3: Planting date

Most of the farmers interviewed (87%) planted their sorghum crops with onset of the rains, but none of the farmers could give any particular reasons for planting his sorghum early. It is however, a well known fact that farmers in northern Nigeria, traditionally give priority to their staple food crops, especially sorghum and millet, as such they make

sure they plant them first as soon as the rains are well established. The farmers appear to be well aware of the fact that late planting of the cereal crops will ultimately lead to a poor harvest.

When asked to give reasons why they did not plant their sorghum early enough, most of those who planted late (9%) said it was because they could not get their lands prepared in good time. Others (3%) said they planted rather late because of insufficient rains at the beginning of the season.

4.3.4: Seed dressing chemicals

Although a high proportation of the respondents (89%) appeared to have a fair knowledge of the use of seed dressing chemicals, only about one-half that number (43%) was actually using the chemicals at the time of the interview. No farmer gave any reason for using the chemicals but it is known that all those who use them do so mainly to protect their newly sown seeds from pests, especially insects, birds and rodents, before the seeds germinate.

When asked to give reasons for not using the chemicals, about one-fifth (22%) of the farmers attributed it to non-availability of the chemicals, while 14% of them doubted the effectiveness of the chemicals, a few of them (6%) said they were not aware of them.

4.3.5: Seed rate

Judicious use of seeds during planting is one of those recommended practices less used by farmers. Only about one-third (36%) of the farmers said they were using the recommended seed rate at the time of the interview. The normal practice by farmers is to sow as many seeds as possible (15 - 20) per hole and later thin out the germinated seedlings leaving three or four plants in a stand. Although their practice is considered uneconomical and a waste of seeds, they on their part use it as an insurance against germination failure. If only they would treat their seeds with seed dressing chemicals before sowing, this problem would be solved.

4.3.6: Close spacing

Among the ten recommended sorghum practices, close spacing has been found by this study to be the least known and the least adopted by the respondents. It was observed that only less than one-fifth of the farmers (19%) was using the practice at the time of the interview.

When asked to give reasons for using the practice, all of those who adopted (19%) said they did so because they noticed an increased production from their crops.

On the other hand, those who failed to adopt the practice advanced various reasons for their non-compliance (Table 4.15).

Table 4.15: Main reasons given by respondents for their failure to adopt recommended sorghum spacing.

Response	No	%
Not applicable	34	18.9
Because of intercropping	90	50.0
Not traditional	26	14.4
Not aware of practice	10	5.6
They produce smaller heads	12	6.7
Spacing too close	6	3.3
Require too much fertilizer	2	1.1
	180	100.0

The most consistent reason given for failing to adopt the recommended sorghum spacing was the intercropping system of farming practiced by most farmers. Exactly one-half (50%) of the respondents mentioned this reason. The next important reason given was that farmers were not used to it and that it was contary to their traditional methods (14%). Other reasons given included the belief that the crops would produce smaller heads and grains (7%) and just not being aware of the practice (6%). Two farmers said close spaced sorghum would require too much fertilizers as such they could not adopt the practice.

4.3.7: Weed control

In effect, all the farmers interviewed appeared to be quite convinced of the importance of weed control as a

necessary pre-condition for a good harvest. The only reasons given by those who failed to weed their sorghum fields in good time were shortage of man-power, mentioned by about 8% of the farmers, and high cost of labour by 3% of the farmers.

4.3.8: Thinning to two plants per stand

Even though the farmers were quite aware of getting stronger stands of crops if they thinned the newly germinated sorghum seedlings to only two per stand; it was found that only one-third (33%) of them adopted the practice. Those who adopted the practice did not give any reason for their action, except that they learnt it through the extension workers. This was mentioned by about one of seven farmers (14%).

When asked to give reasons why they were not thinning their sorghum crops to two plants per stand, most of the respondents were not able to give any satisfactory reasons. The only reasons given were to offset stem borer damage, mentioned by about 7% of the respondents, and shortage of labour by 2%.

It is however, a well-known fact that farmers deliberately allow more than two plants per stands as an insurance against a possible crop failure. For example, if for some reason some stands failed to germinate or that they got damaged by some pests, the farmers would then uproot the less vigorous members of the stand and transplant them to fill up the missing gaps. The use of seed dressing chemicals would to a large extent take care of this problem.

4.3.9: Monocropping

To determine the extent of adoption of the growing of a single crop in one field (monocropping), the farmers were asked to state which of the main grain crops they interplanted and which ones they grew as sole crops. Their responses are presented in Table 4.16(a).

Table 4.16(a): Percentage of respondents who grew major grain crops as sole and as intercropped during the 1981/82 season.

N = 180

Crops	Sole cropped	Intercropped	Not grown
Sorghum (local)	22.2	64.4	13.4
Sorghum (improved)	18.9	1.7	79.4
Maize (local)	17.8	22.8	59.4
Maize (improved)	64.4	15.0	20.6
Millet	11.1	62.2	26.7
Cowpea (local)	10.6	53.3	36.1
Cowpea (improved)	0.6	1.1	98.3

It was observed that almost two-third of the farmers (64%) grew the local sorghum varieties in mixtures, whereas only about 2% of them who grew the improved varieties grew them in mixtures. On the other hand, the improved maize varieties were grown as sole crops by nearly two-third (64%) of the farmers, and only one of seven farmers (15%) grew them in mixtures. As for millet, there were no improved varieties

grown by any of the respondents; and while nearly two-third of them (62%) grew them in mixtures only about 11% of them grew them as a sole crop. Slightly, more than one-half (53%) of the respondent said they grew local cowpea varieties in mixtures while only 10% of them grew it as a sole crop. It was noted that only three of the farmers interviewed said they grew the improved cowpea and only one of them grew it as a sole crop.

The results of the investigations have strongly indicated that in general terms farmers prefer to grow the local varieties of their crops in the traditional way (as intercropped). On the other hand, they are to a large extent prepared to grow the improved crop varieties as recommended (in sole). A clear case to support this assertion is the case of those who grew improved sorghum as a sole crop. In this case it was noted that only three respondents (8%) of the thirty-seven who grew the new varieties had grown them in mixtures. Likewise one of seven farmers (15%) who grew the improved maize seeds grew them as intercrop.

The respondents were asked to give their main reasons for growing sorghum crops in sole in some cases while intercropping them in other cases. The most important reason for growing sorghum as a sole crop, as given by 23% of the respondents, was because it was taught by the extension workers. This is a strong pointer to the fact that there exists a positive relationship between extension worker and adoption of new farming innovations. Another important reason

as given by about one-tenth of the respondents (9%) was that they liked the new varieties. Other farmers (2%) said they planted sole sorghum because they were late in planting, while another 2% of them said they did so because they had enough farm lands.

There were also a number of reasons given for growing sorghum as an intercrop by those who did so. A summary of their responses is presented in Table 4.16(b).

Table 4.16(b): Main reasons given by respondents for growing sorghum as an intercrop.

Response	No	%
No reason given	61	33.9
Insufficient farm lands	59	32.8
To harvest many crops from same field	29	16.0
Following traditions	24	13.3
To save labour	6	3.3
To save fertilizer	1	0.6
	180	100.0

About one-third of the respondents (32.8%) said they were growing sorghum as an intercrop because they did not have sufficient farm lands. About one-sixth of them (16%), however, wanted to harvest more type of crops from the same piece of land. This reason in a way is related to the first reason, that of insufficient lands. About 13% of the respondents had

no other reason than that they were only following the traditional system of sorghum production. Other reasons given were to save labour (6%) and to save fertilizers, mentioned by only one farmer.

4.3.10. Use of storage chemicals

This practice is one of those that have not been adopted to any appreciable extent by the respondents. Whereas almost three-fourth (73%) of the respondents had some knowledge about the use of the chemicals, only about one-fifth (21%) of them said they were using the chemicals at the time of the interview.

The main reasons given for using them by all of those who adopted the practice was to protect their stored crops against insect damage.

The main reasons given by those who did not use the chemicals, as mentioned by nearly one-half (48%) of the farmers, were non-availability of the chemicals, not believing in their effectiveness (2%). Other farmers (2%) said they would not use the chemicals because of their unpleasant smells.

4.4: Farmers' Problems

To determine the type of problems facing farmers in adopting improved farming practices, all of the respondents were asked to list as many of the problems as they were individually affected.

It was found that the three most important problems facing sorghum farmers are insufficient fertilizers, lack of tractor service and shortage of manpower. These were mentioned by 35%, 32% and 27% of the respondents in that order. The next two important set of problems are lack of credit/loan facilities (22%) and lack of improved seeds, (21%). Other problems mentioned are poor marketing arrangements for crop disposal (15%) and lack of extension advice (8%). The least mentioned problem was lack of agro-chemicals (storage, seed dressing and weed-killers), mentioned by 5% of the respondents.

The summary of their responses is presented in Table 4.17.

Table 4.17: Major problems facing respondents in adopting improved sorghum practices.

N = 180

Problems mentioned	No	%
Insufficient fertilizers	63	35.0
Lack of tractor service	57	31.7
Shortage of manpower	48	26.7
Lack of credit/loan facilities	39	21.7
Lack of improved seeds	38	21.1
Poor marketing system	27	15.0
Lack of extension advice	15	8.3
Lack of storage, other chemicals	9	5.0

4.5: Assistance Needed

Finally, the respondents were asked to list the kind of assistance they needed in order to improve their farming activities and to enhance their adoption of sorghum innovations. Their responses are shown on Table 4.18.

Table 4.18: Type of assistance needed by respondents to improve their farming activities.

N = 180

Type of assistance needed	No	%
Credit Loan Facilities	66	36.7
Tractor hire services	65	36.1
More fertilizers in time	63	35.0
Provide oxen and ploughs	28	15.6
Provide improved seeds	24	13.3
Provide more extension advice	18	10.0
Provide storage chemicals	8	4.4
Provide weed-killers	2	1.1

It was observed that the respondents needed assistance in many areas to improve their farming activities. They, however, expressed more desire for assistance in three main areas. The area of needs are the provision of loan facilities, the provision of more tractor hire services, and the provision of more fertilizers in good time. These were mentioned by 37%, 36% and 35% of the respondents (in that order)

About one of seven farmers expressed the desire to be assisted with oxen and ploughs, while 13% of them said they needed more improved sorghum seeds to be made available to them. Other needs expressed were the desire to have more extension workers assigned to the villages (10%) and the provision of grain storage chemicals (4%). Two of the respondents specifically asked for the provision of weed-killer chemicals to help them control weeds.

4.6: Correlation of Factors Associated With The Adoption of The NAFPP Practices

The decision by farmers to accept or reject any given improved farming practices depends to a large extent on the influence of some socio-economic variables or personal characteristics of the farmers. The purpose for the statistical analysis in this section is to determine the relationships of adoption with the selected personal characteristics studied. It is also to determine the relative contribution of each of those characteristics to the adoption of the NAFPP programme by the respondents. The relationships are presented in Table 4.19, while the relative contributions of the variables to the adoption behaviour are presented on Table 4.20.

4.6.1: Age (XI)

The result of the analysis on Table 4.19 reveals that the variable age (XI), is negatively but significantly related to the adoption of the NAFPP sorghum programme (at .05 level

Table 4.19: Pearson Correlation Matrix showing relationships between some selected variables and adoption

Step	Variable	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
X1	Age	1.00	1.											
X2	Social status	-.30	1.00											
X3	Membership of Org.	.22	-.12	1.00										
X4	Primary Education	.06	.28	.01	1.00									
X5	Koranic Education	-.19	-.13	-.68	.26	1.00								
X6	Literacy	.60	.21	.32	.61	.25	1.00							
X7	Add. Occupations	.64	-.53	.27	.16	.56	-.16	1.00						
X8	Level of living	-.21	-.37	.39	-.15	-.25	-.51	.27	1.00					
X9	Size of farms	.28	-.21	-.43	.44	-.03	-.20	-.45	.32	1.00				
X10	Contact	.52	.49	-.47	-.51	.71	-.22	-.33	-.69	.16	1.00			
X11	Participation	-.72	.50	-.61	.48	-.58	.69	-.22	-.69	-.75	.30	1.00		
X12	Sources of Infor	-.72	-.67	-.42	-.41	.54	.62	-.66	.30	.34	.71	-.23	1.00	
X13	Adoption	-.41*	.43*	.30*	.23*	.27*	-.42*	.34*	.41*	.02	-.47*	.43*	.30*	1.00

* Variable significantly correlated with adoption at .05 level (to be significant at .05 level, r = .159). N = 180

of significance). With a correlation coefficient value (r) being - .41 the relationship, although in the opposite direction is quite a strong one. This implies that the older the respondent is, the fewer number of the NAFPP sorghum innovations he is likely to adopt. The findings on the variable age and adoption; therefore, give support to the original hypothesis which predicted that age would be negatively related to the adoption of the NAFPP sorghum programme in the study area.

The results collaborate with some previous findings, For example, Gana (1974); Olorunnipa (1981); Voh (1979); Gross and Taves (1952), Wilson and Gallup (1955), among others, found that age was negatively related to adoption. On the other hand, a few researchers (for example, Basu, 1969; and Lionberger, 1964) did not find any significant relationship between age and adoption.

A possible explanation to the negative relationship may be the fact that the more elderly farmers are somewhat less inclined to take risks, they therefore, would avoid any new ideas they are not certain would be beneficial.

4.6.2: Social status (X2)

This variable shows a strong and positive relationship with adoption, r = 0.43 (Table 4.19). This relationship is significant at .05 level. About 19 per cent of the variability in the adoption process was explained by this characteristics of the respondents. The implication of the

statistical results is that the respondents who have higher social status within their respective communities are more in a position to adopt new ideas and practices. The results therefore give support to the original hypothesis as stated.

The findings on the variable are consistent with those obtained by most researchers who examined leadership status and adoption. Among those who found significant and positive relationship between the variable and adoption include Edache (1978); Voh (1979); Obibuaku and Hursh (1977); Singh (1967); Marsh and Coleman (1954, 1955 and 1956); Rahudkar (1960) and many others. On the other hand, Bose (1964), Wilkening, et. al., (1966), and a few others found no significant relationship between the variable and adoption.

The implication of the results obtained on the variable is that farmers with higher social status adopt more new farming ideas, therefore, extension workers and organisations should include more community leaders in their extension programmes as this will reinforce their efforts.

4.6.3 Membership of farmers' organization (X3)

The result of the analysis showed that this variable is positively and significantly related to the adoption of the NAFPP Sorghum programme, r = 0.30 (Table 4.19). The relationship is significant at .05 level, and explains about 9 per cent of the variability in the adoption of the programme. The positive and significant relationship between the variable and adoption implies that those farmers who are members of

some farmers' voluntary organisations such as the Young Farmers' Clubs, the Farmers' Councils and Farmers Co-operative Societies, are more likely to adopt the NAFPP innovations. It is assumed that such farmers through association with other farmers will be more receptive to new ideas and practices, partaining to personal contacts.

The results obtained on this variable are in line with those obtained by other researchers. For example, Alao (1971), Clerk and Akinbode (1978), among others, found participation in voluntary farmers' organisations to be positively and significantly associated with adoption.

The implication of this finding is that adoption of improved farm practices could be enhanced if they are channeled through voluntary farmers' organisations.

4.6.4: Formal education (X4 and X5)

This variable was treated in two parts (X4 and X5) as shown on Table 4.19. The statistical analysis on each of the two components of the variable showed the following results:

Primary education (X4):- was found to be positively related to the adoption of the NAFPP programme, and r value being .23 indicates that the relationship is weak and explains only about 5 per cent of the variability in the adoption behaviour.

Koranic education (X5):- was similarly found to positively and significantly related to adoption (X13) at .05

level of significance. With an r value of .27 this component of the variable is also weak explaining about only 7% of the variability in the adoption. Koranic education is however, a relatively stronger component of formal education than primary education (X4).

The findings indicate that those farmers who possess any or both types of formal education are more likely to adopt the NAFPP Sorghum programme than those without. The hypothesis that formal education is positively related to the adoption of the programme is therefore supported by the data.

The findings of this study on formal education are consistent with findings by others. For example, Bose (1961), Rahudkar (1961), Alao (1971), Voh (1979) and many others, found formal education to be positively and significantly related to adoption. The results are however opposed to those found by Havens (1966), Brandner (1964), Rogers, et. al., (1972), Lionberger (1964), Williams (1969) and Basu (1969) who reported no significant relationship between the variable and adoption.

4.6.5: Level of literacy (X6)

In this study, the variable literacy, was found to be strongly related to adoption (at .05 level). However, the direction of relationship was found to be opposed to what was hypothesized, r = -.47 (Table 4.19). The strong but negative results obtained imply that those among the respondents who attained the ability to read and write in the Hausa (boko)

and the English language tended to be among those who resisted accepting and adopting the NAFPP Sorghum programme. In effect the data suggest that the higher the literacy level of the respondent, the more likely he would be to resist the programme. The 6th empirical hypothesis of this study, which predicted that the higher the level of literacy attained by the farmer the more he would adopt the practices, is thus not supported by the data.

The negative results as obtained were least expected as most adoption studies conducted both within and outside Nigeria found positive relationship between literacy and adoption. For example, studies by Edache (1978), Voh (1979), Rahim (1961), Lerner (1963), Rogers (1969), Kivlin (1968), among others reported positive relationship between the variable and adoption. The results however, are in harmony with those obtained by Bose (1961) in India and Beal and Rogers (1962) in the U.S.A.

A possible explanation to the negative relationship as revealed by the data may be due to the fact that only about one-fourth of the respondents (25%), as reported earlier, could read and write Hausa (Roman) very well or adequately and that only about 4% of them could read and write the English language reasonably well (Table 4.4). And it may also be that the more highly literate among the respondents had less inclination or may even harbour some disdain for farming as an occupation.

4.6.6: Additional occupation (X7)

The data on this variable revealed a positive and significant relationship with adoption (at the .05 level). With r value of .34 (Table 4.19), this variable explains about 12 per cent of the variability in adoption, thus indicating a fairly strong relationship. This trend in relationship is expected in that those farmers who engage in additional or subsidiary occupations have more additional sources of income which they could use in financing more farming activities.

The implication of the results obtained is that these farmers who engage in other off-farm occupations are more likely to accept and adopt the NAFPP programme than those who depend solely on farming. The stated original hypothesis is thus given support by the data.

The data on this variable support findings by Williams, et. al. (1975), Edache (1978), Voh (1979), D'Silva and others (1981) who reported that more than one-half of the farmers they studied had two or more additional occupations and that the variable was positively and significantly related to adoption.

Olorunnipa (1981), on the other hand, found additional occupation to be negatively and insignificantly associated with the adoption of sorghum and millet seeds.

4.6.7: Level of living (X8)

Level of living as measured by the total value of household assets possessed by the respondents, has been shown by the data to be strongly and positively associated with the adoption of the NAFPP programme in the study area (r = 0.4). This relationship which is significant at .05 level (Table 4.19) accounts for about 17 per cent of the variability in the adoption behaviour. This is interpreted to mean that the individual with higher level of living standard (possessions) adopt more farming innovations. In effect the results indicate that the wealthier the respondent, the more practices he will adopt. The findings therefore, are in support of the original hypothesis as stated.

The results of the data analysed on this variable are in support of other studies by Voh (1979), Gana (1974), Fliegal (1956), Rogers (1969), Edache (1978) and many others. They all reported significant and positive relationship between level of living and the adoption of recommended farm practices.

The results as obtained were expected because it is generally held that the more well-to-do farmers have better access to production inputs as well as extension advice. They are also in a better position to withstand risks and uncertainties associated with farming. It is also possible that they possess bigger farms and may practice additional occupations that fetch extra income that can in turn be invested in better farming.

4.6.8: Size of farms (X9)

Table 4.19 shows that size of holdings is positively related to the adoption of the NAFPP sorghum programme. The r value for this relationship is .02 and is therefore not significant at .05 level. As this variable accounts for only a negligible part (.04%) of the variability in the adoption, the relationship is seen to be an extremely weak one. However, because the relationship is a positive one, the results can be interpreted to mean that there is a weak chance that those farmers who possess bigger sized holdings will be in a position to adopt the NAFPP practices. The result of the analysis therefore, is in support of the original hypothesis as stated, even though the support is not as firm as expected.

The findings on this variable are somewhat in support of other findings in Nigeria and elsewhere. For example, Basu (1969), Edache (1978), Okafor (1979), Bose and Saxena (1965), Clerk and Akinbode (1978), Alao (1971), among many others, all found that size of farm had significant and positive relationship with adoption of farm practices. Those who found no such relationship included Kivlin (1968) and Singh (1965).

It was expected that bigger farmers, being more profit oriented, and having better capacity to absorb losses and failure, would be in a better position to accept and adopt new farming innovations.

4.6.9: Contact with extension worker (X10)

The variable was measured in terms of working visits by the extension workers to the farms or homes of the respondents. The results of the analysis (Table 4.19) revealed that the variable is significantly correlated (at .05 level) with adoption. However, the direction of relationship was found to be a negative one ($r = -.47$). The strong but negative tendency as shown by the results implies that the working visits claimed to have been paid by the extension workers to the farmers had no effect whatsoever on the adoption of the NAFPP sorghum programme by the respondents in the study area. The findings, therefore, gave no support to the original hypothesis that those farmers who had more frequent contact with the extension workers would be more likely to accept and adopt the programme.

The finding on this variable has come as a big surprise. This is so because it was the accepted notion that extension workers serve as the most important influencial ingredients in the adoption process - as so much personal interaction is involved.

A possible explanation to this reversed finding could be explained by the oft stated claims that in Nigeria the number of the hard-core extension staff is grossly inadequate to have the desired impact on the clients (as amplified by Williams, 1978, Onazi, 1974 and Rowat, 1956). The claim that the working ratio of extension worker to farmer was very low

in Nigeria (1:5,000), according to Rowat) was found to be so by this study.

As pointed out elsewhere in this chapter (p.127), there were altogether only 22 full-time extension workers associated with dissemination of ideas on new farming innovations in the entire Zaria Local Government Area. This number when compared with the total number of farm families (tax-payers) in the area, will be too inadequate to be effective.

4.6.10 Participation in extension activities (X11)

This variable was treated in terms of participation by the respondents in field demonstrations and trials, and by active involvement as cooperator by having had any one or both types of field demonstrations actually sited on one's farm. The statistical analysis derived from all the components of the variable revealed that participation in extension activities as expressed in the forms mentioned, are strongly and positively correlated with adoption (at .05 level), with r value = .43. This means that about 17 percent of variation in the dependent variable is attributable to the variable.

The implication of the results as shown by the data is that those farmers who participated in and cooperated as demonstrators in one or both types of field demonstrations (Package Result Demonstration and NAFPP trials) were more in a position to adopt the NAFPP programmes than those who did not participate. The findings were, therefore, in support of the 4th empirical hypothesis of the study as stated.

Many researchers found similar results in respect of the variable. They include Gana (1974), Williams (1978), Lerner and Schramm (1972), Marsh (1962), Erikson and Graham (1967), and many others. They all found participation in extension activities to be positively related to adoption.

The results as obtained were anticipated as it is realised that active participation in any learning situation is contributory to the learning process and consequently a catalyst to adoption. Extension workers and agencies would enhance the adoption of new practices by actively involving the farmers in their programmes.

4.6.11: Various sources of information (X12)

This variable was treated in terms of the various types of information channels mentioned by the respondents through which they get new farming ideas. The statistical analysis on the data (Table 4.19) revealed that this variable is strongly and positively correlated with the adoption of the NAFPP programme. The r value of the variable is .30. This indicates that the relationship is significant at .05 level and explains 9 per cent of the variability in the adoption behaviour.

The results as obtained can be interpreted to mean that those farmers who are exposed to various sources of farm information are in a better position to accept and adopt new farming ideas. It also means that the more such farmers are exposed to the various sources, the better their chances of

adoption. The stated original hypothesis of the study is therefore supported by the data. Many other researchers have also found support for this generalization. Among them are Bogunjoko (1963), Yazidu (1973), Voh (1979), Okafor (1979), Katz (1960), Schramm (1964), Rogers (1961), Filiciano (1964) and many others. Those who did not find support include Kivlin (1967), Marsh and Coleman (1955) and Wilkening and others (1962).

The implication of the findings is that extension service should endeavour to use as many channels of information as possible to enhance the adoption of new farming ideas.

4.7: Relative Contribution of Variables to Adoption

The results obtained using the correlation coefficient statistical analysis show interrelated variances among the variables examined. To show which effects are isolated, further analysis using the Stepwise Multiple Regression Analysis was used. The aim is to determine (a) the amount of variation in the dependent variable (adoption) as explained by all the independent variables operating jointly, and (b), the relative contribution of the independent variables taken individually. In this analysis all the variables are entered, one at a time, until no more variable makes any significant contribution to the equation. Table 4.20 shows a summary of the stepwise Multiple Regression Analysis.

Using the R^2-change column the data shows the following results:

Table 4.20: Summary of Stepwise Multiple Regression Analysis.

Step	Variable Enter Remove	F to Enter or Remove	Signif.	Multiple R	R-Square	R^2-Change	Simple R	Overall F	Signif.
1	Social status	40.157	.000	.430	.184	.184	.430	40.157	.000
2	Literacy	13.830	.000	.493	.243	.059	-.421	28.440	.000
3	Sources of Info.	7.952	.005	.525	.276	.033	.303	22.356	.000
4	Size of farms	5.078	.025	.544	.296	.020	.015	18.425	.000
5	Age	2.001	.158	.552	.304	.008	-.407	15.227	.000
6	Membership of Org.	1.320	.252	.556	.310	.005	.296	12.932	.000
7	Level of living	1.855	.175	.563	.317	.007	.411	11.405	.000
8	Participation	0.998	.319	.567	.321	.004	.427	10.104	.000
9	Koranic	0.242	.623	.567	.322	.001	.266	8.968	.000
10	Primary	0.395	.843	.568	.322	.000	.231	8.030	.000
11	Contact	0.012	.914	.568	.322	.000	-.470	7.258	.000
12	Add Occupations	0.000	.985	.544	.322	.000	.344	6.614	.000

1. All the independent variables, taken together, explain about 32% of the variability in the adoption behaviour. The fact that this total contribution by all the variables examined is relatively low, indicates that there must be other personal characteristics of the respondents that also contribute to their adoption behaviour and which have not been included in this study. For example, such variables as farm income, innovativeness, emphathy, cosmopoliteness, among others, could have been investigated but for the fact that they are rather difficult to measure in a traditional society.

2. Those independent variables (social status , literacy, sources of information, and size of farms) that show a strong and significant relationship with the dependent variable (at .05 level), explain about 30% of the variability in the adoption behaviour. It could be seen that these four variables contribute most in explaining the variability in the adoption behaviour.

3. The individual contribution made by the independent variables to the variability in the adoption behaviour shows that social status contributes 18%, followed by literacy (6%) sources of information (3%) and size of farm (2%). Other contributions were made by age, membership of organisations and level of living (about 1% each). The rest of the variables have bmade very negligible or no contribution whatsoever to the adoption behaviour.

It could be concluded from the result obtained using the Stepwise Regression Analysis that the variable social status contributes more than all the other variables put together in explaining the adoption of the NAFPP Sorghum innovations by the respondents. This suggests that extension workers and extension organisations will enhance the acceptability and the adoption of new farming ideas by working closely with the community local leaders.

4.8: Summary

Relationships between personal characteristics and the adoption of the NAFPP practices was determined using the Pearson Correlation Coefficient Statistical Analysis, while the relative contributions of individual variable was determined using the Multiple Regression Analysis.

The Pearson Correlation Analysis (as summarised in Table 4.21) revealed that the relationship between size of farm (X9) and adoption, is weak and insignificant (r = .02). Similarly, weak and positive but significant relationships were found between formal education (X4 and X5) and adoption (r = .23 and .27 respectively). All the other independent variables were found to be strongly and significantly related to adoption. It is suspected that the unreliable means of assessing the farm sizes might have been responsible for the weak and insignificant relationship between that variable and adoption.

Table 4.21: Summary of findings on factors affecting the adoption of the NAFPP Sorghum innovations.

Variable	Empirical Hypothesis	Relationship with Adoption	Degree of Relationship	Sig. at .05 level	Support/not Support
Age	1	Negative	Strong	Sig.	Supported
Size of Farms	2	Positive	Weak	Not Sig.	Supported
Add. Occupation	3	Positive	Strong	Sig.	Supported
Membership of Organisations	4	Positive	Strong	Sig.	Supported
Participation in Extension	4	Positive	Strong	Sig.	Supported
Primary Education	5	Positive	Weak	Sig.	Supported
Koranic Education	5	Positive	Weak	Sig.	Supported
Level of Literacy	6	Negative	Strong	Sig.	Not Supported
Frequency of Contact	7	Negative	Strong	Sig.	Not Supported
Sources of Information	8	Positive	Strong	Sig.	Supported
Social Status	9	Positive	Strong	Sig.	Supported
Level of Living	10	Positive	Strong	Sig.	Supported

The variable "age" (X1) was, as predicted, found to be negatively associated with adoption (r = -.41), thus giving support to the first empirical hypothesis. Similarly, the variables, "Literacy" (X6) and "contact" (X10) were found to be negatively related to adoption (r = -.42) and -.44) respectively), thus rejecting the predicted outcome as stated in the hypotheses. On the other hand variables X2, X3, X5, X7, X8 and X11 were all found to be positively related to adoption and in support of the respective stated hypotheses.

On the whole, the results reveal that the adoption of the NAFPP practices is significantly associated with all, but one (X9), independent variables at .05 level, thus giving support to the generalized hypothesis as stated.

The Multiple Regression Analysis, on the other hand, shows that all the variables taken together explain about 32% of the variability in the adoption behaviour of the respondents. It also shows that four of the variables (step 1-4) explain about 30% of the variability in the adoption behaviour. Finally, it was observed from the results that the variable social status contributes up to 18% of the variability, thereby making it the greatest single contributor to the adoption behaviour of the respondents.

4.9: Full-Time Extension Workers' Evaluation Of The NAFPP Sorghum Programme

The data obtained on this section were designed to fulfill the third objective of this study. The third objective was aimed at examining the operational problems faced by the

extension workers while implementing the NAFPP Sorghum programme in their working areas. It was also aimed at determining those extension functions that should be given more attention to enhance the extension workers' efforts.

The questions for this objective were based on the extension workers' personal background and experiences in their jobs as well as their personal knowledge of the farmers and their farming activities.

4.10: Characteristics of The Extension Workers

Altogether 22 full-time extension workers from the five districts making up the local government area were interviewed. Among them were 5 senior or supervisory officers (23%) and 17 junior or village-level extension workers (77%). The supervisory staff comprised four Agricultural Superintendents and one Development Officer; while the village-level staff included nine Agricultural Instructors and eight Agricultural Assistants.

The data revealed that slightly more than one-third (36%) of the extension workers had one to four years of experience in extension service, while the same proportion (36%) had five to nine years job experience. The rest of them (27%) had ten or more years of experience on the job. Their years of service ranged from one to thirty, with a mean of about 8 years. It could be deduced from the data that the village-level staff (AAs and A.Is), have the lesser number of years of working experience, while the supervisory staff have the greater number of years of working experience.

This confirms the earlier findings (from the farmers) that most farmers prefer to grow their traditional crops in mixtures, except in cases where they were dealing with newly introduced or improved varieties.

Adoption of sorghum practices:- The extension workers were also asked a number of questions regarding the extent of adoption by farmers of the sorghum innovations introduced to the area. Most of the extension workers (63%) felt that the majority of farmers in the area had adopted most of the recommended sorghum practices. When asked to suggest possible reasons for the farmers adopting the practices, about one-fourth of them (27%) believed that it was because the farmers had confidence in the teachings of the extension workers. Another one-fourth (27%) felt it was because the farmers understood all the techniques involved. Only one extension worker believed it was because the farmers wanted higher yields.

The extension workers were further asked to suggest possible reasons for non-adoption of the recommended practices by some farmers. Their most important suggested reasons included non-availability of production inputs at the required time (36%); complexity of some of the practices (18%); incompatibility with farmers' existing practices (5%) and farmers disliking the new recommended varieties.

Some of the reasons suggested by the extension workers for non-adoption of certain sorghum practices, correspon closely with some of those given by the farmers themselves. For example, the farmers attributed their inability to use certain

recommendations to non-availability or inadequate supply of some production inputs. This particular shortcoming was mentioned by many farmers in respect of fertilizers (inadequate supply), seeds and seed dressing chemicals (non-availability).

4.13: Major Problems Faced By Extension Workers

To find out if there were any operational problems faced by the extension workers in their efforts to implement the NAFPP sorghum programme, they were asked to list as many as such problems as possible. Their responses are summarised in Table 4.24.

Table 4.24: Major operational problems faced by the extension workers in implementing the NAFPP sorghum programme in the area.

N = 22

Response	No	%
Too many assignments	18	81.6
Delay in receiving inputs	16	72.7
Lack of transportation	9	40.8
Delay in settlement of claims	7	31.8
Inadequate training	5	22.7
Lack of farmer cooperation	1	4.5

Most of the extension workers (82%) said they had too many official assignments to cope with. Almost three-fourth of them (73%) said delay in receiving supply of demonstration inputs (fertilizer and seeds) constituted a serious operational problem. Other serious operational problems mentioned by the extension workers included lack of transportation to supervise trials (41%); delay in settlement of claims (32%); and inadequate training to carry out assignments effectively (23%). The least operational problem, mentioned by only one extension worker was lack of cooperation from the farmers.

The findings of this study, regarding extension workers' operational problems, corresponded very closely and give support to similar findings by other researchers for example Williams (1980), Onazi (1974), and Ajakaiye (1979), all found out and pointed to the fact that extension workers tended to be rendered less effective because of excessive work-load.

Another problem raised by the extension workers was lack of adequate transportation facilities to conduct effective demonstration. Onazi (1973) and Gana (1974) similarly identified lack of transportation to be one of the most serious operational problems faced by extension workers.

The extension workers mentioned inadequate training and technical skills as another serious problem. Similarly Onazi (1974), Williams (1969) and other investigators, pointed out the fact that the hard-core extension service in Nigeria was manned by people with inadequate training and skills.

These people are also at the bottom of the hierarchical ladder in the service. They also have the least number of years of experience in the service. Consequently, they lack self-confidence and creditibility and respect from the farmers. It is noted that one extension worker complained of lack of co-operation by farmers.

4.14: Suggestions By Extension Workers

Finally, the extension workers were requested to suggest as many solutions as they felt appropriate with a view to helping the farmers accelerate their adoption of the NAFPP sorghum programme. Their suggestions are presented in Table 4.25.

Table 4.25: Suggestions by extension workers on what could be done to accelerate farmers' adoption of the NAFPP sorghum programme.

N = 22

Suggested solutions	No	%
Provide more fertilizers	15	68.1
Provide tractor hire services	14	63.6
Provide improved seeds	10	45.5
Have more extension workers	4	18.1
Provide storage chamicals	3	13.6
Make loans available	2	9.1
Improve crop marketing system	2	9.1
Build more farm centres	2	9.1
Provide weed killers	2	9.1

More than two-third of the extension workers (68%) advised that more fertilizers be made available to farmers in good time. Slightly less than two-third of them (64%) advised for more tractor hire services, while nearly one-half (46%) believed that the farmers would need a good supply of improved seeds. Other important advices given included the assigning of more extension workers in more areas for more contact with farmers (18%), and the provision of more storage chemicals (14%). Others still included improving crop marketing system, the building of more farm centres, provision of loans to farmers and provision of weed-killer chemicals to help control weeds more easily. These were mentioned by two extension workers in each case.

Comparatively, most of the solutions suggested by the extension workers to the farmers' problems correspond very closely with the actual requests for assistance made by the farmers themselves. Table 4.26 summarises the relationship.

In almost all cases, it can be seen from the table that except for the provision of oxen and ploughs, more farm centres, and improved marketing system, the requests for assistance by the farmers and the advice for assistance to the farmers by the extension workers correspond very closely.

Table 4.26: Relationship between farmers requests for assistance and extension workers' advice for assistance to farmers.

Area of needs	Percentage of farmers requesting	Percentage of extension workers advising
More fertilizers	35.0	68.1
More tractor services	36.1	63.6
Credit/loan facilities	36.7	9.1
Improved seeds	13.3	45.5
Oxen and ploughs	15.6	-
More extension workers	10.0	18.1
Storage chemicals	4.4	13.6
More farm centres	-	9.1
Improved marketing	-	9.1

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1: Restatement of Research Objectives

Although the NAFPP sorghum programme has been in operation in Kaduna State for about a decade, no empirical study has so far been undertaken to ascertain the extent to which the programme has been successful or otherwise. The broad objective of the present study, therefore, has been to evaluate the effect of the NAFPP as an extension strategy for increasing the production of sorghum in the study area. To this end, four specific objectives were outlined and pursued.

The first specific objective was to examine the farmer's personal characteristics thought to be associated with adoption, and the effect those characteristics might have on the farmers' adoption behaviour. The characteristics examined included age, leadership status, education, size of farms, level of living among others.

The second objective of the study was to determine the extent of the adoption of the NAFPP Sorghum production technology by those farmers in the study area who have been exposed to the new technology.

The third objective was designed to find out if there were any operational problems faced by the extension workers while implementing the NAFPP programmes in their extension districts. This was with a view to identifying those extension functions that should be given more attention to enhance the

extension worker's effectiveness.

The last specific objective was to make recommendations based on the findings of the study on how to improve on the acceptability and adoption by farmers of the NAFPP sorghum programme.

Two types of questionnaires were designed to fulfill the objectives of the study. The main set of questionnaire was used in gathering the appropriate data from a sample of 180 randomly selected farmers living within and around the NAFPP extension villages in the study area. Fourty farmers who served as NAFPP sorghum demonstrators in the area were included among the samples.

The data were analysed and percentages and means were used in reporting the farmer's personal characteristics as well as their level of awareness and extent of adoption of the NAFPP Sorghum practices. The Pearson Correlation Coefficient analysis was used to test the hypotheses postulated, while the Stepwise Multiple Regression analysis was used to further isolate the relative contributions of the variables both collectively and individually. The .05 level of significance was used in reporting the significance of relationships between variables.

5.2: Summary Of Findings

The detailed report of the findings of this study has been presented in the preceeding chapter, therefore, this section will only highlight the major findings as they relate to the specific objectives.

The data analysed on personal characteristics of the respondents reveal that more than two-third (68%) of the farmers in the area were relatively young, with a mean number of years of 45.6. The household size in the area varied from 1 to 42 persons, with a mean number of 10.3. The size of farms in the area ranged from 4 to 12 hectares, with a mean of 5.2 hectares.

Nearly two-third of the respondents (61%) were literate in the Hausa Ajami (Arabic) Script, whereas only one-fifth of them (25.6%) could read and write in the Hausa (Roman) Script. Correspondingly, nearly all of the respondents (90%) had attended Koranic Schools for between 1-15 years, while only a few of them (14%) had any Primary education. It was found that only a negligible number (1%) among them were literate in the English Language.

Although farming is the primary occupation of the respondents, all of them reported practicing some other secondary or tertiary occupations all the year round. These additional occupations include petty trading, handicrafts, cattle rearing, among others. A substantial number of the respondents were holding community leadership positions such as Village and Hamlet Heads (13%), political party officials (8%), Village Scribe (2%) and Chief Farmer (2%). Others include one judge, one Imam (Religious leader) and many Koranic instructors.

It was found that only a few of the respondents belonged to any farmers' organisations. The only ones mentioned were

Village Councils (14%), The Young Farmers' Clubs (9%) and the Farmers' Co-operatives (8%). About one-half of the respondents (52%) named the extension worker as their best source of information followed by radio (48%), friends and neighbours (18%) and agricultural shows (12%). The frequency of visits by the extension workers to farms was about twice a month.

Most farmers interviewed (85%) had observed or participated in the old Package Result Demonstrations, while about one-half (53%) of them reported having observed or actively participated in the NAFPP trials.

The knowledge level or awareness of improved sorghum practices among the respondents was found to be fairly high while the actual adoption of the practices was comparatively low. The highest level of knowledge was in respect of planting date (96%) and the lowest was close spacing (37%). On the other hand most of the recommended sorghum practices attracted only very low rate of adoption. Close spacing, use of improved varieties, monocropping, use of storage chemicals, and thinning were adopted by only 19%, 21%, 22%, 24% and 33% of the respondents respectively. It was however, observed that all of the respondents used fertilizers on their crops.

There were many and varied reasons given by the respondents for accepting and/or rejecting certain sorghum recommended practices. Most respondents (96%) said they used fertilizers to increase yields. Same reason was given for using improved sorghum varieties (10%). On the other hand those who did not use enough fertilizers (36%) were only not able to get them.

In the same vein 26% and 27% of the respondents did not use improved varieties and seed dressing chemicals, respectively, because they were not available.

One-half of the respondents did not adopt the practices of close-spacing because of their traditional intercropping practice. And those who intercropped did so because of insufficient land (33%), to harvest more varieties of crops from the same piece of land (16%) and to save labour (3%). The most important reasons for growing sorghum as a sole crop was given by 9% of the respondents who said they did so because they were dealing with new varieties.

The major farming problems mentioned in order of importance are: insufficient fertilizers (35%), lack of tractor service (31%), shortage of labour (27%), lack of credit facilities (22%), poor marketing arrangements for cash crops (15%), lack of extension advice (8%) and lack of storage chemicals (5%). As a measure to improve their farm productivity, the respondents requested for assistance in the areas of credit facilities (37%), tractor service (36%) and more fertilizers (35%). It is interesting to note that about 16% of the respondents expressed the desire to possess oxen and ploughs to suppliment on their farm labour and to minimise their dependence on hired labour. Another interesting request was that for weed killer chemicals, made for the same reasons as for oxen and ploughs.

There were altogether 22 full-time extension workers interviewed, among whom were 17 (77%) village-level staff.

All of them were found to be involved with the NAFPP programmes, among other duties. The major operational problems faced by the extension workers in discharging their duties (especially NAFPP duties) were listed as: having too many assignments (82%); delay in receiving production inputs (73%); lack of transportation to supervise trials (41%); delay in settlement of claims (32%); inadequate training to carry out assignment effectively (23%) and lack of farmer cooperation (5%).

The chapter also discussed correlation analysis between some selected personal characteristics of the farmers and the adoption of the NAFPP sorghum practices. It was found that the independent variables of status, membership, additional occupations, level of living, participation in extension activities, and use of various sources of information, were all strongly positive and significantly related to adoption at .05 level of significance. They all were in support of their respective stated empirical hypotheses. The variable age was, as predicted negatively related to adoption, while formal education was positively but weakly associated with adoption. The variables of literacy and contact, although highly significant at .05 level, were both found to be negatively related to the adoption behaviour of the NAFPP farmers, thus rejecting the predicted outcome.

5.3: Conclusions

A number of conclusions could be drawn from the findings of this study.

1. The results of the study showed that the farmers in the study area are quite familiar with most aspects of sorghum production technology as recommended by the NAFPP. In terms of actual adoption, however, only three out of the ten improved practices were found to be widely practiced by the farmers. The most widely adopted of the sorghum innovations has been the use of inorganic or modern fertilizers. All of the farmers (100%) reported using the fertilizers, even though a number of them did not know how to use them properly. Weed control and timely planting are among the most widely adopted practices; while close spacing of sorghum, sole cropping, and use improved sorghum varieties were among the least adopted. It is therefore concluded that although the NAFPP has been found to be a sound extension strategy, it has not made the expected impact in the study area. The main reason for this may be attributable to the weakness of the extension service in the area.

2. The extent of adoption of the sorghum recommended practices varied from one practice to another, depending on their relative advantages, complexity and compatibility with farmers' own practices, and other socio-economic factors. For example, the most important factor that motivated the farmers to adopt certain recommended practices such as the use of fertilizers and improved varieties, was the desire to obtain higher crop yields.

3. Many of the farmers failed to adopt some of the sorghum practices because of certain constraints such as non-availability or inadequate supply of some production inputs, especially

fertilizers, insecticides and improved seeds. Other reasons given for failure to adopt include complexity and /or incompatibility of some practices compared to farmers' own practices (for example, close spacing and sole cropping).

4. Sole cropping of sorghum, and indeed of other crops, is an innovation that is not readily acceptable by the generality of farmers because of its incompatibility with their traditional practices. The most consistent reason given for failure to adopt this practice was insufficient farm land and shortage of labour. The farmers also believe they obtain higher output from mixed crops. It was however, observed that generally farmers were prepared to grow improved crop varieties (especially maize) as a sole crop.

5. For economic and other reasons, the farmers in the study area have within the past few years considerably reduced the production of cotton, which was one of their most important cash crops, in favour of maize which they now use as both food and cash crop.

6. The best sources of farm information in the study area are the extension workers, radio, friends and neighbours, and agricultural shows (in that order).

7. Most of the respondents had been exposed to sorghum improved technologies through either the old Package Result Demonstration programme or the new NAFPP trials. A good proportion of them were actively involved as demonstrators in one or both extension strategies.

8. The ratio of extension workers to farm families in the area is extremely low; only 22 full-time extension workers (available at the time of the interview) cannot adequately serve the five districts of the local government.

9. There is a strong relationship (both positive and negative) between the various personal characteristics studied and the adoption of the NAFPP Sorghum innovations by the farmers exposed to such innovations in the study area.

10. The personal characteristics of farmers (social status, membership, level of living, participation in extension activities, use of various sources of information, additional occupations, and formal education) were all found to be positively and significantly related to the adoption behaviour of the respondents. The variables of social status, literacy, sources of information and size of farms were found to have had more influence in the adoption behaviour.

11. There were a number of problems facing the farmers in adopting improved farming practices. The most frequently mentioned ones (in order of importance) are insufficient fertilizers; lack of tractor service; shortage of manpower; lack of credit/loan facilities; inadequate supply of improved seeds; poor crop marketing arrangements; lack of extension advice; and lack of storage and other agro-chemicals.

12. Extension workers were faced with some operational problems that limit their success in implementing the NAFPP sorghum programme in the area. Among the most important problems

mentioned are: too many assignments to cope with; delay in receiving demonstration materials; lack of transportation to supervise trials; delay in settlement of allowances and claims; inadequate training, and lack of cooperation from farmers.

5.4: Recommendations

The recommendations given in this section are primarily based on the findings of the study. They are also partly based on the author's observations of prevailing farming situations in the area during data gathering; and on his personal knowledge and experiences about farming generally in the area.

The following recommendations are made for the attention of the Kaduna State Ministry of Agriculture in particular, and other Ministries of Agriculture in the Northern States, in general. They should also be of interest and value to other organisations and agencies concerned with the development of agriculture throughout the country:

1. Production inputs:- Non availability or inadequate supply of some essential production inputs, especially fertilizers, improved seeds and insecticides, was to a large extent contributory to the low adoption level of some of the NAFPP improved sorghum practices. The 1982/83 cropping season was particularly an outstanding season in which fertilizers not only came very late in the season, at one time, they were selling for as high as ₦12 a bag in some areas of Kaduna State (the study area included). In view of this, it is strongly advised that the government makes adequate quantities of

fertilizers and other production inputs available to farmers well ahead of time. The present distribution system needs to be critically re-examined with a view to improving it. In this direction it is recommended that more input distribution centres (including those to be operated by farmers' organisations) be sited in strategic areas.

2. Improved sorghum varieties:- It was observed that although most of the farmers interviewed were aware of improved sorghum varieties, only about one-fifth of them were growing them at the time of data gathering. This is a clear indication that either the farmers were not quite aware of the advantages the new varieties could offer or that they were very much convinced of the superiority of their own local varieties. It is a well known fact that generally farmers prefer the tall white or cream coloured local varieties for other reasons than high yields. For example, the farmers in the area are known to use the stems of the tall sorghum varieties for various household utilities, especially thatching and fencing.
On the other hand, one of the qualities of the improved varieties is high yields. Another outstanding quality is early maturity; whereas some of the tall local varieties may take 5-6 months to mature, some of the improved varieties (e.g. the HP series) take only 105-110 days to mature. With the severe intermitent draughts prevalent in the northern part of the country, these improved varieties would be of immense value to farmers.
After experiencing this year's (1983) severe draught, farmers have already started appealing to the government to help them with early maturing varieties, not knowing that the varieties

with that quality are aready available. It is therefore advised that an effective campaign be mounted to educate the farmers on the advantages of these improved varieties. At the same time adequate supply of the appropriate varieties should be made to all sorghum areas.

3. Tractor hire services:- One of the persistent problems of farmers is the inability to prepare their lands for planting in good time. This has been one of the numerous causes of late planting. If only farmers would get timely tractor service, they would prepare their lands and plant in good time. The THU Service in Kaduna State had been phased out for a long time and farmers in the study area were left to seek such services from other agencies and organisations (such as the AERLS/ABU, the Nigerian Tobacco Company) and private owners. In view of this, there is an urgent need for the government of Kaduna State and the Zaria Local Government to reconsider reintroducing this useful service to the farmers. Along this line, individual farmers and organisations should be assisted to purchase tractors to supplement the efforts of the government. They should also be assisted to purchase oxen and oxen-drawn implements to help ease the drudgery of farming operations.

4. Herbicides:- Weed control is one of the most labour intensive farming operations, and it is so critical that if not undertaken at the appropriate time, the farmer is sure to get poor crop performance leading to highly reduced yields. A few of the farmers interviewed were observed to be using chemical weed killers (herbicides) to reduce the drudgery of hand-hoe weeding. It is advised that more research be undertaken to

determine the suitability and side effects of herbicides to sorghum and other crops. This is with a view to eventual substitution of hand-hoe weeding with chemical weed control.

5. Credit facilities:- None of the farmers interviewed indicated having obtained any loan or credit from either the bank or the government to carry out his farming operation. It is suggested that the government effort on agricultural production credit be intensified. Small scale farmers, especially, will benefit immensely if they are given loans (in both cash and production inputs) to improve their farming.

6. The NAFPP sorghum production trials should as far as possible not be conducted in sole crops. This has been proved to be unpopular with farmers as the practice is incompatible with their normal practices and therefore unrealistic.

7. Farmers' organisations:- Such groups as the Young Farmers' Clubs, Farmers' Councils, and Farmers' Co-operatives, serve as referents or consultant to the individual adopter in his decision making process. It is therefore recommended that more Village Committees and other farmers' organisations be formed as a vehicle for transmitting new farming innovations. Participation in extension activities through group action greatly enhances awareness and adoption. Farmers have been known to readily accept innovations from other farmers whereas they would hesitate to accept same from government agents.

8. Extension worker-farmer ratio:- Personal contact is the most important instrument for arousing interest and for

teaching and learning of new farming skills. The more frequently the farmer and the extension worker interact, the better the chances of adoption taking place. In view of the very low ratio between the extension workers and the farm families in the Kaduna State, it is advised that more trained village level extension workers be employed.

9. Communications:- The study indicates that the majority of farmers in the study area are literate in the Hausa - Ajami (Arabic) Script. It is therefore, recommended that more instructional farming publications (posters, leaflets, guides and bulletins) be produced using that form of written Hausa language. The AERLS efforts in this direction should be more intensified.

10. Personal characteristics of farmers:- Almost all the personal characteristics of the farmers interviewed were found to be positively and significantly related to their adoption behaviour. Among those characteristics, social status has been found to contribute the most towards the adoption behaviour of the respondents. It is therefore advised that in order to achieve greater positive results, extension should endeavour to always identify and work with those persons with higher social status such as the local community leaders.

11. Incentives to extension workers:- The village level extension worker is the person who is in direct contact with the farmer, therefore, the success or failure of extension programmes lie squarely on his shoulders. The extension worker is however, saddled with many operational and technical problems.

In view of all the numerous problems that tend to limit the effectiveness of the extension worker, the following suggestions are made to improve the situation.

- That more trained village-level extension workers should be employed and that they should be made to undertake only educational duties (rather than combining their duties with supply of inputs). This will help greatly in reducing their various assignments.

- To improve their skills and confidence, they should be given constant training (both formal and in-service).

- Most of the extension workers complained of lack of mobility to effectively supervise their trials and demonstration plots and to go around and visit their farmers. Loans to purchase motorcycles should be made to them.

- To make extension workers conduct effective demonstrations and trials, all inputs and materials must be made available to them in good time.

- All mileage claims and allowances must be settled without too much delay. This will certainly help to boost their morale and effectiveness.

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APPENDIX A

AN EVALUATION OF NAFPP SORGHUM INNOVATION IN ZARIA L.G.A., KADUNA STATE, NIGERIA, QUESTIONNAIRE FOR FARMERS

CROPPING SEASON : 1981/82

1. Village/Town/Hamlet: _____
2. District: _____
3. Local Government Area: _____
4. Name of Respondent: _____
5. Approximate Age: _____
6. No. of Farmer's Wives: _____
7. No. of Children: Males: _____ Females: _____
8. Ages of Children: Males: _____ Females: _____

   _____ _____

   _____ _____

   _____ _____

   _____ _____

   _____ _____

9. Are you the head of a "gandu"?

   Yes _____ No _____ (if no go to question No. 14)

10. If you are, for how long have you been the head of this gandu? _____ Years.

11. How many people altogether are under your gandu? _____

12. Are you the head of this compound?

    Yes _____ No _____

13. How many family units (Garma) are in this compound?

    There are: _____

14. Do you hold any social position/rank in your Community?

    Yes _____ No _____ (if no go to question 16)

15. If yes, which one of the following?

(a) Hamlet Head _____

(b) Village Head _____

(c) District Head _____

(d) Judge _____

(e) Religious leader (Imam/Koranic Teacher _____

(f) Member, LGA Council _____(Office held)_____

(g) Farmers Council membership _____(Office held)_____

(h) Political Party membership _____(Office held)_____

(i) Farmers Co-op. membership _____(Office held)_____

(j) Any other _____(Office held)_____

16. Do you belong to any of the following organisations?

	Membership	Office held?
(a) Young Farmers Club	Yes___No___	_____
(b) Co-operative Society	Yes___No___	_____
(c) Farmers Council	Yes___No___	_____
(d) Others	Yes___No___	_____

17. Have you ever attended primary school?

No, never _____

Yes, I attended for _____ years.

18. Have you ever attended Koranic School?

No, never _____

Yes, I attended for _____ years

19. Have you ever attended Adult Education Classes?

No, Never _____

Yes, I attended for _____ years/months.

20. Can you read and write the following languages?

	Very well	Adequately	A little	Not at all
a. Arabic Language	_____	_____	_____	_____
b. Hausa (Ajami Script)	_____	_____	_____	_____
c. Hausa Eng. Script)	_____	_____	_____	_____
d. English language	_____	_____	_____	_____

21. Are you a full-time farmer?

Yes _____ No _____

22. What is your other important occupation beside farming?

(a) During the Wet Season:

i. _____

ii. _____

iii. _____

iv. _____

v. _____

(b) During the Dry Season:

i. _____

ii. _____

iii. _____

iv. _____

v. _____

(c) All the year round:

i. _____

ii. _____

iii. _____

iv. _____

v. _____

23. How many members of your family work on your (family) farm regularly (including yourself)? _____ people.

24. How many of your male children are in your gandu?_____

25. How many of your children assist you on your farming operation? _____

(a) Males _____

(b) Females _____

26. Do your wives assist on the farm? Yes ___ No ___ (if no go to question 28).

27. What kind of work do they help with?

(a) Land prep. _____

(b) Planting _____

(c) Weeding _____

(d) Fert. Appl. _____

(e) Harvesting _____

(f) Other (Specify) _____

28. What is the main source of labour for your farming operations?

(a) Family labour Yes _____ No _____

(b) Hired labour Yes _____ No _____

(c) Aikin Gaiya (Group aid) Yes _____ No _____

29. Was most of your farm work last year performed by family or hired labour?

(a) Family labour only _____

(b) Mostly family labour _____

(c) Hired labour only _____

(d) Mostly hired labour _____

(e) Family did about the same as hired labour _____

30. Do you use oxen and ox-ploughs? Yes ____ No ____ (if no, go to question 34).

31. If yes, do you own _____ borrow _____ or rent it _____

32. If yes, how many? _____

33. For how long have you been using ox-plough on your farms?

_____ years.

34. Do you use tractor? Yes _____ No _____

35. If yes, do you own _____ borrow _____ or hire it _____

36. If you hire the tractor services, who is it from?

(a) Some one in the village _____

(b) Some one from outside the village _____

(c) The Local Govt. _____

(d) Other (Specify) _____

37. Since when did you start using tractor hire service? ____

_____

38. For what operation do you use tractor?

(a) Ploughing _____

(b) Disc. harrowing _____

(c) Ridging _____

(d) Planting _____

(e) Others (Specify) _____

39. Do you or anybody in your household own the following?

(a) Household items	Yes	No	How many?
i. Iron roofs	___	___	_____
ii. Gadon Karfe	___	___	_____
iii. Matress (foam)	___	___	_____
iv. Sewing machine	___	___	_____
v. Radio	___	___	_____
vi. Television	___	___	_____
vii. Electric Generator	___	___	_____
viii. Bicycle	___	___	_____
ix. Motor Cycle	___	___	_____
x. Grinding machine	___	___	_____
(b) Livestock			
i. Cattle	___	___	_____
ii. Sheep	___	___	_____
iii. Goats	___	___	_____
iv. Donkeys	___	___	_____
v. Horses	___	___	_____
vi. Poultry	___	___	_____
vii. Other farm animals	___	___	_____
(c) Farm implements and equipment			
i. Tractor	___	___	_____
ii. Ox-plough	___	___	_____
iii. Ox-Cart	___	___	_____
iv. Sprayer	___	___	_____
v. Pick-up (cars)	___	___	_____
vi. Wheel borrow	___	___	_____
vii. Others	___	___	_____

40. How many farm sites do you have? _____(Number)

41. What type of farms are they?

(a) Farm Gandu _____

(b) Farm Gayauna _____

(c) Fadama Gandu _____

(d) Fadama Gayauna _____

(e) Other (Specify) _____

42. Has any of your farms been measured?

Yes _____ No _____

43. If yes, how many acres? _____ acres

44. How did you acquire your farms?

(a) Purchased _____

(b) Inherited _____

(c) Gift _____

(d) Hire _____

(e) Loaned _____

(f) Other _____

45. What major crops have you grown over the past 3 years.

(a) Last year 1. _____

2. _____

3. _____

4. _____

5. _____

(b) 2 years ago:

(1) _____ (3) _____

(2) _____ (4) _____

(5) _____

(c) 3 years ago

(1) _____ (3) _____

(2) _____ (4) _____

(5) _____

46. Have all your farms been planted this year?

Yes _____ No _____

47. If yes, what crops have you planted?

(a) Millet _____

(b) Sorghum(local) _____

(c) Sorghum (improved) _____

(d) Maize (local) _____

(e) Maize (improved) _____

(f) Cotton _____

(g) Groundnut _____

(h) Other _____

48. Which of these crops did you grow as sole crops? - as intercrop?

	Sole	Intercrop
(a) Millet	____	_____
(b) Sorghum (Local)	____	_____
(c) Sorghum (Improved)	____	_____
(d) Maize (Local)	____	_____
(e) Maize (Improved)	____	_____
(f) Cotton	____	_____
(g) Groundnut	____	_____
(h) Other	____	_____

49. Have you used improved sorghum seeds before (if not go to question 54).

50. If yes for how long?

(a) This season _____ (d) 3 years ago _____

(b) Last year _____ (e) for more than 3 years

(c) 2 years ago _____ _____

When asked to state the number of villages in their areas of operations, it was found that the village-level extension staff operated in from three to seven villages, while the supervisory staff worked in nine or more villages. The mean number of duty villages for all the extension workers is 5 (Table 4.22).

Table 4.22: Number of villages assigned to extension worker in his duty area.

Number of villages	No	%
Not mentioned	1	4.5
3 villages	3	13.6
4 "	7	31.8
5 "	2	9.1
6 "	2	9.1
7 "	1	4.5
9 or more villages	6	27.3
Mean = 5	22	100.0

4.11: Responsibilities

The village-level extension worker involved with the NAFPP trials is expected to perform a number of functions regarding his assignment on the programme. Firstly, he is, in collaboration with the village leaders and other farmers, responsible for the selection of the demonstration farmers as well as the trial sites. Secondly, he is responsible for the

procurement and distribution of production inputs (Fertilizers, seeds and insecticides) to the selected farmers in good time. Thirdly, he is expected to pay a number of visits to the demonstration plots and conduct all necessary method demonstrations such as planting, fertilizer applications, spraying, and any such other important operation. He is also expected to organise farm-tours in which as many farmers as possible are invited to the site to observe visually the effect of all the recommended practices being used on the demonstration plots. This is done about twice during different growing stages of the crops.

To determine the degree of contact between the extension workers and the farmers, the extension workers were requested to state the frequency of their working visits to their clientel. Table 4.23 summarises their responses.

Table 4.23: Frequency of working visits to the farmers by the extension workers.

Response	No	%
Once a week	6	27.3
Once a fortnight	4	18.2
Once a month	12	54.5
	22	100.0

More than one-half (55%) of the extension workers reported visiting the farmers once a month, while the rest of them (45%) said they were visiting two to four times a month.

The mean number of visits by the extension workers is about 2 times a month.

The frequency of visits to farmers as claimed by the extension workers agrees very closely to that reported as received by the farmers. The mean number of visits reported by the farmers was about 23 times during the 1981/82 cropping season. This works out to be 1.9 or approximately 2 visits in one month.

4.12: Extension Workers' Experiences With The Farmers

Size of holdings:- When asked if they could give an estimate of the average farm sizes within their areas of operations, more than one-half (59%) of the extension workers believed that the farm sizes would range from one to four hectares. The rest of them (41%) believed that farmers in this area possess an average farm size of from 5 - 10 hectares or more.

When compared to what was actually obtained from the farmers, the average size of holding as estimated by the extension workers is acceptable. The mean size of holdings obtained from the farmers was about 5 hectares, and most extension workers estimated the farms to be about the same average sizes.

Major crops grown:- Extension workers were asked to list the main food and cash crops grown in the area. All of those interviewed mentioned sorghum, millet and maize (in that order) to be the most important food crops in the area.

Almost three-fourth of them (73%) mentioned yams as the next important food crop followed by cowpeas (69%).

The findings on the first three most important food crops correspond closely with what the farmers indicated. The two results, therefore, confirmed that sorghum, millet and maize are the most important grain crops grown in the area.

As for the cash crops, groundnuts and cotton were listed by most of the extension workers (90%) in each case) to be the most important. Others are tomatoes (50%), peppers (36%) and vegetables (27%).

It is noted that when the extension workers were asked to indicate any important cash crops the farmers were growing less within the past few seasons, most of them (86%) listed cotton. And the main reason in the opinion of most extension workers (68%) for the farmers' action was the poor marketing arrangement that made cotton production unattractive to the farmers. It is most probable therefore, that farmers in the area, as well as those in other cotton growing zones, have dropped cotton production and taken up more maize production due to economic reasons.

Farmers cropping patterns:- When asked to enumerate on the farmers' practice of intercropping in the area, all the extension workers indicated that almost all farmers practice the intercropping system. Most extension workers (86%) gave sorghum/millet as the most common intercropping pattern, followed by sorghum/millet/groundnuts and cotton/cowpeas, mentioned by 32% of the extension workers in each category.

56. Approximately how many days would it take a man to ridge by hand each of the fields on which you grew guineacorn last year?

(a) The biggest g'corn field _____ days

(b) The second biggest field _____ days

(c) All other g'corn fields _____ days

(d) All the fields together _____ days

57. Did you plant g'corn as sole crop or in mixtures last year?

(a) All fields were intercropped _____

(b) All fields were sole cropped _____

(c) Some fields intercropped; some sole cropped _____

58. If you planted g'corn mixed with other crops would you explain why?

(a) _____

(b) _____

(c) _____

(d) _____

(f) _____

59. Which crops did you plant as sole crops last year?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

(f) _____

60. What are your main reasons for planting the crops as sole crops?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

(f) _____

61. Could you recall, what was the total yields of your guineacorn from all your guineacorn farms during the last three seasons?

(a) Last years (1981) _____ sacks

(b) The year before last (1980)_____ sacks

(c) Three years ago (1979) _____ sacks

62. Have you ever used fertilizers on your crops

Yes _____ No _____

63. Did you apply fertilizers to your guineacorn crops last year?

Yes _____ No _____

64. If yes, which type did you use?

(a) Compound _____

(b) Sulphate of Ammonia _____

(c) Single superphosphate _____

(d) Urea _____

(f) Calcium Ammonium Nitrate (CAN) _____

(g) Other (Specify) _____

65. If you used fertilizer how much of each type did you use?

	Type	Quantity (in 50 kg bags etc)
(a)	Kampa	_____ Bags
(b)	Supa	_____ Bags
(c)	Salfa	_____ Bags
(d)	Urea	_____ Bags
(e)	Can	_____ Bags
(f)	Manure	_____ Bags

66. What effect did the fertilizer have on your g'corn?

(a) It increased yields _____

(b) Decreased yields _____

(c) Had no effect _____

67. Have you used as much fertilizer as you wanted this cropping season?

Yes _____ No _____

68. If no, why not?

(a) Could not got enough to buy _____

(b) Not enough money to buy _____

(c) Could not get the right _____

(d) It was not available in good time_____

(e) Other reasons (Specify) _____

69a. From what source did you learn how to use fertilizers?

(a) Extension worker (Dem. Plots) _____

(b) Friends and neighbours _____

(c) Traders _____

(d) Village leaders _____

(e) Radio _____

(f) Television_____

69b. From what source did you learn how to use fertilizers?

(g) Newspapers _____

(h) Posters & Leaflets _____

(i) Agric. Shows _____

(j) Film & Slide Shows _____

(k) Other (Specify) _____

(l) Not sure _____

70. Did you encounter any problems after applying fertilizers to your guineacorn crop?

Yes _____ No _____

71. If so what kind of problems?

(a) Slight wilting of the crops _____

(b) Excessive wilting of the crops _____

(c) All the crops shriveled and dried up _____

(d) Part of the crops shriveled and died _____

(e) Malformation of some of the crops _____

(f) Other problem (specify) _____

73. Did you treat your guineacorn seeds with seed dressing chemical before planting?

Yes _____ No _____

73. If no, why not?

(a) Seed dressing chemical not available _____

(b) Don't know about it _____

(c) Don't think it has any advantage _____

(d) Other (Specify) _____

74. If you used seed dressing chemical from what source(s) did you learn to use it?

(a) Extension worker (Dem. Plots) _____

(b) Friends & Neighbours _____

(c) Traders _____

(d) Village leaders _____

(e) Radio _____

(f) Television _____

(g) Newspapers _____

(h) Posters & Leaflets _____

(i) Agric. Shows _____

(j) Film Shows _____

(k) Other (Specify)_____

(l) Not sure _____

75. What is the name of the seed dressing you used?

(a) Aldrex T _____

(b) Fernason D _____

(c) Other (Specify) _____

(d) Don't know _____

76. Last year did you use the recommended spacing for guineacorn (2ft apart or 3ft ridges for tall varieties, and 1ft or 1½ft apart for short varieties).

Yes _____ (go to question No. 78)

No _____

77. If not, why not?

(a) I planted other crops with g'corn _____

(b) It is not our traditional way of growing guineacorn. _____

(c) Don't know about the recommended spacing_____

(d) I believe the recommended spacing is much too close for guineacorn _____

(e) Other (Specify) _____

78. If yes, how was the yield of your guineacorn planted using the recommended spacing compared to the yield of guineacorn planted using traditional spacing?

(a) Less than average _____

(b) Just average _____

(c) More than average _____

79. Did you plant your guineacorn early (with the first onset of rains).

Yes _____ (go to question No. 81)

No _____

80. If no, why not?

(a) Could not get my land prepared in good time _____

(b) Could not procure seeds in time _____

(c) Other (Specify) _____

81. Is there any extension worker stationed in this village or in a neighbouring village but visits here to advise farmers on how to improve guineacorn production?

(a) Yes _____

(b) No _____

(c) Not sure _____

82. When did an extension worker last visited a farm on which you grew guineacorn?

(a) This season _____

(b) Last years' cropping season _____

(c) Two years ago _____

(d) More than 2 years ago _____

(e) Can't remember _____

(f) He never visited _____

83. How many times did an extension worker visit your guineacorn farms last year? _____ times.

84. Have you seen an extension guineacorn demonstration plot before?

Yes _____ No _____ (go to question No. 88)

85. If yes, where did you see it?

(a) In our own village _____

(b) In a neighbouring village _____

(c) On my own farm _____

(d) On relative's/friend's farm _____

(e) On governments farm _____

(f) Other (Specify) _____

86. Have you taken part in the extension guineacorn demonstration as a cooperator?

Yes _____ No _____

87. If yes, did it encourage you to adopt improved guineacorn production practices?

(a) Very much encouraged _____

(b) Somewhat encouraged _____

(c) Not at all encouraged _____

(d) Not sure _____

88. Have you seen a guineacorn minikit/production kit plot before?

Yes _____

No _____ (go to question No. 93).

89. If yes, where?

(a) In our own village _____

(b) In a neighbouring village _____

(c) On my own farm _____

(d) On relative's/friend's farm _____

(e) On government's farm _____

(f) Other (Specify) _____

90. Have you taken part in the minikit/production kit programme as a cooperator?

Yes _____ No _____ (if not go to ques. No. 93)

91. If you have taken part in the minikit/production kit programme how helpful was it in encouraging you to adopt improved guineacorn production practices?

(a) Very helpful _____

(b) Somewhat helpful _____

(c) Not at all helpful _____

(d) Not sure _____

92. Give the main reason why you consider the programme so helpful in encouraging you to adopt improved guineacorn prices.

(a) Because it was located on my farm _____
(b) I participated fully and learnt to carry out various improved practices _____
(c) I was able to observe the advantages of the improved practices _____
(d) The new practices were superior to our traditional methods _____
(e) I did not have to pay for the costs of production _____
(f) The practices were not difficult to carry out _____
(g) Because I was selected to participate _____
(h) Other (Specify) _____

93. This question is to test the farmer's knowledge of the improved sorghum practices (check where appropriate)

Practice	Improved Recommendation	Does the farmer know? Yes	No
a. Variety	i) SSF 60(Farafara) ii) LS187 (Short Kaura)	-	-
b. Use of Fertilizers	i) 150 kg of Supa/ha i) 150 kg of CAN/ha	-	-
c. Time of Planting	Mid April-Early May or at beginning of rains	-	-
d. Use of Seed Dressing	I packet of Aldrex T or Pernasan D to 3 mudus of seeds.	-	-
e. Seed Rate	11-14 kg/ha or 4-6 seeds per hole	-	-
f. Spacing	2ft apart or 3ft ridges for tall varies, 1½ or 1ft apart on 3 ft ridges for dwarf varieties.	-	-
g. Weed Control	As required	-	-
h. Thinning	Thin to 2 plants per stand	-	-
i. Monocropping	- Plant only guineacorn on one field	-	-

	Practice	Improved Recommendation	Does the farmer know? Yes	No
j	Storage insecticide	Lindane Dust or Aldrin dust. (1½ matchbexful per bundle of g'corn heads)	-	-

94. If you have learnt any new improved guineacorn production practices, could you indicate which ones you are now using?

(a) Use of improved seeds _____

(b) Use of fertilizers _____

(c) Time of planting _____

(d) Use of seed dressing _____

(e) Seed rate _____

(f) Close spacing (2ft apart on 3ft ridges) for tall varieties, 1½ft or 1ft apart on 3 ft ridges from short varieties). _____

(g) Weed Control _____

(h) Monocropping _____

(i) Thinning to 2 plants/stand _____

(j) Use of storage insecticide _____

(k) Other (Specify) _____

95. To which of your guineacorn farms have you applied the improved practices you said you have learnt?

(a) All the farms _____

(b) Biggest farm only _____

(c) Smallest farm only _____

(d) Biggest and smallest farms _____

(e) Other farms (Specify) _____

96. List any of the improved guineacorn practices which you once adopted and which you no longer use.

(a) None _____

(b) Improved seeds _____

(c) Use of fertilizers _____

(d) Timely Planting _____

(e) Use of seed dressing _____

(f) Seed rate _____

(g) Close spacing _____

(h) Weed Control _____

(i) Monocropping _____

(j) Thinning to 2 plants/stand _____

(k) Use of storage chemical _____

97. Explain the main reasons why you discontinued the use of the improved guineacorn practices as you indicated:

Practice	Reason for discontinuation
(a) Use of improved seeds	_____
(b) Fertilizers	_____
(c) Timely Planting	_____
(d) Seed dressing	_____
(e) Seed rate	_____
(f) Close spacing	_____
(g) Weed Control	_____
(h) Monocropping	_____
(i) Thinning to 2 plants/stand	_____
(j) Storage chemicals	_____

96. List any of the improved guineacorn practices which you once adopted and which you no longer use.

(a) None _____

(b) Improved seeds _____

(c) Use of fertilizers _____

(d) Timely Planting _____

(e) Use of seed dressing _____

(f) Seed rate _____

(g) Close spacing _____

(h) Weed Control _____

(i) Monocropping _____

(j) Thinning to 2 plants/stand _____

(k) Use of storage chemical _____

97. Explain the main reasons why you discontinued the use of the improved guineacorn practices as you indicated:

Practice	Reason for discontinuation
(a) Use of improved seeds	_____
(b) Fertilizers	_____
(c) Timely Planting	_____
(d) Seed dressing	_____
(e) Seed rate	_____
(f) Close spacing	_____
(g) Weed Control	_____
(h) Monocropping	_____
(i) Thinning to 2 plants/stand	_____
(j) Storage chemicals	_____

98. What is your main source of information on new farming practices?

(a) Extension worker _____

(b) Friends and neighbours _____

(c) Traders _____

(d) Village Leaders _____

(e) Radio _____

(f) Television _____

(g) Newspapers _____

(h) Posters and Leaflets _____

(i) Agricultural Shows _____

(j) Film and Slide Shows _____

(k) Other (Specify) _____

(l) Not sure _____

99. Which of the sources of information is most helpful to you?

(Rank in order of importance)

(a) Extension worker _____

(b) Friends and neighbours _____

(c) Traders _____

(d) Village Leaders _____

(e) Radio _____

(f) Television _____

(g) Newspapers _____

(h) Posters and Leaflets _____

(i) Agric. Shows _____

(j) Film and Slide Shows _____

(k) Other (Specify) _____

(l) Not sure _____

100. What were your main problems in trying to adopt new farming practices during last year's cropping season?

(a) Lack of fertilizers _____

(b) " " improved seeds _____

(c) " " labour _____

(d) " " tractor operations _____

(e) " " storage chemicals _____

(f) Poor marketing _____

(g) Lack of credit _____

(h) " " extension advice _____

(i) Other (Specify) _____

101. Can you tell me which is your source of credit for your farming activities?

(a) Your own money _____

(b) Relatives _____

(c) Friends and neighbours _____

(d) Commercial bank _____

(e) Co-operative society _____

(f) Agricultural bank _____

(g) Local money lenders _____

(h) Government(State/Federal/Local) _____

(i) Other (Specify) _____

102. Was the credit given in cash or in kind?

(a) Cash _____

(b) Kind _____

(c) Both cash and kind _____

103. What assistance do you need to improve your farming?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

(f) _____

(g) _____

(h) _____

(i) _____

(j) _____

Date of interview: _____, 1982

Name of Interviewer: _____

APPENDIX B

AN EVALUATION OF NAFPP SORGHUM INNOVATION IN ZARIA LOCAL GOVERNMENT AREA - CROPPING SESSION 1981/1982

QUESTIONNAIRES TO BE FILLED BY FULL-TIME EXTENSION WORKERS

1. Date of interview: _____
2. Village: _____
3. District: _____
4. Local Government Area: _____
5. Name of Extension Worker: _____
6. Rank: _____
7. Total number of years in extension service: _____ yrs.
8. How many villages are in your extension area? _____
9. What is the total number of farm families in your extension area? _____
10. What percent is full-time farmers? _____ %
11. State percentage of literate farmers in the area:
    (a) Hausa (Roman) _____ percent
    (b) Hausa (Ajami) _____ "
    (c) Both Hausa Roman & Ajami _____ "
    (d) Arabic _____ "
    (e) English _____ "
    (f) Other _____ "
12. How often do you visit each farm family in your extension area:
    (a) Once a week _____
    (b) Once a fortnight _____
    (c) Once a month _____

13. Which are the main crops grown in the area?

(a) Food crops	(b) Cash Crops
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____
6. _____	6. _____

14. What is the most common crop mixture in the area?

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

15. Are there any farmers' organisations in the area?

(a) YFCs _____

(b) Farmers' Council _____

(c) Other _____

16. Do farmers generally use improved farming practices of crop production in this area?

Yes _____ No _____

17. If yes, which ones?

(a) Use of fertilizers _____

(b) Early planting _____

(c) Use of insecticides _____

(d) Use of improved seeds _____

(e) Close spacing of crops _____

(f) Monocropping _____

(g) Use of storage chemicals _____

(g) Use of labour-saving devices (animals/tractor). _____

18. What is the average size of farm holdings in this area?

(a) 1 - 2 ha _____

(b) 3 - 4 ha _____

(c) 5 - 10 ha _____

(d) over 10 ha _____

19. What fraction of the farmers grew guineacorn during the past 3 seasons in this area?

Period	Percentage of farmers
(a) Last year	_____%
(b) Two years ago	_____%
(c) Three years ago	_____%

20. Would you say that the farmers in your extension area grew a lot more guineacorn last year than they did during the previous two seasons?

Yes _____ No _____

21. If yes, what was the main reason?

(a) They wanted to grow more food crops _____

(b) They were using guineacorn as food and as cash crop _____

(c) It was more profitable to grow _____

(d) There was a much higher demand for guineacorn _____

22. If the farmers grew more guineacorn and other food crops which of the traditional cash crops did they grow less?

(a) Cotton _____

(b) Groundnuts _____

(c) Other (Specify) _____

23. Why did they grow less of the cash crop?

(a) It was less profitable to grow _____

(b) It required more labour _____

(c) The marketing arrangement was not favourable _____

_____

(d) Other (Specify) _____

24. Have you carried out any Minikit/Production Kit Trials for MAFPP during 1979-1981 cropping seasons in your extension area?

Yes _____ No _____

25. If yes, on what crops and what was the total number of trials on each type of crops?

	Year		Crop	Number of trials Minikit/Prod. Kit
(a)	1979	1.	_____	_____
		2.	_____	_____
		3.	_____	_____
		4.	_____	_____
(b)	1980	1.	_____	_____
		2.	_____	_____
		3.	_____	_____
		4.	_____	_____
(c)	1981	1.	_____	_____
		2.	_____	_____
		3.	_____	_____
		4.	_____	_____
(d)	1982	1.	_____	_____
		2.	_____	_____
		3.	_____	_____
		4.	_____	_____

26. How were the participating farmers for the guineacorn trials selected?

(a) Selected by the Village Head _____

(b) Selected by the farmers' or Extension Committee _____

(c) Selected by YFC _____

(d) Selected by the extension worker _____

(e) Other (Specify) _____

27. How were the guineacorn trial plots selected?

(a) By the Village Head _____

(b) By the farmers' group _____

(c) By the co-operating farmer himself _____

(d) By the extension worker _____

(e) Other (Specify) _____

28. How willing were the participating farmers in carrying out all the recommended practices on guineacorn production?

(a) Most of them very willing _____

(b) About half of them willing _____

(c) Less than half of them willing _____

(d) Only a few of them willing _____

29. How effective were the Minikit/Production Kit trials in helping the willing participating farmers to adopt improved guineacorn practices?

(a) Very effective _____

(b) Quite effective _____

(c) Not so effective _____

(d) Not at all effective _____

30. What fraction of the participating farmers would you say have adopted the improved guineacorn practices?

(a) All of the farmers? _____

(b) Most of the farmers _____

(c) Just half of the farmers _____

(d) Less than half of them _____

(e) Just a few of them _____

(f) None of them _____

31. If the trials were effective and so many farmers have adopted the improved guinea-corn practices what in your opinion made them adopt the practices?

(a) They had implicit confidence in the extension worker _____

(b) They were willing to adopt any new farming innovation that brings them more benefits _____

(c) They liked the attention they were getting from other farmers _____

(d) They liked the new guineacorn varieties introduced to them _____

(e) They understood all the techniques involved _____

(f) They were convinced that they had increased their production _____

(g) List other reasons: _____

_____

_____

32. If the trials were not effective and most of the participating farmers were not adopting the improved guineacorn practices, what in your opinion was responsible for that?

(a) They could not prochure the necessary inputs _____

(b) The practices were rather difficult to follow _____

(c) They practices ran contrary to their traditional beliefs and methods _____

(d) List other reasons: _____

_____

_____

33. To the best of your knowledge were there any other non-NAFPP participating farmers who have adopted the guineacorn improved practices.

Yes _____ No _____

34, If yes, what motivated them to do so?

(a) They found the village leaders have adopted the new practices _____

(b) They were convinced the improved practices were good enough for them _____

(c) List other reasons: _____

_____

_____

35. If no, what were the reasons for non-adoption?

(a) They were not aware of the trials _____

(b) They did not participate in the village extension activities _____

(c) They did not believe the practices were good enough _____

(d) They could not obtain the necessary inputs _____

(e) There was no extension worker nearby _____

(f) They did not like to change their traditional practices _____

(g) They could not understand what the new practices were all about _____

(h) List other reasons: _____

36. What factors do you think limit the success of your NAFPP sorghum programme?

(a) Lack of cooperation from the farmers _____

(b) Lack of encouragement by the Ministry _____

(c) I am not well trained for the job. _____

(d) Too many assignments to handle effectively _____

(e) Lack of transportation to supervise the trials ____

(f) Delay in receipt of farming inputs _____

(g) List other reasons: _____

37. What do you think should be done to improve the running of the NAFPP sorghum programme to enhance adoption by farmers?

_____

_____

_____

_____

_____