SEED MULTIPLICATION AND DISTRIBUTION SYSTEM IN NORTHERN NIGERIA: A CASE STUDY OF KADUNA, KANO AND PLATEAU STATES

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CHAPTER ONE

INTRODUCTION

Nigeria, like many developing nations of the world, is today confronted with many economic problems. Paramount among these problems are hunger, malnutrition, high inflation rate and a Malthusian population growth rate. These problems have constituted a clog in the wheel of her economic development.

At the root of these problems is food shortage which is now very acute. In Nigeria, it has been shown, through quantitative examination of food demand and supply projections, that on the aggregate "supplies will be incapable of meeting the demands in 1975, 1980 and 1985" (Olayide et. al. 1972, p. 104). Thus the failure of Nigeria's agriculture to turn out enough food is largely responsible for the current acute shortages of some essential foodstuffs[1].

Nigeria's ever-increasing food import bill (Abalu 1978) coupled with the observation that her food production trails behind her population growth rate (Third National Development Plan, 1975-80) are probable indicators of the nature of undersupply of food that characterises the economy.

This food shortage constitutes a threat to Nigeria's economic progress and her major pre-occupation necessarily must be how to produce more food.

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[1] Examples of these crops are rice, maize, sorghum and millet. (For details see Abalu and D'Silva 1978).

This policy of boosting food production through various strategies seems to have started gathering momentum during the last military administration, when agricultural programmes like Operation Feed the Nation (OFN), Seed Multiplication Scheme (SMS), National Accelerated Food Production Project (NAFPP), and Agricultural Service Centres were launched[1].

The Seed Multiplication Scheme in Nigeria

The increasing gap[2] between population growth rate and food production growth rate in Nigeria has been traced to a number of factors. Important among these factors are low yields, declining soil fertility with limited use of fertilizers, unimproved crop varieties and breeds of livestock etc. (Third National Development Plan, 1975-80). All these problems have aggravated Nigeria's food problem.

One of the approaches of the Federal Government to combat the food shortage problem is through the multiplication and distribution of improved seeds. It is hoped that the mass adoption of such improved seed varieties will *ceteris paribus*, significantly increase food supplies.

The multiplication of seeds started in Nigeria long ago, though in an unorganized and uncordinated form. A national policy on seed multiplication and distribution designed to build an integrated and coordinated

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[1] All these programmes were launched with intent and purpose of increasing food production.

[2] The Nigerian food sub-sector is asserted to be growing at an average annual rate of 2.5 percent vis-a-vis a population growth rate of about 3 percent (Famoriyo, 1980).

National seeds programme, which is capable of meeting increased requirements of improved seeds by Nigerian farmers came into existence in about the middle of the seventies. The approved policy emanated from extensive delibrations of the Federal Department of Agriculture, National Agricultural Development Council, and the National Committee on OFN (National Seed Service and FAO/UNDP, 1979). The details of the national seed policy are discussed in chapter three (III) of this thesis.

Importance of Improved Seeds in Agricultural Production

The importance of improved seeds is synonymous with the importance of seeds. The word "seed" means the germ or propagative source of plants. Seeds are thus indispensable because without them, no agricultural crop production can take place. The dependence of man on food (which comes directly or indirectly from crops, produced through the use of seeds) underscores the importance of seeds in general. Furthermore, without agricultural crop production which relies heavily on seeds, the future of a nation is doomed, for 'Seeds are ever a positive and creative force. Seeds are the germ of life, beginning and an end, the fruit of yesterday's harvest and the promise of tomorrow's. Without an ample store of seeds there can be no national treasure, or no future for a nation' (United States Department of Agriculture, 1961, p. 1).

Improved seeds are vital because of their potential to increase agricultural production. For instance yield trials carried out by the

Institute for Agricultural Research (IAR) Samaru, Nigeria, under the Cereals Improvement Programme shows that a mean grain yield of 835 kg/ha was obtained from improved sorghum variety as against 583 kg/ha obtained from local sorghum variety grown under the same conditions (Report to the Board of Governors on the Institute's work 1977-1978, "Cereals Improvement Programme", p. 5).

It is also reported that between 1966/67 and 1973/74 the yields of the High Yielding Varieties (HYVs) in India varied from 2.3 to 3.7 times those of the traditional varieties of wheat and from 1.7 to 2.6 times those of rice (International Seed Testing Association (ISTA) News Bulletin, December 1976, p. 4). Similar experiments in the Philippines in 1968-72 shows that the yields of the HYVs of rice averaged about 1.3 times those of traditional varieties (Ibid p. 4).

The importance of improved seeds in agricultural production comes more to the limelight when one considers its role vis-a-vis that of other agricultural farm inputs. According to Liman (1979), "It is no exaggeration that the effectiveness of all other inputs like fertilizers, crop production chemicals, and modern technology is dependent on the availability of high quality seeds to our farmers at the right time and in required quantities" (Liman's forward to National Seed Service, Food and Agricultural Organization/United Nations Development Project, 1979).

The implication of this assertion is that virtually no agricultural farm input can singularly shift the production function much to the right. Therefore, fertilizer, which seems to have gained greater popularity (than improved seeds) among many Nigerian farmers, will yield even greater results if it's use is accompanied with the use of improved seeds.

Furthermore, Falusi and Adubifa, 1975, cannot see how Nigeria's agriculture can be modernised without the use of "package-responsive crop varieties". To them this is the logical approach to achieving substantial increases in yield per hectare.

Successful use of improved seeds can be a potent force for advancing agricultural development as a whole (FAO, ROME, 1969). In fact the extra income that farmers can realise from the sale of their surplus output resulting from the use of improved seeds can promote such farmers to an era of consumer economy. For instance it is reported that in India, the added income obtained by farmers from successful high-yielding variety programmes is creating an increased demand in rural areas for prestige items like radios and bicycles (FAO, ROME, 1969).

In America where improved seed varieties are widely used, farmers have been able to increase their returns "... by well over a billion dollars annually" (Delorit et. al. 1974, p. 625). Delorit and his group believe that other benefits that can accrue to the use of improved

seeds varieties include the possibility of providing consumers with a greater variety and abundance of higher quality food, textiles, beverages and other products.

The much talked about "Green Revolution" draws its background, historically, from the use of improved seeds along with fertilizers and water. One of the foremost protagonists of the "Green Revolution", Borlaug, won a Nobel Peace Prize in 1970 because he developed high yielding varieties of dwarf Mexican wheat. (Famoriyo, 1980).

The Problem and Objectives of the Study

The use of improved farm inputs is imperative to any modern agriculture that aims at high productivity. Infact Mellor shares this view, for he maintains that "a modern high productivity agriculture is dependent on supply of a vast quantity of new forms of inputs", (Mellor, 1966, p. 228).

The Federal Government of Nigeria also seems to have realised this fact and has even identified among other factors, "inadequate supplies of agricultural inputs" as constituting "serious constraints" to achieving high agricultural productivity (Third National Development Plan, 1975-80, p. 65). Evidence abounds that this fact is indisputable especially with respect to improved seeds. Preliminary field work shows that about 60 percent of sampled farmers did not even know what

improved seeds were[1]. It is even reported that the National Seeds Service could supply only 10 percent of the total National seed requirements between 1976 and 1977 (Project Report on National Seed Multiplication 1978, p. 3). Furthermore table 1 shows that, generally improved seeds of most crops were grossly under supplied to the states in 1977.

At present, published information concerning seed multiplication and distribution in Nigeria are very scarce. Most of what are available

Table 1: States Requests For Improved Seeds And The Quantities They Got (In Tonnes)

Crops	Maize	Millet	Rice
Quantity requested	1531.87	453.95	2178.55
Quantity Supplied	833.12	28.45	505.97
% of Request met	54.39	6.27	23.23

Source: Computed from "Progress on National Seed Service" - Paper presented by A. Joshua during the 4th National Accelerated Food Production Project Workshop held at National Cereal Research Institute Ibadan, 1978.

on this subject are agronomic in content and are not only silent on why there is pronounced inadequacy of improved seeds, but also have nothing to say about why many farmers are still ignorant about the use of improved

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[1] During one of the initial field trips, the researcher discussed with some farmers in Maigana in Zaria Local Government Area of Kaduna State and found that 12 out of 20 farmers claimed not to have heard about improved seeds.

seeds. Little attempt, if any, has been made to investigate the performance of the existing organizational set up for seed multiplication. An assessment of the existing seed multiplication activities like seed production, seed harvesting, seed processing, storage and marketing is equally lacking. Such investigation is necessary to show the presence of constraints and problems.

When policy makers and researchers are well informed as regards the present situation of seed multiplication and distribution system then steps can be taken to improve upon the existing system so that improved seeds can be made adequately available to farmers at the time, place, form and in quantity that will guarantee increased food supplies. This study is therefore exploratory and fact-finding in focus and has the following specific objectives:

(1) To gain an understanding of the organizational set up of seed multiplication and distribution pattern.

(2) To identify problems encountered in seed multiplication and distribution with a view to offering remedies.

(3) To determine farmers perference pattern for improved and traditional seeds.

(4) To understand the extent to which farmers' demand for seeds are met.

(5) To formulate policy recommendations for improving seeds multiplication and distribution system that will facilitate increasing food supplies.

Scope of the Study

Broadly speaking this study covers the 10 northern states of Nigeria. In the study, attention was paid only to the multiplication and distribution of seeds of food crops[1]. Particular attention was paid to the multiplication and distribution of seeds of guineacorn (sorghum), rice, millet and maize. These crops constitute important staple food items in the food basket of the majority of people living in northern states. Furthermore, one way to reduce or prevent future gross undersupply of food to these areas is to exploit avenues for ensuring continuous increased production. Efficient system of multiplying and distributing improved seeds to farmers is considered a logical step in this direction.

It is relevant to mention that the study of each of these four crops on a 'variety by variety' basis especially at farmer's level is beyond the scope of this thesis. What is done is to regard all various improved varieties of guineacorn for instance, as "improved guineacorn seed". The same thing applies to other crops.

In order to gain a deeper understanding of the seed multiplication system, intensive survey was carried out in 3 states, viz, Kaduna, Kano and Plateau States. This provided the opportunity to investigate

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[1] It is hoped that a similar research will be conducted on non-food crops in the future.

functions that were performed, and how, when and by whom these functions were carried out. It was also possible to look into demand, supply and level of adoption of improved seeds by farmers in the areas of intensive study. Limitations of resources in terms of time, personnel and finance prevented the extension of this intensive survey to cover all the 10 northern States.

In each of the 3 states selected, 6 local government areas were further chosen for greater investigation. Details about the selected areas of study are given in chapter two which deals with Methodology of data collection. The next section in this chapter is concerned with a review of literature.

Literature Review

Improved seeds have for long been recognised as a vital instrument in increasing crop production. Olayide and others attribute Nigeria's food shortages to low levels of inputs on fragmented peasant holdings. And one of the steps they advise to remedy the situation is to establish "seed production and pesticides production/supply schemes with units in various ecological zones" (Olayide et. al, 1972, p. 87).

In a similar vein, Olatunbosun maintains that a very vital incentive to increasing food supplies in this country lies in the provision of a more adequate and regular system of supplying farm inputs (Olatunbosun, 1975). He went further to stress that "more attention should be given to introducing high-yielding varieties of rice, maize, sorghum and millet which should be carried to the farming population (Ibid, p. 109).

Other efforts to explain Nigeria's current food shortages have also been made. A new Nigerian Statement identified a number of factors impeding the production of abundant food in the country. (New Nigeria

11th December, 1978). One of such factors, relevant to this thesis is the believe that the low yield of food crops "is caused by the fact that peasant farmers, the bulk of the producing farming population in the country, still use the low yielding seeds" (p. 23).

A number of reasons can be adduced for peasants' adherence to their traditional seeds. These may include:

(a) Level of information available on improved seeds.

(b) Extent to which improved seeds are available to farmers.

(c) Whether or not farmers notice any difference between improved seeds and traditional seeds.

The extent to which these variables have influenced the use of improved seeds by farmers in the study area will be examined in chapter 4.

The history of a scientifically based seed multiplication in Nigeria can be traced as far back as 1863 when the colonial adminstrators established the Federal Department of Agricultural Research (FDAR) with the headquarters at Moor Plantation, Ibadan. The department was charged with the major function of conducting breeding and agronomic research on maize, rice and grain legumes (NSS, FAO/UNDP, 1979).

Other institutions that have actively participated in seed multiplication and plant improvement for the last 2 to 3 decades include the Institute for Agricultural Research (IAR), Samaru, Zaria, the Universities of Ibadan, Nsukka and Ife and the International Institute of Tropical

Agriculture, Ibadan. The seed producing activities of most of these institutions are now coordinated by the National Seed Service (NSS).

Prior to the establishment of the National Seed Service in the mid 70s, there were various schemes of seed multiplication carried out by different institutions in Nigeria (FAO, 1970, p. 15). For instance, the Institute for Agricultural Research, (IAR) at Samaru, Zaria and the FDAR "set forth discreet stages (generations) of seed multiplication for food crops (Ibid, p. 15). The two schemes differed in the terminology used for the various stages of seed multiplication (Table 2). The international varsions of these terminologies are shown in column 4 of Table 2.

Under these Seed Multiplication Schemes all "Breeder's 1" seed was produced by the research institute under the direct supervision of the breeder. Breeder's 1 seed was then supplied by the breeding institutes to the State Ministry of Agriculture for the production of Breeder's 2 seed. This was grown on State Ministry of Agriculture and Natural Resources' farms. Basic seed was grown from Breeder's seed on state farms, demonstration farms, farm institutes or by selected growers. Certified seed was then produced by selected farmers.

A number of observations can be made about these earlier seed multiplication schemes. The first thing is that lack of uniformity in the terminologies used could create confusion when seeds were supplied

Table 2: Examples of The Seed Multiplication Schemes Existing In Nigeria Before 1970

Generation	FDAR Scheme	IAR Scheme	International Schemes
Seed from plant breeder	Nucleus seed	Foundation seed	Breeder's 1 seed
1st generation increase	Stage 1 seed	Stage 0 seed	Breeder's 2 seed
2nd generation increase	Stage 2 seed	Stage 1 seed	Basic seed
3rd generation increase	Stage 3 seed	Stage 2 seed	Certified seed

Source: FAO Report to the Government of Nigeria on Seed Production and Distribution, FAO, Rome 1970, p. 15.

to a state from both FDAR and IAR. Secondly there was a conspicuous absence of a coordinating body to harmonize the activities of the two schemes so as to prevent duplication of efforts. Thirdly the certified seeds produced by selected farmers lacked "organised seed trade to purchase, clean and store the seed until the next planting season (FAO, 1970, p. 16). Finally the schemes benefited very few farmers. The FAO reported that less than 1 percent of food crop farmers were planting pure seed of selected varieties (FAO, 1970, p. 17).

Apparently dissatisfied with the food crops seed multiplication schemes, the Federal Republic of Nigeria requested the assistance of the Food and Agriculture Organization in "Establishing a Nationally Coordinated Food Crop Multiplication Administration in Nigeria". The terms of reference of the FAO consultant on seed production were "to advice the Government of the Republic of Nigeria on the kind of organization required to coordinate and expand the existing seed multiplication and distribution machinery in Nigeria, including proposals for a seed certification scheme and the drawing up of a draft request to the United Nations Development Programme/special fund (UNDP/SF) for assistance in the form of experts, equipment and finance" (FAO, 1970, p. 17).

The FAO, on the basis of work done by its consultant (who was in Nigeria from 24th September to 27th November 1969), made the following recommendations to the Federal Government of Nigeria:

Immediate Needs

1. Organize a national programme to coordinate seed multiplication, cleaning, storage and distribution of improved varieties.

2. Organize a national seed control programme.

3. Provide technical within country training for Federal and State personnel assigned responsibilities for seed multiplication and distribution.

4. Coordinate and intensify national educational programmes in cooperation with state Agricultural Extension Officers to have farmers use seeds of adapted varieties together with the best cultural practices.

5. Organize cooperative and/or private farm supply business that will provide national, regional and local distribution of seed and non-farm inputs to farmers. These local organizations must have resources for providing credit to farmers.

6. Develop a system for marketing food crops that will provide an incentive to farmers to increase yeids and lower production cost per unit.

7. Draft and have adopted national seed legislation which will establish and enforce standards for seed quality, varietal identity and purity, and seed certification.
8. Organise and implement a seed certification scheme with reasonable standards for genetic purity and seed quality.
9. As experience and need warrant, expand the seed multiplication system to include other species of economic importance, such as grass and legume varieties recommended for forage and grazing.

Future Needs

1. Draft and have adopted national seed legislation which will establish and enforce standards for seed quality, varietal identity and purity, and seed certification.
8. Organize and implement a seed certification scheme with reasonable standards for genetic purity and seed quality.
9. As experience and need warrant, expand the seed multiplication system to include other species of economic importance, such as grass and legume varieties recommended for forage and grazing.

The Fundamentals of Seed Multiplication and Distribution System

The fundamentals of any seed multiplication and distribution system include seed multiplication, seed processing and storage, seed certification, seed testing and marketing, and seed legislation (Joshua in 3rd National Seed Improvement Course, NSS, FAO/UNDP, 1977).

These "essential components" of Seed Multiplication and distribution system are even reflected in the FAO's recommendations to the Federal Government of Nigeria discussed earlier. Furthermore the experiences of countries like the United States and the Netherlands that have evolved highly reputable seed industries show that these "essential components" are very crucial to the success of any Seed Multiplication and distribution system .

A brief discussion of each 'component' of seed multiplication is presented below:

Seed Multiplication

This is the stage that aims at increasing the small quantities of breeder seeds to large quantities of quality seeds. Four stages of seed multiplication are generally recognized (3rd National Seed Improvement Course, 1977).

These stages[1] are breeder seed, foundation seed, registered seed and certified seed.

During the seed multiplication process, certain precautions are necessary to maintain the genetic, physical and physiological characteristics of the seeds. These precautions, as described by Joshua (1977, Pp. 3-4) are as follows:

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[1] Not all countries use the same terminology to describe the stages (ISTA 1967, 1971).

(1) The seed should be planted on clean land that did not grow another variety of that crop the preceding year.

(2) The variety should have proper isolation from other varieties to prevent varietal contamination through crops pollination.

(3) The seed should be grown at a high level of soil fertility.

(4) Dangerous weed and diseases should be controlled to prevent their dissemination through the seeds.

(5) Care needs to be taken in harvesting, threshing, cleaning and bagging of the seed to prevent mixture with other varieties to ensure minimum impairment of the viability.

Several types of arrangements are made for the multiplication of seeds depending on the policy of each country. In general, the governments of most countries exercise monopoly power over the production of breeder seeds. Private enterprises are however allowed to participate in the production of certified and commercial seeds. For instance the production of certified and commercial seeds are exclusive rights of private firms in the Netherlands while these seeds are handled by government institutions/ private seed firms in Turkey (FAO, 1975, p. 41, 49). In Denmark, France, Italy, and Sweden, the national federations of farmers' cooperative organize seed production on a large scale (Organization for European Economic Cooperation, 1955, p. 13).

Seed Processing and Storage

Seeds are processed after harvesting. The processing activity involves safe seed drying, seed clearing, grading, treating and packaging. Seed processing helps to improve the physical and physiological qualities of the seeds produced (Joshua in Third National Seed Improvement Course, 1977).

Equipment[1] that are commonly used for efficient seed processing include seed separator, air screen cleaner, specific gravity separator, indent disk and cylinder separators, pneumatic and aspirator separators, velvet roll separators, spiral, inclined draper timothy bumper mill vibrator, electronic separators, magnetic separators and colour separators (USDA 1961, p. 307).

The guiding principle in the storage of seed is that "seed should be stored dry and kept dry" (USDA 1961, p. 307) so that the germination will not deteriorate before the seeds are planted.

It has been suggested that when bagged seeds are stored in warehouses, there should be provisions for weather-tight roofs and walls; strong, smooth floors and properly spaced columns that permit easy passage for machines and people handling the seeds (Ibid, p. 347). Furthermore good storage must be equipped with wooden pallets, equipped for proper fumigation and must be cool, dry and have clean environment (NSS; FAO/UNDP, 1979).

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1 For a detailed description of the function of each of these equipment, see United States Department of Agriculture, (USDA), Yearbook of Agriculture, 1961. Pp. 307-321.

Seed Certification

The seed certification component of seed multiplication and distribution system is the provision of guarantee as to

(a) the trueness to type of variety of strain,

(b) the percentage purity and germination of the seed and freedom from certain weed-seeds and

(c) freedom of the seed from certain seed-borne diseases (OEEC[1], 1955, p. 20).

While seed certification standards and procedures may vary from one country to the other, the general trend is to have an officially recognized body (not directly involved in production or sales of seeds) to vouch for the qualities of particular seed lots (4th National Seed Improvement Course, 1978, p. 82).

The seed certification agency, among many other functions, ensures that only the best varieties of any crop are accepted into seed multiplication Scheme and establishes realistic minimum certification standards. The Agency is also expected to undertake field inspections of seed farms to ensure adherence to laid down standards. (4th National Seed Improvement Course, Pp. 82-84).

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[1] OEEC = The Organization for European Economic Cooperation.

Seed Testing

The main objective of seed testing is to assess the planting value of the seed (Joshua in 3rd National seed Improvement Course, 1977, p. 8). Joshua listed the items for which seeds are tested, as the rules prescribed by International Seed Testing Association (ISTA). These Items are:

1. Purity of seed
2. Other crop seeds
3. Weed seed contents
4. Moisture contents
5. Germination percentage
6. Pathological tests for seed helth.

Marketing and Seed Legislation

The importance of marketing in a seed Multiplication and distribution system has been emphasised by several authors. Bal is of the view that "Marketing occupies the most important position in a seed enterprise" (4th National Seed Improvement Course, NSS, FAO/UNDP, p. 290). Joshua also stressed that an efficient seed distribution outlets is crucial to ensuring that adequate quantities of high quality seeds reach the farmers at the right time and place (3rd National Seed Improvement Course, NSS, FAO/UNDP, 1977, p. 9)

Bali has identified about 4 major organizations that may perform seed marketing functions. These are government agencies, public sector organization, private enterprises and other agencies (Like cooperatives and joint enterprises).

Of these 4 agencies, Bal is of the opinion that public sector organizations and private enterprises are likely to operate with reasonable efficiency, since their survival depends on the ability to do effective marketing of the seeds produced (Bal, 1978). He warned that a government agency is likely to incur high marketing costs.

The activities of any seed marketing agency includes:

Preparing the product.

Adequate stocking before supply.

Planning logistics of seed movement.

Arranging transit storage.

Selling against orders.

After-sale service.

A myriad of problems that may confront a seed marketing agency in the execution of these activities has been documented (NSS, FAO/UNDP, 1979, Pp. 15-16). These problems include lack of transport facilities, poor communication, limited purchasing power of small farmers and inadequate storage facilities. Others include the need for advance

seed demand estimation, the vulnerability of seeds to loss of viability, the need of specific varieties for specific areas at specific times, and storage problems.

In order to avoid or reduce these problems a seed agency is advised[1] to emphasise; market information, marketing research, demand assessment, inventory control, seed storage, pricing, logistics and seed movement, supply and transport, sales and collection of sale proceeds and promotion and publicity.

Seed legislation is concerned with the operation of control systems over production and distribution in order to ensure that the quality of seed is maintained from the time it leaves the breder to the time it reaches the farmer (Utoh in 4th National Seed Improvement Course NSS, FAO/UNDP, 1979, p. 307).

The control systems are usually in form of ensuring adherence to enacted laws for seed trade. Two mechanisms by which the legal standards are maintained are:

1. Seed certification to ensure varietal pureness or "trueness to type"
2. Seed testing to ensure seed quality for germination and physical purity.

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[1] For detail see NSS, FAO/UNDP, 1979, p. 16.

Seed legislation has been operational for long in many countries, for instance it came into force in the Netherlands in 1941, Turkey in 1963, Egypt in 1926 and Mexico in 1961 (FAO, ROME, 1975)

At present seed legislation is not in existence in Nigeria. The FAO recommends that the seed legislation should come into force when "there is distribution of seeds by private suppliers" (FAO, 1970, p. 9).

When eventually it becomes operational in Nigeria, the seed legislation is to "control varietal identity and purity, regulate the distribution and sale of domestic and improved seed, define the essential terms, provide for the promulgation of pertinent regulations, establish the authority to certify seed and provide for the assessment of penalties when the act and/or regulations are violated" (FAO, 1970, p. 9).

An efficient seed multiplication and distribution system ensures that all the "essential components" operate efficiently. A thorough examination of the existence (or otherwise), and the performance of these "essential components" is therefore necessary in order to identify areas where there are deficiencies and constraints and to suggest necessary improvements.

Varieties of Rice, Maize, Sorghum and Millet Resulting from Seed Multiplication

The numerous varieties of rice, maize, sorghum and millet that have been evolved and/or are recommended as a result of seed multiplication and plant breeding activities in Nigeria are briefly described below:

Rice (Oryza Sativa)

The bulk of research on rice in Nigeria to date has been carried out at the National Cereals Research Institute with headquarters at Moor Plantation, Ibadan. A total of 24 rice varieties have been recommended by this institute and those currently in the programme of National Seed Multiplication include:

Faro[1] - 12 (SML 140/10)

Faro - 13 (IR - 8)

Faro - 14

Faro - 15 (FRRS - 162)

Faro - 18 (Tjina)

Faro - 19 (IR - 20)

Faro - 20 (BPI - 76)

Faro - 21

Faro - 24 (De Ganlle)

Faro - II (O.s. - 6)

Faro - 25 (P/ROX x 56/36)

The major general characteristics that are peculiar to these varieties include high yielding potential, high resistance to diseases and lodging, early maturing, vigorous seedling, high tillering capacity, high milling

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[1] "FARO" stands for Federal Agricultural Research Oryza. Oryza refers to the genus to which rice belongs.

recovery, good eating quality and hard grains which command high market price (NSS, FAO/UNDP, 1978, p. 54 - 59). For individual varietal distinguishing characteristics, see appendix 1.

Maize (Zea Mays)

Maize, which is the third most cultivated cereal crop in Nigeria now exists in more than 30 improved variety forms (OBILANA, 1978). However only 18 of these varieties are considered most superior as at now and are available for production (Obilana, 1978, p. 2). Those varieties that are currently in the national seed multiplication program are:

FARZ[1] - (NSI)

FARZ - 7 (Western Yellow)

NCA

NCB

NCC (FARZ 17)

Samaru 1. 2. 3. (FARZ - 22)

FARZ (NCB Rb 02U)

FARZ (096 EP6)

FARZ - 26 (TZA x TZB)

FARZ - 27 (TZPB)

FARZ - 34 (TZB)

[1]"FARZ" stands for Federal Agricultural Research Zea.

The important general traits that characterise these varieties (Appendix II) include high grain yield, early maturity, good standability, disease and insect/pest resistance and high protein grain content (Obilana, 1979, NSS & FAO/UNDP, 1979, Pp. 327-329).

Guineacorn (Sorghum)

Considerable work has been done by plant breeders in evolving improved varieties of sorghum. Obilana (1979) reports that some 14 'pure lines' of sorghum varieties have been developed and released for particular ecological zones in Nigeria. These varieties are:

H. P. - 3

H. P. - 8

B. E. S.

Kano Bulk

R. Z. I.

L - 187

L - 1499

L - 181

SK - 5212

C - 7 - 4

FDI

Y. G. 5760 (K.S.W. 2)

K. B. L. (K.S.V.S.)

For the details of distinguishing characteristics and ecological adaptation of these varieties, see appendix III.

Millet (Pennisetum Typhoides)

Among the cereals covered in this study, millet has the least number of improved varieties that are currently in existence in Nigeria. There are 3 types of millet grown in Nigeria. These are "gero millet" which occupies 90% of the area grown to millet, 'maiwa millet' and "dauro millet" (NSS and FAO/UNDP, 1978).

Only 4 varieties of 'gero millet' are currently being distributed under the national seed policy. These varieties are:

EX - Bornu

EX - Benue

Nigerian Composite

World Composite

Summary

The major focus of this introductory chapter has been a brief history of seed multiplication and distribution in Nigeria, the highlighting of the importance of improved seeds in agricultural production and the statement of the problem and objectives of the study. The final section of the chapter dealt with a review of literature on seed multiplication and distribution. In the next chapter, attention is focused on the methodology used in the collection of data to fulfil the objectives of the study.

CHAPTER TWO

METHODOLOGY IN DATA COLLECTION

This chapter is divided into 3 main sections. The crops that are covered in the study are discussed in the first section. The second section deals with a discussion on areas of study. Finally, sample selection and data collection are dealt with in section three of the chapter.

The Crops Covered in the Study

The crops selected for this study are maize, guineacorn (sorghum), millet and rice. Several criteria were taken into consideration in the selection of these crops. The first criterion is that these 4 crops are the most important cereals in the food basket of the people living in the savannah zone which includes the areas covered in this study (Appendix IV). As shown in appendix IV the per caput weekly consumption for each of the 4 crops selected for this study is higher than that of other cereals.

The apparant popularity of these cereal crops in the study area, coupled with increasing population might lead to increasing demand for these crops in the foreseable future. The projected output targets for these crops for the study area are presented in Table 3. These output targets are not only expected to cope with food demand by Nigerian populace, but also to leave enough margins to cater for export, animal

feed, seeds, manufactures or processing and storage and harvesting wastes (Olayide et. al. 1972).

Table 3. Projected Output Targets (In Million Long Tons) For Some Crops In the Study Area.

CROP	YEAR	KADUNA	KANO	BENUE/PLATEAU
Maize	1980	0.068	0.035	0.316
	1981	0.074	0.038	0.341
	1982	0.080	0.041	0.368
	1983	0.086	0.044	0.397
	1984	0.093	0.048	0.429
	1985	0.101	0.052	0.463
Guineacorn	1980	1.091	1.308	1.327
	1981	1.178	1.413	1.433
	1982	1.273	1.526	1.548
	1983	1.375	1.648	1.672
	1984	1.485	1.780	0.806
	1985	1.604	1.922	0.950
Millet	1980	0.924	1.131	0.518
	1981	0.998	1.222	0.559
	1982	1.078	1.320	0.604
	1983	1.164	1.426	0.652
	1984	1.257	1.540	0.704
	1985	1.358	1.663	0.760
	1980	0.015	0.007	0.174
	1981	0.017	0.008	0.200
	1982	0.019	0.009	0.230
	1983	0.021	0.010	0.265
	1984	0.024	0.011	0.305
	1985	0.027	0.013	0.351

Source: Olayide et. al. 1972: A Quantitative Analysis of Food Requirements, Supplies and Demands In Nigeria, 1960-1985, Pp. 95-104.

One way to ensure that the supply of these crops does not fall short of such possible increases in demand is to guarantee timely and adequate supply and use of improved seeds of these crops by farmers in the study area. An understanding of the present situation of improved seeds multiplication and supply programme for these crops is considered a logical approach.

Another reason for selecting maize, guineacorn, rice and millet for this study lies in the fact that each of these crops currently exists in several varieties. For instance there are 11 maize varieties, 11 rice varieties, 13 sorghum varieties and 4 millet varieties that are currently under the national seed multiplication and distribution programme (NSS and FAO/UNDP, 1978, Pp. 54-59); Obilana, 1979, NSS and FAO/UNDP, 1979, Pp. 327-329). There is no other cereal crop as at now, that has as many varieties as each of the selected crops for this study.

This suggests that the improved seeds of these 4 crops are probably more available than that of any other creals. The determination of the extent of availability of the improved seeds of these crops in the study area is one of the major objectives of this study.

The final reason for selecting these 4 crops (maize, guineacorn, millet and rice is that they are included in the seed multiplication programmes of the states selected for the study. Kaduna and Kano States multiply and distribute the improved seeds of maize, sorghum millet and rice, among other crops; while only two of these crops (maize and rice) are included in the seed multiplication and distribution programme of Plateau State.

Areas of Study

This study concentrates mainly in the northern part of Nigeria. The research topic is listed in the socio-economic research programme of IAR (Institute for Agricultural Research) and the study areas selected are in line with the policy of the socio-economic and extension research programme of the institute which is "to focus on the small scale farmer in the savannah areas of the country and his social and economic environment" (Notes on the socio-economic and extension programme, 1979, p. 2).

To this effect information about seed multiplication and distribution system were obtained from Bauchi, Benue, Borno, Gongola, Kwara, Kaduna, Kano, Niger, Plateau and Sokoto States.

Three states were then selected for a more thorough investigation. These states are Kaduna, Kano and Plateau States. The choice of these 3 states were based on 3 reasons. In the first place, financial and time constraints could not allow the study to be conducted in more than 3 states.

The second reason was that of administrative convenience. The 3 states selected are the 3 states nearest to the Institute for Agricultural Research, Samaru, Zaria, where the researcher is based. It was therefore possible for the researcher to adequately and conveniently supervise the data collection.

The 3 states selected for intensive study are also considered suitable because of differences in the type of participants involved in their seed multiplication programmes. Preliminary investigations showed that Kano and Plateau State governments involve seed contractors in their seed multiplication programmes while Kaduna State government does not[1]. This might make it possible to investigate the effect of this difference on the level of availability of improved seeds in each of the 3 states.

There are 3 distinct groups in this study. These are the government agents involved in seed multiplication and distribution, the private individuals who act as seed production contractors to the government and the farmers who are the final users of improved seeds. The government agents interviewed were government seed farm managers. Discussions were also held with other government agents like extension workers and plant breeders. Seed production contractors are individual "progressive farmers" who produce and deliver improved seeds to the government on agreed terms. A detailed description of the activities of the government agents and the seed contractors is provided in chapter five while detailed information on the sampled farmers is given in chapter four.

Sample Selection and Data Collection

Government Seed Farms

It has already been stated that government seed farm managers are one of the groups in this study. Their selection was determined by the government

1 The 2 seed contractors based in Kaduna State are in the employment of the National Seed Service.

seed farms selected since these managers were available at the seed farms they looked after.

The distribution of government seed farms and the local government areas (LGAs) in which they were located in each state is presented in Table 4.

Table 4. Number of LGAs With Government Seed Farms In The Study Area

State	No. of Seed farms	No. of LGAs with seed farms
Kaduna	8	8
Kano	11	8
Plateau	3	3

Source: From the findings of preliminary field trips.

The plan was to interview all government seed farm managers in each of the 3 states[1] since they were considered few in number. However, not all the farm managers in each state were available for interview after persistent visits[2]. Financial constraints did not allow such visits to be continued. Thus interviews could only be carried out in 6 government seed farms each in Kaduna and Kano States and 3 government seed multiplication farms in Plateau State. The government seed farm centres on which information is available are located in the LGAs shown in Table 5.

1. Each government seed farm has a farm manager.
2. Even the questionnaires that were left for the farm managers that were not available at seed farm sites were not returned to the researcher.

Table 5. Location of Government Seed Farms On Which Information Were Obtained In 3 States.

Kaduna State	Kano State	Plateau State
Kaldia LGA	Rano LGA	Lantang LGA
Zaria LGA	Tundun Wada LGA	Barikin Ladi LGA
Birnin Gwari LGA	Gaya LGA	Jos LGA
Saminaka LGA	Birnin Kudu LGA	
Kachia LGA	Dambata LGA	
Jama'a LGA	Kazaure LGA	

Seed Production Contractors

Preliminary findings showed that Kano State government had 4 seed production contractors while Plateau State government had 12 of such contractors. Kaduna State government had no seed production contractor at the time of this study. It was planned to locate and interview all the seed production contractors in Kano and Plateau States since they were few in number. However, only 3 contractors in Kano State and 7 in Plateau State were available for interview after several attempts to get them. Table 6 below shows the distribution of sampled seed contractors in each state.

Table 6. Selected Seed Contractors and Their Locations In The Study Area.

State	No. of Contractors	LGA of Contractor
Kaduna	NIL	N.A.
Kano	2	Rano
	1	Tudun Wada
Plateau	7	Mangu

N.A. = Not Applicable.

Farmers

In order to identify the problems encountered by farmers in obtaining and using improved seeds, it was necessary to interview them. A total of 720 farmers were sampled in the 3 states with an average of 240 farmers from each state. Farmers were selected on LGA's basis. Six LGAs were selected in each state for intensive study. The 6 LGAs selected each in Kaduna and Kano States, as well as 3 of those selected in Plateau State are the LGAs with government seed farms on which information was obtained (Table 5). This was a deliberate action to make it possible to interview farm managers and farmers in a particular LGA during a single trip. The remaining 3 LGAs selected in Plateau State was on a random basis.

The method of randomization employed was to allocate numbers to the remaining 11 of the 14 LGAs in Plateau State[1]. These numbers were written on pieces of papers which were folded and put in a small container. Three of such papers were picked one after the other. The numbers on those pieces of paper were checked against the list of LGAs that were earlier compiled. The LGAs selected as a result of this exercise are those of Shendam, Nasarawa and Mangu.

Forty farmers were selected in each LGA on the basis that each of the 5 enumerators would interview an average of 4 farmers per day[2]; and that about 2 days would be spent in each LGA covered in the study.

The forty farmers selected in each LGA with a seed farm were from farmers around the location of the seed farms. These farmers were selected with the assistance of local government extension staff as well as that of the village heads. In LGAs without seed multiplication farms, the sampled farmers were from those around the local government area's headquarters and were selected with the help of the local government extension agents as well as the village heads' assistance.

It was specified (by the researcher) that the farmers to be sampled should be within a radius of 10 kilometres to the location of government

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1. Plateau State had only 14 administrative LGAs when the sample for this study was drawn.
2. This estimation was based on the experience gained while pretesting the questionnaire, that is, an enumerator could administer 4 to 5 questionnaires per day.

seed farm/local government headquarters. This was to minimize the amount of travelling to be done by enumerators. Furthermore, for a farmer to be selected, he must have resided within the 10 kilometre radius for a minimum of 10 years[1] and must be producer of at least 2 of the crops covered in this study.

Table 7 below shows the distribution of sampledfarmers according to LGAs and according to the states in which they were selected.

Table 7. Distribution of Sampled Farmers According To States And LGAs Within Each State.

KADUNA STATE		KANO STATE		PLATEAU STATE	
LGA	No. of farmers	LGA	No. of farmers	LGA	No. of farmers
Kankia	40	Rano	40	Lantang	40
Zaria	40	Tudun Wada	40	B/Ladi	40
B/Gwari	40	Gaya	40	Jos	40
Saminaka	40	B/Kudu	40	Shendam	40
Kachia	40	Dambatta	40	Mangu	40
Jema'a	40	Kazaure	40	Nasarawa	40

Types of Data Collected

The data collected for this study can be categorised into 3 groups. first is the data about the general picture of seed multiplication and

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[1] Ten years is an arbitrary figure which the researcher considers to be long enough for a given farmer to have been aware of impvoved seeds.

distribution in each of the 10 northern states of Nigeria. In this group information obtained includes the types of food crops multiplied in each state, the sources of foundation seeds of each crop, quantities of such foundation seeds obtained and quantities distributed to farmers for the past 2 seasons. Other information collected pertains to description of seed distribution procedures as well as the problems encountered in seed distribution.

The second category of data collected is about the activities of seed contract growers and government seed farms. For instance information about the various operations normally performed in the process of seed production were obtained. The sources of foundation seeds and the terms under which they are obtained were asked. The availability or otherwise of other inputs like fertilizers, herbicides, pesticides, etc., were looked into. The factors determining who to select as a seed contractor, as well as contractors' adherence (or otherwise) to the terms of contracts were similarly studied. The channels of distribution of seeds produced and the various uses of the seeds produced by this group were investigated.

The farmers who constitute the ultimate users of improved seeds are the third category of people on whom data were collected. The information obtained about this group includes whether or not they are aware of improved seeds, and whether or not they use improved seeds. Farmers' preferences between improved seeds or traditional seeds were also examined.

Availability and sources of extension advise on use of improved seeds by farmers were investigated. Data were also collected on timeliness of arrival and adequacy of improved seeds supplied to farmers. Information on farmer's household size and number of farm fields were similarly obtained.

Method of Data Collection

The modus operandi for collection of information for this study is by personal discussions as well as by structured questionnaire. The researcher held discussions with various people including officials of states ministries of agriculture, the National Seed Service and plant breeders at the Institute for Agricultural Research, Samaru, Zaria.

Questionnaires were designed to collect information from farmers, seed contract growers and from government seed multiplication farms. Before administering the questionnaires in each area, permision was obtained from the respective state's ministry of agriculture headquarters, local government headquarters and from the village head[1]. In most cases representatives of these authorities accompanied the enumerators to alley farmers' and seed contractors' fears as to the mission of the enumerators.

The questionnaires were designed in English language but were administered in Hausa by Hausa speaking enumerators who interpreted the

[1] Ejiga has already stressed the advantage of "channels of governmental authority" in establishing "good rapport" with participants in studies of this nature (Ejiga, 1977, p. 41).

questions to the farmers and recorded the answers. Efforts were made to gain the confidence of the respondents and by and large respondents supplied all the information asked.

The researcher went through the questionnaires together with the enumerators before they started field data collection. This was to ensure that the enumerators know exactly what types of information the questionnaires were designed to find out from the respondents. The researcher was also able to accompany the field staff to most of the sites of this study for close data supervision and for prompt solution to field problems encountered in the course of data collection.

Summary

The methodology of data collection has been discussed in this chapter. The next chapter, chapter three is concerned with the organizational set up of seed multiplication and distribution system in Nigeria.

CHAPTER THREE

ORGANIZATIONAL SET UP OF SEED MULTIPLICATION AND DISTRIBUTION SYSTEM IN NIGERIA

This chapter aims at a detailed description of the existing organizational set up of seed multiplication and distribution system. Such a description provides an understanding of the distribution channel of improved seeds as well as an identification of distribution inefficiencies and problems as improved seeds are moved from the breeder to the farmer.

In this regard, section one of this chapter identifies the participants involved in seed multiplication and distribution. This is closely followed by section two which analyses the roles of each set of participants. The problems encountered by the participants in executing their roles are enumerated in section three of the chapter. The chapter is then concluded by a comparison of Nigeria's seed multiplication and distribution procedure with the 'essential components' or the fundamentals of seed multiplication that have been identified in chapter one.

Participants in Seed Multiplication and Distribution System:

Four institutions have been identified to be heavily involved under the National Seed Multiplication Policy.

These institions are:

(1) The National Seed Committee

(2) The National Seed Service

(3) The State Seed Multiplication Projects

(4) The National Seed Certification Units.

While these four institutions are in one way or the other concerned with the production of improved seeds, farmers are the final users of the seeds.

Functions of Agencies Involved in Seed Multiplication And Distribution

The responsibilities and functions of each of the institutions under the national seed multiplication policy are adequately spelled out in the policy memorandium (National Seed Multiplication Policy, FDA, 1976). It will suffice to give only the highlights of these functions here.

The National Seed Committee

This committee is made up of representatives from the Federal Ministry of Agriculture, National Science and Technology Development Agency, Directors of Crop Research Institutes and State Ministries of Agriculture and Natural Resources. The sole function of the National Seed Committee is to formulate seed policies and facilitate regular interaction among all the organizations involved in seed production in the country. It has provisions for setting up sub-committees comprising of experts to advise it on issues like variety release, certification standards, pricing policy, etc. (Joshua and Singh, 1979).

National Seed Service (NSS)

The National Seed Service (NSS) performs the role of a 'liaison officer' between the crop research Institutes and the State Ministries of agriculture and natural resources. This is because the National Seed Service obtains quantities of breeder seeds of recommended varieties from the respective crop research institute and ensures the production and distribution of sufficient foundation seeds to all the state's ministries of agriculture (NSS, FAO/UNDP, 1979, p. 9).

Established in 1976, the National Seed Service is expected to produce foundation seeds directly by itself, as well as through the services of some contract growers, who operate under strict supervision of the NSS officials. The conditions guiding the appointment of seed contractors are discussed in chapter five while the names of some important NSS seed growers and the crops they grow is presented in Appendix V.

Other functions of the National Seed Service include:-

a. The organization of seed improvement training courses for the staff of the ministries of agriculture and natural resources.

b. The development of seed certification standards.

c. Helping the states ministries of agriculture in establishing their processing and storage facilities.

The State Seed Multiplication Projects

It is stipulated in the national seed policy that all states of the Federation should have seed multiplication projects (SMP). Each of these SMPs is to be concerned with the production of the respective states' needs for certified seeds by direct efforts as well as through contract seed growers. The state SMPs are also to oversee the distribution of the improved certified seeds to farmers in the state.

In accordance with the national seed policy directives, all the 10 northern states now have well established semi-autonomous seed multiplication units within the states ministries of agriculture and natural resources.

Table 8 shows food crops that are currently under the seed multiplication projects in each of the 10 northern states.

The 4 crops studied intensively in this study occur in the seed multiplication programmes of 8 out of the 10 northern states. Two states (Kwara and Benue) do not multiply the seeds of millet. This might be due to the fact that millet is not a major staple food for people in those states. All the 10 northern states are actively involved in the production of the seeds of the 3 other crops (that is rice, maize and guineacorn). The inclusion of these 4 crops (rice, maize, guineacorn and millet) in seed multiplication programmes of the states shows how popular the crops are in the diet and economy of the people of northern Nigeria.

Table 8. Food Crops Under Seed Multiplication in Each State

STATE	FOOD CROPS
Bauchi	Guineacorn, Millet, Maize, Rice, Groundnut, Cowpeas.
Benue	Rice, Maize, Guineacorn, Soyabeans, Groundnut, Vegetables.
Borno	G/Corn, Millet, Maize, Rice, Cowpea, G/Nuts, Vegetables.
Gongola	Rice, Maize, G/Corn, Millet, G/Nut, Wheat, Cowpeas.
Kaduna	G/Corn, Millet, G/Nut, Maize, Rice, Soyabeans, Cowpeas.
Kano	G/Corn, G/Nut, Millet, Maize, Wheat, Rice, Cowpeas, Sesame
Kwara	G/Corn, G/Nut, Rice, Maize, Cassava.
Plateau	Maize, Rice, Irish Potato.
Niger	Guineacorn, Rice, Maize, Millet, Cowpeas.
Sokoto	Guineacorn, Maize, Millet Cowpea, Rice.

Source: Field Study, 1979/80.

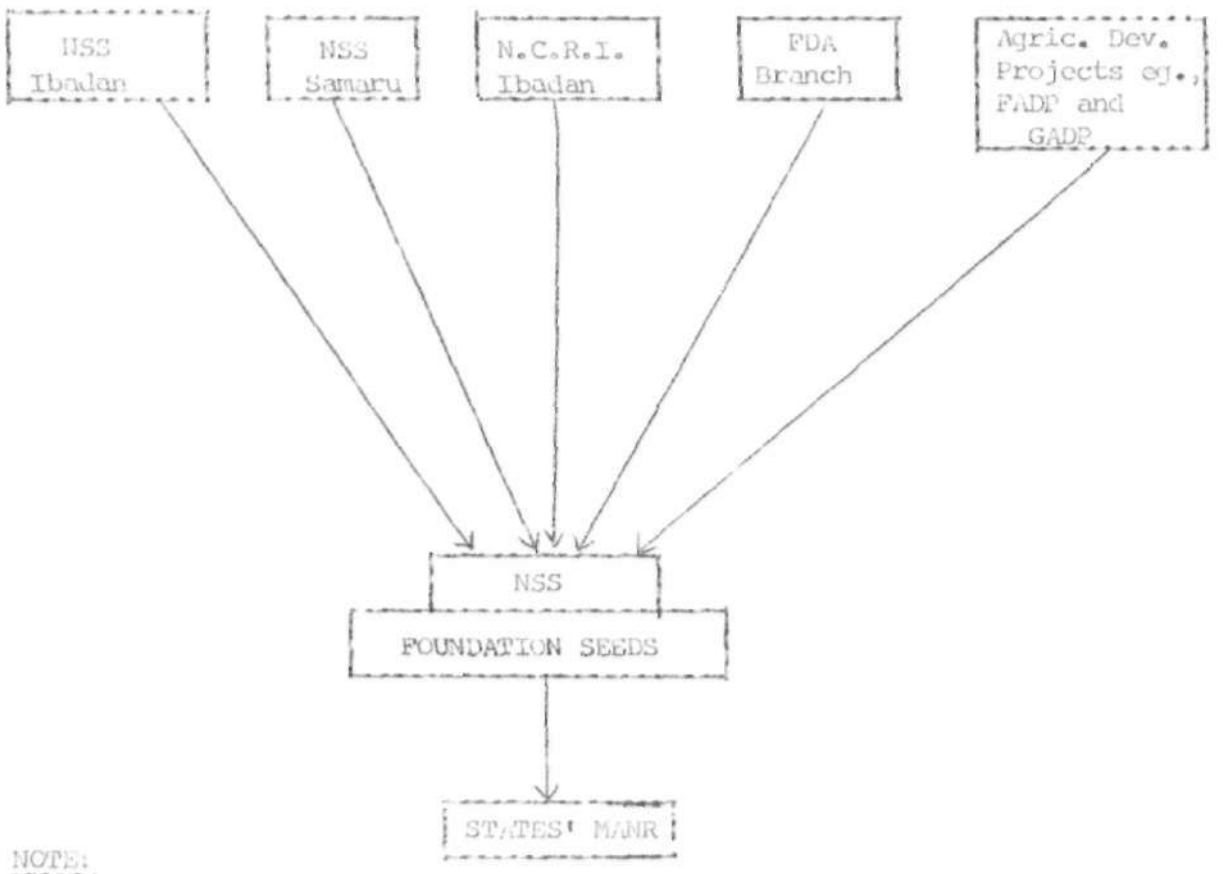
The states obtain the foundation seeds of improved crop varieties from various sources. Important sources of foundation seed to the states include the National Seed Service (both at Ibadan and Samaru), various offices of the Federal Department of Agriculture and from some Agricultural Development Corporations (See Fig. 1).

This study reveals that the National Seed Service is the most important source of foundation seeds to the states when one considers the quantity of seed supplied to the states from various sources. In

1978/79 planting season, the NSS supplied 68.4 percent, over 80 percent and 74.3 percent respectively of rice, maize and guineacorn foundation seeds supplied to all the 10 states.

Table 9 shows the planned supply schedule of seeds of maize and rice and the expected sources of supply during the 1979/80 growing season.

Fig. 1. Schematic Presentation of Sources of Foundation Seeds to the States.



NOTE:

NSS = National Seeds Service
FDA = Federal Department of Agriculture
N.C.R.I. = National Cereal Research Institute
FADP = Funtua Agricultural Development Project
GADP = Gusau Agricultural Development Project.

Table 9. Quantities and Sources of Supply of Maize and Rice Foundation Seeds To The 10 Northern States 1979/80

State	Maize (Tonnes)	Rice (Tonnes)	Sources
Sokoto	28	14	N.S.S. Samaru (Rice) F.A.O.P. (maize)
Kano	27	20	N.S.S. Samaru
Kaduna	20	20	N.S.S. Samaru
Borno	25	20	N.S.S. Samaru
Gongola	32	7	N.S.S. Ibadan/ Samaru
Plateau	28	28	F.D.A. Jos (Rice) N.S.S. Samaru (Maize)
Benue	28	28	N.S.S. Samaru/ Ibadan
Bauchi	25	38	Gombe A.D.P., (Maize) N.S.S. Samaru (Rice)
Kwara	20	28	N.S.S. Ibadan
Niger	30	32	N.S.S. Ibadan
Total	263	225	
% supplied by NSS	69.20	87.56	

Source: National Seed Service, Samaru.

The table shows that National Seed Service is dominant among the various sources of supply of improved seeds to the states. For instance, out of 263 tonnes of maize and 225 tonnes of rice planned to be supplied to the ten (10) northern states in the 1979/80 growing season, 182 tonnes or 69.20 percent of maize and 197 tonnes of rice or 87.56 percent will be supplied by the National Seed Seed Service. The supply of guineacorn and millet seeds are likely to follow a similar pattern.

The National Seed Certification Unit

The setting up of an agency to certify seed[1] as stipulated in the National Seed Memorandum is yet to materialize. The function of this Certification Agency is currently being performed rudimentarily by the National Seed Service. The NSS does this through a small unit which was set up to undertake field inspections to ensure conformity with the laid down standards pertaining to improved seed production.

When in existence, the Seed Certification Agency is expected to perform many functions[2] important among which are:

a. Establishment of minimum seed certification standards in consultation with plant breeders, pathologists and seed technologists. Also there is to be periodical revision of these standards in the light of actual experience.

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[1] Seed certification is the system designed to assure desired seed quality through third party checking and control in seed multiplication.

[2] For details see technology of Seed Production and Certification in Nigeria, FAO, UNDP/NSS, 1979, Pp. 43-44.

b. To develop well-defined rules and procedures and make them available for information of general public.

c. To undertake recruitment and training of technical staff of integrity, calibre, competence and dedication and position them at suitable locations within seed production areas.

d. To develop tags, seals, sealing pliers and technical leaflets to accompany seed bags to ensure proper use of improved seeds.

e. Establishing procedures for lot numbering, identification revelidation, seed treatment and seed packing.

f. Verification of seed source and field inspection to varify conformity to field standards.

g. Undertaking registration of seed growers each season.

h. Evaluating processing plants for suitability and approving them for certification on an annual basis.

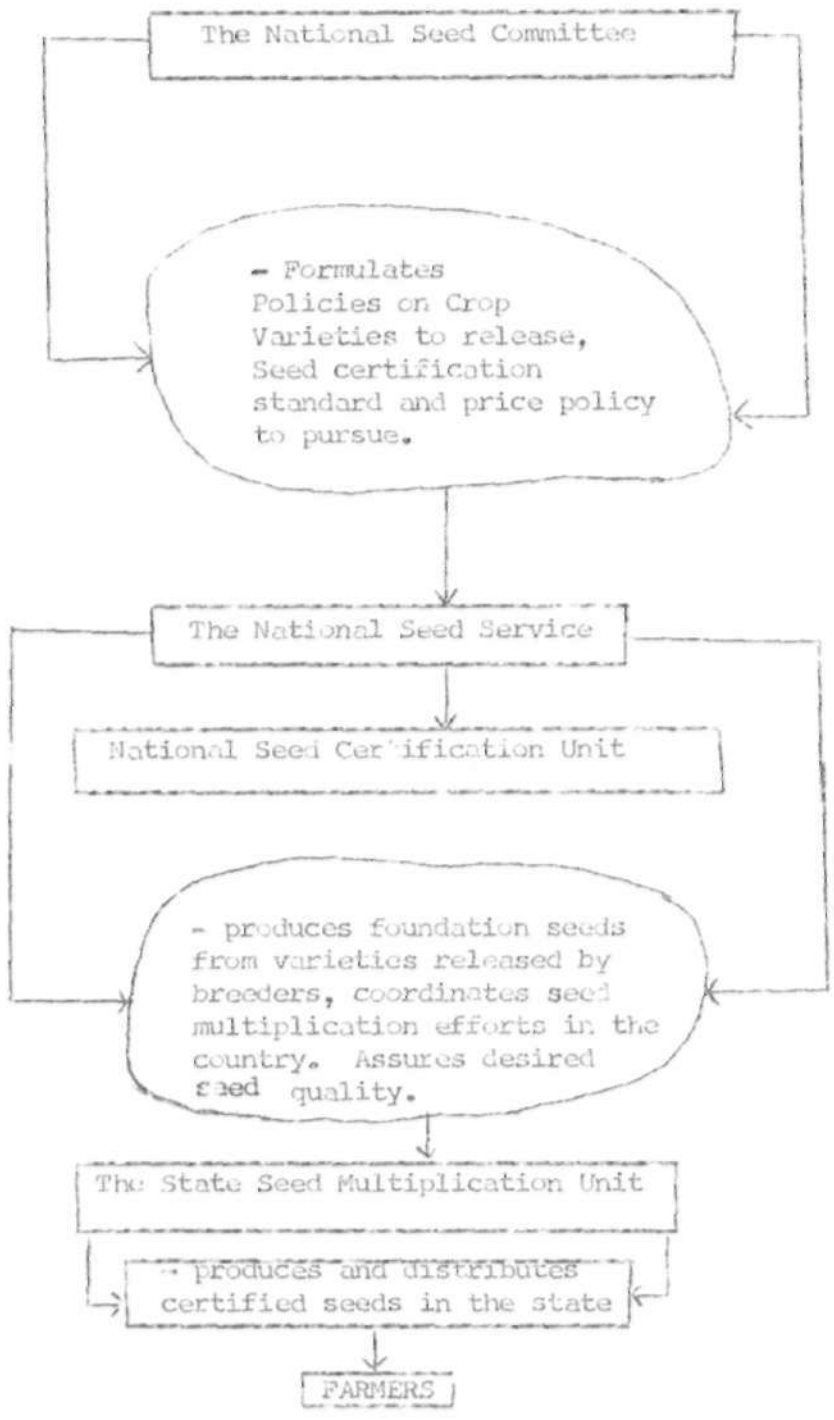
i. To compile and publish annual statistics of seeds certified.

All these functions are very vital to evolving a viable seed multiplication scheme. The National Seed Service will not be able to effectively perform those functions and at the same time carry out its own assignment. There is therefore an urgent need for the Federal government to expedite action in setting up an autonomous Seed Certification Agency.

Linkages Between the Various Institutions of the National Seed Multiplication Scheme

The connections between the various institutions/agencies involved in the seed multiplication scheme is sketched out in Fig. 2.

Fig. 2: Linkages Between The Various Institutions of The National Seed Multiplication Scheme



As shown in Fig. 2 the National Seed Committee, assisted by expert advice formulates policies as regards which crop varieties to release and the type of certification standards to follow. Crop breeders in research institutes are then encouraged to evolve crop varieties that will possess characteristics prescribed by the National Seed Committee.

The improved seeds released by the breeders are handed over to the National Seed Service who produces first stage progeny or foundation seeds from the breeder seeds. Foundation seeds produced by the National Seed Service by direct efforts as well as through seed contract growers are certified (presently by NSS) to ensure quality control.

Certified seeds are then released to states seed multiplication units for further production and subsequent distribution to farmers within the states.

Problems Encountered in the Multiplication and Distribution of Improved Seeds

Improved seeds' supply to Nigerian farmers is grossly inadequate because of a number of constraints militating against the seed multiplication and distribution projects of many states. Four such major constraints have been identified in this study. These are financial constraints, transportation bottlenecks, lack of executive capacity and inadequate seed processing and seed storage facilities. Each of these problem areas is briefly discussed below.

Financial constraints

Financial constraints appears to be the most serious problem faced by all states in the course of seed multiplication and distribution. The dimension of this problem ranges from complete unavailability to inadequate and untimely release of funds.

Table 10 below shows the nature of financial problems faced by states in their seed multiplication and distribution exercises during the 1979/80 seed production season.

Table 10. Nature of Financial Problems Faced In The Seed Multiplication Projects In The 10 Northern States 1979/80

Nature of Financial problem	No. of States reporting this problem (a)	(a) as percent of 10 States
Inadequacy of funds	8	80
Untimely release of funds	6	60
No money	1	10

Source: Field Study, 1979/80.

Even though large sums of money have been voted for seed multiplication in the study areas (see Appendix VI) quite a high percentage of the states, infact 80 percent reported inadequacy of funds as a major constraint to the seed multiplication programme (Table 10). Inadequacy

and untimely release of funds either caused delays in operations like land clearing, planting, weeding, seed harvesting and processing or led to cut down in the number of hectares planned to be put into seed production by many states. The consequence of this is of course a reduction in seed output estimated for the next growing season.

One state, Borno State, appears to be most hit by financial problem during 1979/80 seed production season. This is because no seed multiplication and distribution exercise could be carried out in the state during this period as no money was made available (Table 10). This implies that the entire state had to depend on external sources for improved seeds supply for production in the 1980/81 growing season. The problem of seed inadequacy becomes agravated as most of these external sources are under-supplied with improved seeds. The implication of the inability of a state to produce and distribute improved seeds to its farmers is that such farmers will continue to use their traditional seeds especially when other sources of improved seeds are denied them.

Lack of funds has also hampered seed production activities all over the states by making it difficult for most states to purchase seed processing facilities. Infact 80 percent of the states stated that they would have performed better if they had money to purchase processing facilities. Manual processing of improved seeds constitutes a slow process and an energy exerting exercise. Many states have persistently suffered these problems due to lack of funds to purchase processing facilities.

Transportation Bottlenecks

Adequate and efficient transportation has been recognised as a cornerstone of any modern marketing system (Kohls, 1961, p. 16). A seed multiplication and distribution programme that aims at success can not be an exception to this rule. A fleet of well maintained vehicles are required for various haulages that need to be done during the seed planting and subsequent harvesting operations. Efficient transport system is also important to ensure timely delivery of essential inputs (like fertilizers, insecticides, herbicides. etc.) to seed farms. Readily available and dependable transport is very essential for regular seed farm inspections.

Ready transport availability constitutes a serious constraint to the seed multiplication and distribution projects of all the 10 northern states. This stems from the fact that apart from one or two vehicles attached to a seed farm centre, all other government vehicles are centrally controlled at the headquarters of the state's ministry of agriculture where there is usually a heavy demand for vehicles. Thus when the limited number of vehicles at the farm centres can not cope with the various activities in connection with the seed farm[1], it is usually very difficult to secure additional vehicles from the "central vehicle pool" because of the limited number of these vehicles.

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[1] Examples of these activities include haulages during seed harvesting, processing storage and distribution as well as fertilizer transportation to the seed farms.

The states encountered many problems arising from inadequate vehicle supply. These problems are summarised in Table 11 as reported by the states.

Table 11. Nature of Problems Encountered On Seed Multiplication And Distribution As A Result of Limited Vehicle Supply

Problem Description	No. of States (2)	(2) as percent of 10 States
Delay in seed distribution to farmers	6	60
Delay in fertilizer and other inputs distribution to farmers	4	40
Delayed and Irregular field inspections and supervisions	8	80
Inability of extension workers to give constant advice to farmers	4	40

Source: Field Survey, 1979/80.

As shown in table 11, eight out of 10 states reported that scheduled inspection or supervision trips to improved seed farms are often delayed or cancelled because of transport unavailability. Seed farm inspections are very vital as it is the only way to check whether or not seed production activities are carried out according to technical instructions.

Six out of 10 states reported that seeds could not be supplied to farmers at the required time due to limited number of vehicles. Even when seeds eventually arrived at farmers' gates[1], 4 out of 10 states could not adequately educate their farmers on use of improved seeds as extension staff lacked enough vehicles to make constant visits to farmers to advise them on seeds multiplication activities.

Lack of Executive Capacity

Like any other agricultural development project, the seed multiplication and distribution project requires the services of well trained personnel to manage its various facets, especially if it is to achieve the aim for which it was set up, that is, to boost crops production. Skilled man power is required to provide expert technical advice that must accompany the production of certified seeds from the foundation seeds that come from the National Seed Service.

This study reveals that the seed multiplication programme in its present state suffers from inadequate qualified personnel especially at state levels. All the 10 states complained of acute shortage of well trained staff. The few that were available were often overladen with other ministry's duties such that they attended to the seed multiplication activities only on part time basis. This made it

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[1] Private transporters are usually employed to help in transporting seeds to LGAs headquarters at the peak of seed distribution.

difficult for adequate supervision of the unskilled and semi-skilled labour that were involved in the execution of most of the seed multiplication activities.

The National Seed Service is heavily involved in the training of personnel for the implementation of the state and Federal seed programmes. Five National Seed Improvement Training courses have been organised so far by the NSS and a total of about (161) participants have benefited from such courses. The participants were drawn from state ministries of agriculture and organisations like the World Bank Agricultural Development Projects[1]. The number of beneficiaries can be greatly increased if such improvement courses can be increased to twice per year instead of the current yearly courses.

Seed Processing and Storage Facilities Bottleneck

Field observations and discussions with officials of state ministries of agriculture reveal that one of the major constraints to the seed multiplication efforts is pronounced shortage of processing and storage facilities in all the states. The processing activity involves the removal of undesirable materials such as, weedseeds, broken seeds, seeds of other crops etc.

Machines that have been designed to aid in separation of good seeds from 'Foreign materials' (Often on basis of size, length, shape, weight surface texture, colour etc.) are markedly absent in most of the states.

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[1] Examples of these include Gombe and Funtua Agricultural Development Projects.

Heavy reliance therefore has been placed on manual labour in the processing of improved seeds. Although this manual processing method does not require heavy capital investment (Barau, 1979) it is comparatively slower and energy sapping.

The extent to which seeds can preserve their viability, vigour and germination percentage is the extent to which they are well stored. The total outlay on seeds in terms of capital, time, manpower and material can be lost if seeds are poorly stored (NSS, FAO/UNDP, 1979). Although storage facilities are generally inadequate the few ones available in most states appear to be well maintained. However, it is necessary to emphasise that rodents and pests must be peristently kept out of reach of improved seeds.

Defects in Nigeria's Existing Seed Multiplication and Distribution System

This section highlights some defects in the present system for seed multiplication and distribution in Nigeria. The method employed is to assess Nigeria's seed multiplication programme in the light of the "essential components" of a typical seed multiplication and distribution system that were discussed in chapter one.

Seed Multiplication

An assessment of Nigeria's seed multiplication programme in terms of the agronomic and other cultural practices expected to be carried

out in an "ideal" seed multiplication system is beyond the scope of this thesis. The main focus is an assessment of the type of organizational arrangement for seed multiplication.

As pointed out in chapter one, there are 3 stages of seed multiplication in Nigeria, viz: breeder seeds, foundation seeds and certified (or registered seeds). The government of Nigeria, like in many other countries, exercises exclusive right over the production of breeder seeds. These breeder seeds are produced by some crop research institutes (e.g. IAR, Samaru; Cereal Crop Research Institute, Ibadan) and by faculties of Agriculture in some universities (e.g. University of Ibadan, University of Ife, Ahmadu Bello University, Zaria.)

The control of the production of foundation seeds is solely by the NSS. The NSS produces foundation seeds by direct efforts as well as by engaging the services of a few seed contractors (see Appendix V).

In countries with advanced seed industries like the United States of America and Netherlands, foundation seeds are produced by many private enterprises and seed companies on competitive basis (FAO, Rome 1975; OECC, Paris, 1954; USDA, 1961). Seed multiplication in Nigeria as at now is not very competitive, and this is probably contributing to inadequate supply of improved seeds.

Seed Processing and Storage

The importance of seed processing and storage facilities in the seed industry has already been stressed in chapter one. There is a general shortage of seed processing and storage facilities in Nigeria as at now.

The National Seed Service presently has only 2 modern seed drying, processing and storage plants, one at Ibadan and the other located at Samaru, Zaria. At full capacity these plants can each process about 5 tonnes per hour of seeds of maize, millet and guineacorn (5th National Seed Improvement Course, NSS, FAO/UNDP, 1970).

All the 10 northern states reported that they were ill-equiped as regards seed processing. While inadequate storage facilities constitute a general problem , they appear to be in accute shortages in Kwara, Gongola, Niger, Kaduna, Borno and Benue States.

Seed Certification

The function of seed certification is currently been performed by an arm of the National Seed Service. This constitutes a drain on NSS' resources (in terms of personnel) because already the NSS is under-staffed even for its own functions. The result of this is that inadequte attention is paid to certification standards as spelled out in Chapter one.

Seed Testing

Lack of adequate seed testing laboratories and qualified staff prevent seed testing from being carried out according to the rules laid down by the International Seed Testing Association (see Chapter one).

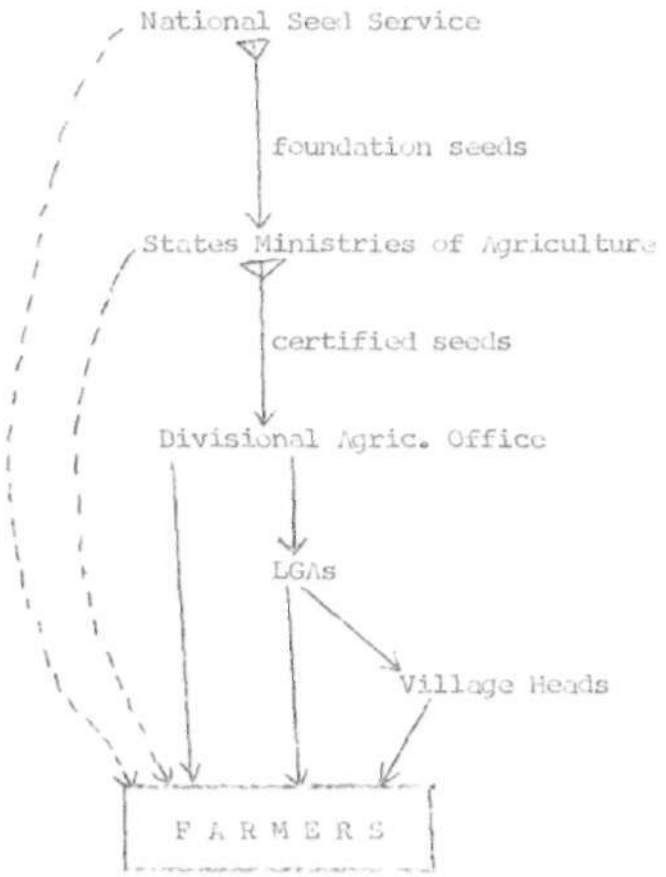
No seed testing laboratory exists in any of the 10 northern states as at the time of this study. The National Seed Service has 2 seed testing laboratories one at Ibadan and the other at Samaru, Zaria. Facilities in these laboratories include the universal moisture tester, the purity board, etc. These facilities allow the testing of seeds for moisture content, germination percentage, seed purity and seed vigour.

Seed Marketing and Seed Legislation

There is cuspicuous absence of private entrepreneurs and seed companies in the marketing of improved seeds in Nigeria as at now. The distribution of improved seeds at highly subsidized rates is done solely by the Federal and State governments.

The present distribution channels are depicted in Fig. 3 below:

Fig. 3. The Present Distribution Channels for Improved Seeds



As shown in the diagram, government agents play the role of wholesaling and retailing improved seeds. The National Seed Service sells foundation seeds to states ministries of agriculture who further retail certified seeds to farmers through LGA and village heads. It was noted however that some individual farmers go directly to NSS, states ministries' headquarters and divisional agricultural office to obtain their improved seeds.

The major defect that have been noticed in the present marketing system is that improved seeds often arrive late to farmers' gates. This is due mainly to the various channels seeds have to go through before getting to farmers. Even farmers who go directly to NSS or agricultural offices often face delay in receiving improved seeds because of prolonged bureaucracy.

Another defect is with respect to sale of improved seeds to farmers through village heads. There were complaints by farmers that some village heads "discriminate" on who gets improved seeds.

The third defect in the existing seed marketing procedure is that there is no seed legislation in existence. This is due mainly to the fact that the improved seeds marketing is solely in the hands of the government.

Summary

The present Nigeria's seed industry involves the activities of several government agencies. Important among these agencies are the National Seed Committee, the National Seed Service and the States Seed Multiplication Projects.

The National Seed Committee formulates seed policies (e.g. the type of crop varieties to release, price policy to pursue etc.). The National Seed Service acts as a 'Liaison Officer' between the crop research institutes and states ministries of Agriculture. It's main

functions are to make foundation seeds available to the states and to assist the latter in setting up viable seed multiplication projects. The NSS is also saddled with seed certification functions as there is no autonomous agency (as at now) to perform this function.

Improved seeds get to farmers through various channels. These may include the National Seed Service, various offices of the ministries of agriculture, the local government headquarters and through village heads. None of these channels is fault proof but the majority of farmers expressed preference for supply of improved seeds by MANR through L.G.A.

The major defects in the existing distribution procedures include late arrival of improved seeds to farmers, village politics resulting in some farmers not getting seeds while some others may have excess and absence of seed legislation.

Numerous problems militate against the existing seed multiplication and distribution system in Niger a. These problems include acute shortage of funds and inadequate processing and storage facilities in all the 10 northern states. Transport problems(in terms of inadquate number of vehicles) and manpower shortages also constitute limitations to efficient performance of the seed multiplication and distribution projects of most states.

CHAPTER FOUR

FACTORS INFLUENCING ADOPTION OF IMPROVED SEEDS

The bulk of food production in Nigeria today has been from the peasant (small scale) farmers (Olayide, 1979). If this assertion is valid, then any agricultural programme designed to boost food production in the country must logically place very significant emphasis on this category of farmers. The high yielding improved crop varieties will not perform the 'miracle' of increasing food supplies unless their improved seeds are made available and are widely adopted by Nigerian farmers.

This chapter examines the influence of some factors on the adoption of improved seeds in the study area. The factors that are examined include:

a) Level of information available on the practice of using improved seeds.

b) The availability of improved seeds.

c) The availability of complementary inputs.

d) Farmers' preference for improved seeds compared to traditional seeds.

e) Government price policy for improved seeds.

In Nigeria similar factors have been investigated with respect to the adoption of other farm inputs innovation. A case in point is fertilizer adoption. Falusi and Adubifa (1975) reported that factors

that constrained the level of fertilizer use included inadequate information, unavailability of complementary inputs, unfavourable price relationships etc. (p. 9). No such comprehensive investigation has been carried out on improved seeds, especially in the study area. It is therefore useful to examine how these specified factors have influenced (or can influence) the adoption of improved seeds in the study area. Furthermore, it is anticipated that such examination could lead to the fulfilment of objectives 3 and 4 of this thesis (Chapter 1).

The first part of this chapter examines how the factors enumerated above have influenced adoption of improved seeds in the study area. This is done mainly by drawing inferences from frequency distributions and percentages of adopters and non-adopters of (improved seeds) as well as analysing reasons given by farmers for their decisions.

In the second part of the chapter correlation analysis is carried out to examine the extent to which some socio-economic variables influenced the adoption of the improved seeds of the crops studied. Some of the socio-economic variables considered include some of the variables discussed the first part of the chapter.

Level of Information Available On Improved Seeds

The provision of adequate information can be considered as one of the most crucial factors in getting farmers to innovate. Farmers are not likely to change from their traditional method of production, using traditional resources, unless they are aware of alternative

production techniques that promise higher yields and/or higher returns. The implication of this is that it becomes imperative that farmers become exposed to an innovation so that they can decide whether or not to adopt it.

Improved seeds constitute an innovation to farmers and in order for farmers to adopt it, they need to be aware of its existence. An attempt was made in this study to determine and compare the extent of the information available on improved seeds to farmers in Kaduna, Kano and Plateau States. The results obtained are presented in Table 12.

The table shows that 590 out of a total of 689 farmers (or about 86 percent) of the farmers interviewed in the 3 states had a prior knowledge of improved seeds while 99 out of 689 (14 percent) farmers sampled in the 3 states said they had not heard of improved seeds before. There was no response from 31 farmers who refused to answer any questions.

Table 12 shows that Plateau State has the highest percentage (98 percent) of sampled farmers that have heard of improved seeds. This is followed by Kano State with 87 percent. Kaduna State has the highest percentage (26 percent) of farmers that are ignorant of improved seeds.

Farmers in Plateau and Kano States appear to have more information about improved seeds than farmers in Kaduna State. Since information

Table 12. Farmers' Prior Knowledge About Improved Seeds

State	Have you heard of improved seed before?		
	Answer	No. of farmers (1)	(1) as percent of total respondents
Kaduna	Yes	175	74
	No	63	26
	No Answer	2	-
	Total	240	100
Kano	Yes	209	87
	No	31	13
	No Answer	0	0
	Total	240	100
Plateau	Yes	206	98
	No	5	2
	No Answer	29	-
	Total	240	100
All the 3 States	Yes	590	86
	No	99	14
	No Answer	31	-
	Total	720	100

Source: Field Research questionnaire on Farmers.

about improved seeds get to farmers only through extension workers as at now, it may be inferred that extension workers in Kaduna State are not disseminating information concerning improved seeds as much as those in Plateau and Kano States.

The percentage of farmers that are aware of improved seeds in the 3 states (86 percent) can be considered to be quite high. This suggests that farmers in the study area are fairly adequately aware of improved seeds. Thus the failure of farmers to adopt the innovation, on the average, cannot be ascribed to total ignorance.

Although quite a large proportion of the sampled farmers 86 percent) were aware of improved seeds in general, not all of them have actually adopted the practice. This is not surprising, because as Lionberger puts it, all people do not adopt an innovation at the same time. "There are always some persons who adopt first, some who adopt later, and some who adopt last and for some practices and ideas, some who never adopt" (Lionberger 1960, p. 4).

It has been pointed out that farmers will adopt an innovation if it is technically feasible, economically worthwhile and socially acceptable (Famoriyo 1979, Famoriyo 1980, Abalu and D'Silva 1979). What appears to be the most important reason why farmers in the study area adopted improved seeds is the economic profitability arising from increased yield obtainable from the practice. This is inferred from

the fact that 83 percent of those who preferred improved seeds to traditional seeds cited the potential of improved seeds to yield more as their reason for this preference (see Table 22).

Table 13 shows farmers that have adopted the use of improved seeds as percentage of all farmers who had received information about improved seeds in each of the 3 states as well as in the 3 states put together.

Table 13. Farmers That Have Adopted Improved Seeds

Farmer's State	Description	No. of farmers	Percentages
Kaduna	Heard of Improved seeds before	175	-
	Used Improved seeds before	88	50.29
	Never used Improved seeds	87	49.71
Kano	Heard of Improved seeds before	209	-
	Used Improved seeds before	136	65.07
	Never used Improved seeds	73	34.93
Plateau	Heard of Improved seeds before	206	-
	Used Improved seeds before	117	56.80
	Never used Improved seeds	89	43.20
3 States	Heard of Improved seeds before	590	-
	Used Improved seeds before	341	57.80
	Never used Improved seeds	249	42.20

Source: Field Survey, 1979/80.

The Table shows that about 58 percent of farmers that have heard about improved seeds in the 3 states have adopted the practice. The adoption level is not however uniform in the 3 states. Kano State has the highest

percentage (65%) of farmers that have heard about improved seeds and have adopted the practice. These percentages are 57 percent and 50 percent for Plateau and Kaduna states respectively.

It can be observed that Kaduna State has the highest percentage (50 percent) of farmers who have never used improved seeds amongst the 3 states. It is of interest to note also that it is in the same State (Kaduna State) that we have recorded the highest number of sampled farmers that were ignorant of improved seeds. From Tables 12 and 13 it can be observed that the state that had the highest number of farmers who were aware of improved seeds (Kano State) also had the highest number of farmers that had adopted improved seeds. Thus the level of adoption of improved seeds at State level tends to be related to the level of farmer's awareness of the practice. In fact empirical evidence from an earlier study in Northern Nigeria supports this finding. In studying factors that influence adoption of recommended farm practice amongst selected farmers in Giwa District of Kaduna State (Northern Nigeria), Voh (1979, p. 20) reported positive correlation between adoption and amount of information available from various channels.

DISTRIBUTION OF SAMPLED FARMERS ACCORDING TO TIME OF AWARENESS AND ADOPTION OF IMPROVED SEEDS

In order to gain an understanding about how information about the improved seeds (of the crops discussed in this thesis) has spread

amongst farmers over time, farmers were grouped according to the time of their first awareness of improved seeds. The results obtained are presented in Table 14.

Table 14. Cumulative Distribution of Farmers According To Time Of First Awareness of Improved Seeds of Various Crops

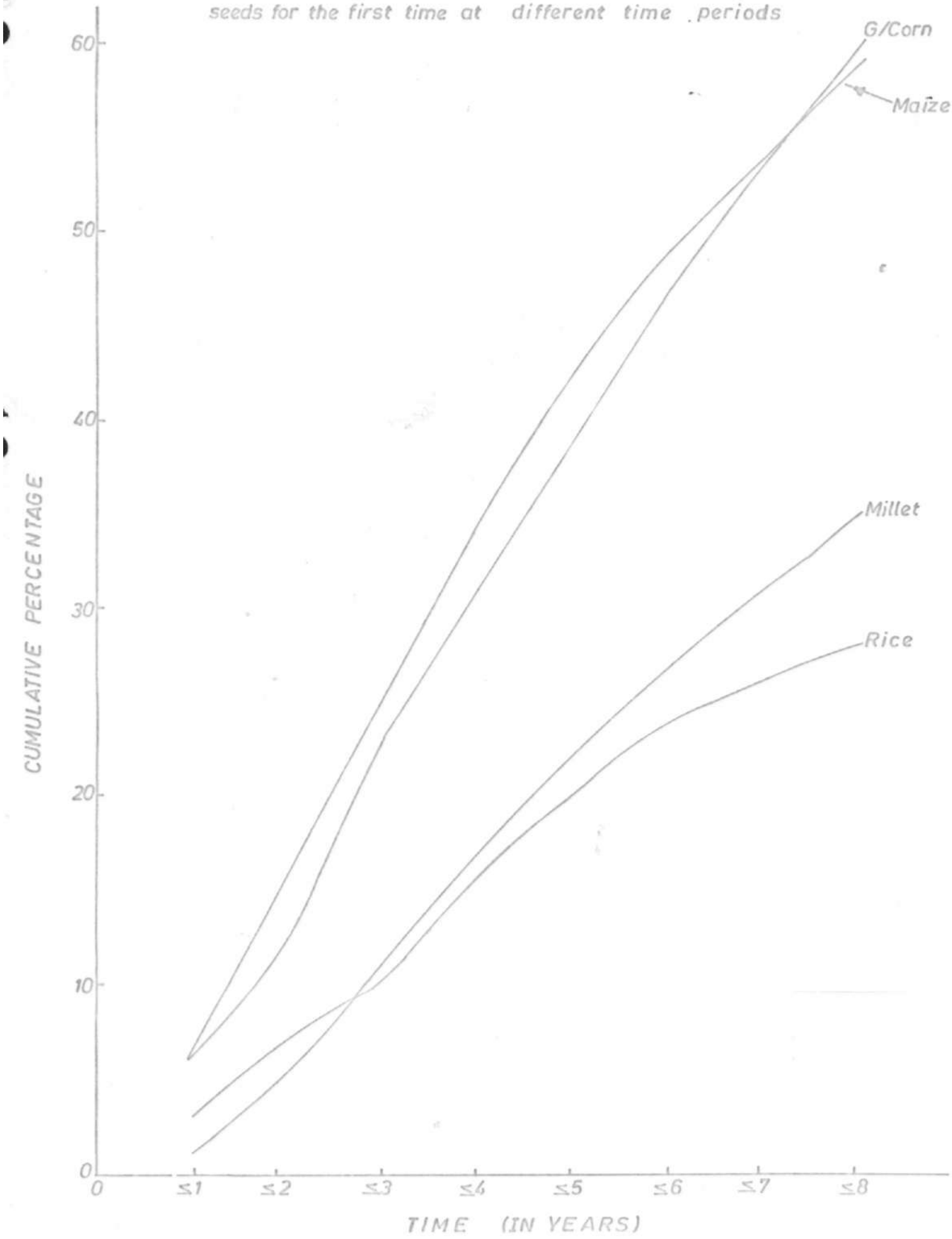
Time In (Years)	Maize		G/Corn		Rice		Millet	
	No. of farmers	Percent of Resp.*	No. of farmers	Percent of Resp.	No. of farmers	Percent of Resp.	No. of farmers	Percent of Resp.
≤ 1	41	6	39	6	21	3	10	1
≤ 2	109	16	83	12	46	7	35	5
≤ 3	174	25	157	23	68	10	78	11
≤ 4	237	34	216	31	108	16	116	17
≤ 5	295	43	271	39	141	20	151	22
≤ 6	341	49	322	47	162	24	184	27
≤ 7	382	54	370	54	178	26	217	31
≤ 8	405	59	411	60	190	20	238	35

* Resp. = Total Respondents = 689 farmers.

Source: Field Survey 1979/80.

It can be observed in Table 14 that in general, the number of farmers who had knowledge of improved seeds (of the 4 crops) for the first time increased cumulatively as the time period increased from one year to the other (see Fig 4.) Table 14 also shows that in general, the marginal increase in the number of farmers that had the knowledge of improved seeds of the 4 crops (for the first time) decreased as the length of time increased.

FIG.4 : Ogives showing cumulative percentage of farmers who learnt of improved seeds for the first time at different time periods



Farmers were also asked about the time they adopted the seeds. The distribution of farmers according to time of first adoption follows a similar trend as farmers distribution according to time of first awareness of the practice (see Table 15).

Table 15. Cumulative Distribution of Farmers According to Time Of First Adoption of Improved Seeds of Various Crops

Time In (Years)	Maize		G/Corn		Rice		Millet	
	No. of farmers	Percent of Resp.*	No. of farmers	Percent of Resp.	No. of farmers	Percent of Resp.	No. of farmers	Percent of Resp.
≤ 1	47	7	11	2	10	1	8	1
≤ 2	86	12	42	6	23	3	24	3
≤ 3	120	17	71	10	33	5	45	7
≤ 4	149	22	96	14	42	6	63	9
≤ 5	167	24	121	18	49	7	79	11
≤ 6	174	25	133	19	55	8	92	13
≤ 7	179	26	138	20	59	9	99	14
≤ 8	182	26	141	20	62	9	103	15

* Resp. = Total Respondent = 689 farmers.

Source: Field Survey, 1979/80.

Table 15 shows the cumulative distribution of farmers according to time of first adoption of improved seeds of maize, guineacorn, rice and millet over a time span of 8 years. It can be noted from the table that each of the 4 crops had additional number of first adopters from one year to the other. This cumulative increase in the number of first adopters over the years is shown in Fig. 5.

Another observation that can be made from Table 15 is that less and less farmers adopted improved seeds of the crops for the first time as the time period increased over the 8 year period. The final point from Table 15 is that maize has the highest number of first adopters while rice has the least.

Reasons Why Some Farmers Failed to Adopt Improved Seeds Even After Learning About Them.

As reported in Table 13, only 58 percent of sampled farmers who were aware of improved seeds in the study area adopted the practice. Forty-two percent (42%) did not adopt the practice.

Farmers are known to be rational entrepreneurs (Jones quoted in Agbonifo 1974, p. 13) and they always have reasons for their decisions. Those who failed to adopt improved seeds practices amongst the sampled farmers were asked to give reasons for their failures. The various answers received are tabulated in Table 16.

The table shows that out of 249 farmers who failed to use improved seeds even after learning of it, 98 (or 39.4 percent) failed to adopt the practice because improved seeds were not available to them. Unavailability of improved seeds thus constitutes the reason cited (by the highest percentage of non-users of improved seeds) for failure to adopt improved seeds.

Table 16. Reasons[1] Why Farmers Failed To Adopt Improved Seeds

Reasons	No. of farmers	% of 249
Improved seeds not available	98	39.4
No money to buy it	17	6.8
Improved seeds come late	63	25.3
Uncertain about the profitability	16	6.4
Can't understand it's use	38	15.3
No reason	17	6.8
Total	249	100.0

Source: Field survey, 1979/80.

Another reason cited by farmers for failing to adopt improved seeds is that of late arrival. This situation has prevented about 63 out of 249 farmers from adopting the practice (Table 16). Even among improved seeds users in the 3 states (341), two hundred and sixty-one or 76.5 percent reported that improved seeds often arrived late (i.e., long after the planting season). The problems encountered in seed transportation as discussed in chapter 3 could be one of the major causes of lateness in the arrival of seeds.

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[1] Although not mentioned by farmers, the author is of the opinion that other reasons like lack of conformity with the farming systems and cultural background might have contributed to non-adoption of improved seeds by farmers.

Lack of money to purchase improved seeds and uncertainty as regards economic returns to use of improved seeds do not appear to constitute any serious constraints to use of improved seeds in the study area. This generalization is based on the observation that only 14 percent of non-seed users cited the two factors (7 percent of non-users for each factor) as their reasons for failing to use improved seeds.

There is enough evidence also to show that higher level of adoption of improved seeds could be achieved if extension education on use of improved seeds is intensified for farmers in the study area. Table 17 shows that 15 percent of non-users failed to use improved seeds because they could not comprehend the practices associated with using improved seeds. Examples of these practices include time of planting, correct spacing and fertilizer application.

Availability of Improved Seeds, Supply versus Demand

As pointed out in Table 16 unavailability of improved seeds constitute one of the limitations to the use of improved seeds in the study area. The extent of this unavailability is estimated in this section. This exercise is useful as it leads to a fulfilment of one of the objectives of this study: that is to establish the extent to which farmers' demand for improved seeds are met. Farmers were asked the quantity of improved seeds of maize, rice, guineacorn and millet they wanted in 1978/79 season and the quantities they received.

While some farmers gave their answers in standard units like the pound (lb) and kilograms (kg) the rest expressed theirs in "mudus"[1]. This called for the task of conversion of farmers' figures into standard units. The conversion problem was complicated because local measure used by farmers (the 'mudus') vary within and between villages and/or states. Norman encountered similar problems of lack of uniformity in local measures in some of his farm management surveys in Northern Nigeria (Norman 1973, p. 21).

The five-unit method[2] (Norman 1973, p. 25) for measuring crop yield was modified and used to standardize the quantities of improved seeds requested by farmers and the quantities they received. Five mudus of the improved seeds[3] of each crop were weighed in each village to obtain an average weight of a mudu for each village. Then the total quantity of seeds required by each farmer sampled was computed by multiplying his total number of mudus by the average weight of mudu for that village. This exercise was carried out for maize, rice, guineacorn and millet wherever sampled farmers used improved seeds of these crops.

The average weights of a mudu for each crop in the different states are shown in Table 17.

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1 The 'mudu' is a local unit of measure.

2 Another modification of this method referred to as 'sample weight method' was used to estimate quantities of cowpeas produced by farmers in Northern Nigeria (Ejiga, 1977, p. 83).

3 In villages where improved seeds were not available for weighing, the local varieties of the corresponding crops were used.

Table 17. Average Weights of A 'Mudu' of Seeds of Each Crop In 3 States.

State	Average weight of a mudu (in kg)			
	Rice	Maize	G/Corn	Millet
Kaduna	2.78	2.98	2.95	2.63
Kano	2.94	3.12	2.82	2.49
Plateau	2.79	3.07	2.86*	2.51*

Source: Field Survey, 1979/80.

* These figures are for local types of mudu of G/Corn and Millet as obtained in few villages that requested or used improved seeds of these crops in Plateau State.

It can be observed that the weight of a mudu of a given improved seed varies from one state to the other. Differences in volume of the mudu could be possible sources of variations in the weight of the mudu within a State and between States.

The results obtained after series of conversions and aggregating individual farmers' answers in each state are presented in Table 18. It should be noted that the figures shown in Table 18 includes both those given in standard units by farmers plus the converted values. The result presented in Table 18 is the basis for fulfilling one of the crucial objectives of this study that is to determine the extent to which farmers' demand for improved seeds are met. A number of observations can therefore be made from the table. First is that wide gaps exist between the quantities of improved seeds demanded by farmers and the

Table 18. Quantities of Improved Seeds Demanded By Farmers And the Quantities They Recieved During The 1978/79 Season (3 States).

State (1)	Crop (2)	Quantity Required (kg) (3)	Quantity Supplied (kg) (4)	Percent of Requirement Supplied
Kaduna	Maize	2486	1143	44
	Rice	2834	1363	48
	G/Corn	1449	609	42
	Millet	1569	565	36
Kano	Maize	3016	1562	52
	Rice	2982	1375	46
	G/Corn	2315	1341	58
	Millet	2115	765	36
Plateau	Maize	2242	941	42
	Rice	3273	2215	68
	G/Corn	2819	184	7
	Millet	1142	62	5
All 3 States	Maize	7744	3647	47
	Rice	9089	4952	54
	G/Corn	6583	2133	32
	Millet	4827	1392	29

Source: Field Survey, 1979/80.

quantities they received for maize, rice, guineacorn and millet crops. This gap is widest for millet crop both at each state and considering the 3 states together. As shown in Table 18 only 29 percent of farmers' demand for improved seed of millet were supplied in 1978/79 season for

the 3 states of this study. Although millet improved seeds was generally undersupplied to farmers in the 3 states, the percent undersupply is highest in Plateau State (95%) and least for Kano (64%). Only 36 percent of farmers request for millet improved seeds was supplied in Kaduna State in the 1978/79 planting season.

Like millet, guineacorn is also acutely undersupplied to farmers on the average in the 3 states. Only 32 percent of farmers requirement for guineacorn improved seeds could be supplied (Table 18). The trend of supply of this crop (G/Corn) is about the same as that of millet in each of the states. Plateau State has the least proportion of the total farmers' requirements for the crop met.

The gross undersupply of improved seeds of millet and guineacorn in the 3 States in general and in Plateau State in particular is due to the fact that these 2 crops are not currently included in Plateau State's seed multiplication and distribution programme. The little quantities of the improved seeds of these crops received by farmers in the State were reported to have been obtained from 'friends' outside the State.

The aggregate farmers' requests for improved seeds of rice in the study area is 9089 kg in 1978/79 season. Only 4953 kg (or 54 percent) of this required quantity was obtained. Looking at each State's requirement and suuply of improved seeds of rice however, it can be observed that farmers in Plateau State received the highest percentage (68 percent) of their request while those in Kano and Kaduna States

received only 46 percent and 48 percent respectively of their request for improved seeds of rice.

The comparatively high percentage of improved rice seeds received by Plateau farmers may have been due to the existence of 4 large scale rice seed production agencies located in the State[1]. These agencies contribute very significantly to increase the level of improved rice seeds available in the State. Improved seeds of maize also appear to be acutely undersupplied to the sampled farmers in the 3 States of this study. The aggregate demand for improved maize seeds in the 3 States was 7744 kg. Of this quantity, farmers could only receive 3547 kg (or 47 percent). While sampled farmers in Plateau and Kaduna States respectively got 42 percent and 46 percent of their demand for improved seeds of maize, those in Kano State were slightly better of in that they received as much as 52 percent of the quantity of improved maize seeds they wanted in the same season.

The wide gaps existing between demand and supply of improved seeds amongst sampled farmers is a reflection of general undersupply of improved seeds to farmers in the study area. The total quantities of improved seeds distributed to farmers in the 3 States in 1978/79 season are shown in Table 19.

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[1] These agencies are Bokkos Farm Project, Lonkat Cooperative Contract Growers, Lantang Cooperative Rice Growers (at Sabon-Gida) and Lafia Cooperative Rice Growers at Lafia.

Table 19. Total Quantities of Improved Seeds Distributed To Farmers In 3 States (1978/79)

State	Crop (in Tonnes)			
	Rice	Maize	G/Corn	Millet
Kaduna	30	118	66	64
Kano	36	N.S.	91	17
Plateau	50	30.00	N.A.	N.A.

Source: Field Survey 1979/80

N.S. = Data Not Supplied
N.A. = Not Applicable

Although the total quantities of improved seeds requested by farmers were not given, the fact that farmers reported that they were always calling at the sale points of improved seeds to request for more seeds is an indication that quantities distributed to them were inadequate. The implication of the general undersupply of improved seeds to farmers in the study area is that those who could not obtain improved seeds were bound to continue to use their traditional seeds.

Availability of Complementary Inputs

Improved seeds are only likely to yield optimal outputs in optium favourable environment. Such factors as adequate nutrients and water supply, edaphic suitability and protection against insects, pests and rodents will definitely increase realisable returns from the use of improved seeds.

One major factor that was posited to influence the use of improved seeds by farmers in the study area, is the extent to which other inputs (like fertilizers) are available.

The complementarity between improved crop varieties and other farm inputs especially chemical and organic fertilizer has been pointed out by many writers. Lester Brown (1970) upholds the view that improved crop varieties respond to heavier dosages of fertilizer, and are more efficient (than their traditional varietal counterparts) in fertilizer utilization (Brown 1970, p. 18). Schultz has also pointed out that hybrid corn, an improved variety of maize, yields best in the presence of adequate fertilizer and water environment (Schultz, 1964, p. 170).

Evidence from Badeku village near Ibadan and Daudawa in Kaduna State shows that farmers obtained yields more than twice what they obtained from traditional crops varieties when they adopted improved varieties with appropriate fertilization (Falusi & Adubifa, 1975, p. 14). Realizing that improved seeds perform better when used along with fertilizer, a consultancy group-Emirate Technical Services Limited recommended that "seed of improved crop varieties should only be issued to farmers in conjunction with fertilizer (Emirate Technical Services Ltd. report submitted to Ministry of Agriculture, North Western State, 1975, p. 10).

The use of high yielding crop varieties in Bangladesh was noticed not to meet the expectation of the people simply because complementary production inputs like chemical fertilizers etc. were not made available to every peasant. And because of this, many farmers, especially the small farmers and sharecroppers have not been able to take full advantage of this new technology (Bangladesh Preceedings of the International Seminar on High Yielding Crop Varieties 1975, p. 8).

The implications of these references is that improved seeds and some other farm inputs (especially fertilizers) should be supplied together if any profitable results is to be expected from their (improved seed) use.

Farmers in the study area were asked to indicate other inputs used along with improved seeds in the last production season (1978/79). The catalogue of farm inputs mentioned which were said to have aided the use of improved seeds include fertilizer, herbicides and insecticides. Among these inputs, fertilizer appears to have gained the widest acceptance among users of improved seeds in the study area. Table 20 shows the distribution of improved seeds users according to other farm inputs used on farms planted to improved seeds.

Table 20 shows that users of improved seeds in the study area appear to be aware that fertilizer utilization is a necessary though not a sufficient condition for using improved seeds. This conclusion is drawn from the high percentage of farmers that used fertilizers vis-a-vis

improved seeds. In the 3 States, 328 out of 341 (or 96 percent) of improved seeds users also used fertilizer in the 1978/79 season. Kano State has the highest percentage (99 percent) of improved seeds users who also used fertilizers on their seed farms. This percentage is 92 and 97 for Kaduna and Plateau States respectively.

Table 20. Distribution of Improved Seeds Users (In 3 States) According to Other Complementary Inputs Used On Improved Seed Farm.

State	Fertilizer	%	Insecticides	%	Herbicides	%
Kaduna	81	92	46	52	2	2
Kano	134	99	109	80	2	1
Plateau	113	97	57	49	7	6
Total No. of farmers	328		212		11	

Source: Field Survey, 1979/80

Another input that has aided the use of improved seeds in the study area is insecticides. Going by the number of users, insecticides constitute the second most important complementary input used on farms planted to improved seeds in the study area (see Table 20). Out of 341 users of improved seeds, 212 (or 62 percent) applied insecticides to their seed farms. As with fertilizer it is in Kano State that the highest proportion (80 percent) of sampled farmers who used improved

seeds also used insecticides. Similar proportions in Kaduna and Plateau States are 52 percent and 49 percent respectively.

The application of herbicides to crops appears to be an unpopular practice among farmers in the study area. Only 11 of the 341 users of improved seeds (or 3.23 percent) applied herbicides to their seed farms (see Table 20).

Farmers Preference Between Improved Seeds and Traditional Seeds.

In keeping in line with one of the objectives of this study (that is to determine farmers preference between improved seeds and traditional seeds) farmers were asked to indicate their choice between improved seeds and traditional seeds in general. The answers obtained are summarised in Table 21.

Table 21. Preference of Farmers - Improved or Traditional Seeds.

Farmers' State	Do You Prefer Improved Seeds To Traditional Seeds?		
	Answer	Users	Non Users
Kaduna	Yes	88	24
	No	-	50
	Can't tell	-	78
Kano	Yes	136	5
	No	-	2
	Can't tell	-	97
Plateau	Yes	117	2
	No	-	5
	Can't tell	-	116
3 States	Yes	341	31
	No	-	57
	Can't tell	-	291

Source: Field Survey, 1979/80.

Based on Table 21, a number of observations can be made. First is that all farmers who have used improved seeds before prefer it to traditional seeds. Second is that majority (77 percent) of non users of improved seeds could not tell whether or not they would prefer improved seeds to traditional ones. Thirdly, a small percentage of those not using improved seeds (8 percent) expressed the opinion that they would prefer improved seeds to traditional seeds even though they have not used it previously. Their preference for improved seeds is probably based on their observation of its performance on their neighbours' farms. The final point worth nothing in Table 21 is that 57 of the 349 (or 16 percent) of non users of improved seeds indicated that they would not prefer improved seeds to traditional seeds.

Reasons Why Farmers Prefer Improved Seeds To Traditional Seeds

Various reasons were given by farmers in the study area for their preference for improved seeds. Farmers' answers are summarised in Table 22. It should be pointed out that it is only the most important reason expressed by each farmer for preferring improved seeds that was counted for such a farmer. Other reasons given by such a farmer were not taken into consideration in the frequency distribution shown in Table 22. This was deliberate action to avoid double counting a given farmer who might have more than one reason for preferring improved seeds to traditional seeds.

Table 22. Distribution of Farmers Showing Their Reasons for Preferring Improved Seeds To Traditional Seeds.

Farmers' Reasons[1]	No. of farmers*	Percent of 372*
Improved seeds yield more	307	83
Improved seeds germinate and mature faster	15	4
Improved seeds respond better to fertilizer	22	6
Improved seeds have better taste	17	4
Other reasons	11	3
Total	372	100.00

Source: Field Survey, 1979/80.

* 372 is the total number of farmers who prefer improved seeds to traditional seeds. This number includes both users and non-users.

As can be seen in Table 22 the potential of improved seeds to yield mor output than its traditional counterpart appears to be the most important reason why farmers in the study area opt for improved seeds. In fact this reason was cited by 307 (or 83 percent) of the 372 farmers that expressed preference for improved seeds. Other reasons (of lesser importance) for preferring improved seeds include better

[1] Only each farmer's most important reason for preferring improved seed is considered, as a single farmer might have more than one reason for preferring improved seeds to traditional seeds.

response to fertilizer (6 percent) better germination and faster maturity (4 percent) and better taste (5 percent) (see Table 22) Eleven (11) farmers out of 372 or (3 percent) gave ambiguous answers like 'I like it', 'it is good', etc. as their reasons for preferring improved seeds to traditional seeds. These type of responses are categorised as "other reasons" in Table 22.

Government Price Policy for Improved Seeds

As indicated in Chapter 3, the major source of improved foundation seeds to the states is the National Seed Service. This agency sells seeds to the States and some agricultural corporations at the rates shown in Table 23.

Table 23. National Seed Service Seed Prices

Crops	₦/Tonne	Kobo/kg. Approx.
Rice	400	40
Maize	300	30
Guineacorn	300	30
Millet	300	30

Source: National Seed Service (Samaru) Personal Discussion, 1980.

It can be seen from the table that the per unit price charged for these seeds is highest for rice (40 kobo/kg) and uniform for maize, guineacorn and millet (30 kobo/kg). The seeds obtained from the National

Seed Service, supplemented with certified seeds produced by contractors and on government seed farms are sold to farmers. The prices charged for improved seeds of various crops in each state are shown in Table 24.

Table 24. Prices Charged For Seeds Of Various Crops In Kaduna, Kano and Plateau States.

State	Crops[1]	Kobo/kg (1979/80)	Kobo/kg (1980/81)
Kaduna	Rice	25	30
	Maize	20	25
	Guineacorn	20	25
	Millet	20	25
Kano	Rice	26	26
	Maize	20	14
	Guineacorn	20	14
	Millet	20	14
Plateau	Rice	32	32
	Maize	20	20
	Guineacorn	-	-
	Millet	-	-

Source: Ministries of Agriculture, Kaduna, Kano, and Plateau States (Personal discussion, 1980).

Except for Plateau State where per unit prices of rice and maize have remained constant in the 2 planting seasons shown (1979/80, 1980/81)

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[1] Inspite of the expected genetic superiority of these crops, each of them has been subsidized (to the tune of at least 33 $\frac{1}{3}$ percent) when their prices were compared to what obtained for the corresponding local varieties.

there are notable changes in per unit prices of the improved seeds in the states, (see Table 24). It was learnt through personal discussions with officials of the ministry of agriculture) that in Plateau State improved seeds prices are reviewed every 5 years.

In Kaduna State current per unit price for each crop is 5 kobo higher than what it was in 1979/80 planting season (Table 24). On the other hand the price per unit of improved seeds of maize, guineacorn and millet are 6 kobo lower in 1980/81 season than their corresponding prices in 1979/80 planting season in Kano State (see Table 24).

When the officials of the ministries of agriculture were asked the reason for the changes in improved seed prices, the explanation received was that prices were adjusted according to farmers' demand for improved seeds. This suggests that the demand for improved seeds of rice, maize, guineacorn and millet is higher in 1980/81 season than in 1979/80 season in Kaduna State. The reverse was the situation in Kano State, with exception of rice whose price has remained constant in the two seasons.

Correlation of Adoption of Improved Seeds and Some Socio-Economic Variables

The decisions of farmers to accept or not to accept innovations could be largely influenced by several factors. The influence of some of such factors on the adoption of improved seeds in the study area has been discussed earlier in this chapter.

In this section, the relationships between the adoption of improved seeds (of maize, rice, guineacorn and millet) and some socio-economic variables are examined. The tool of examination employed is the correlation analysis.

Adoption (scored as 1) and non-adoption (scored as 0) was treated as the dependent variable while the independent variables are age, household size, farming as primary occupation, number of farm plots, awareness of improved seeds, preference for improved seeds, availability of extension advice, availability of complementary inputs and time lapse (in years) between first awareness and first adoption. Where qualitive responses were obtained from farmers, an attempt was made to quantify them using the scoring procedure. The results obtained for each of the crops of this study are reported below.

Adoption of Improved Maize Seeds

The matrix of zero-order relationship (between adoption and some socio-economic variables) obtained using Pearson correlation procedures is presented in Table 25. The relationships of adoption with each of the selected socio-economic variables are discussed below.

Age (X1)

Table 25 shows that no relationship exists between the adoption of improved maize seeds and the ages of farmers. This suggests that there are other factors of more importance that influenced the adoption of improved maize seeds in the study area.

Household Size (X2)

Table 25 shows that household size is significantly related (at α = .01) with the adoption of improved maize seeds. The r* value for this relationship is .13. The implication of this significant positive relationship is that the larger the size of family, the greater the chances of adoption of improved maize seeds. This trend may be due to two reasons. The first is that a larger family is likely to require more food than a smaller one. Such a family is therefore likely to adopt improved maize seed faster than a smaller family for the fact that improved seeds have the potential of significantly increasing food supplies. Secondly it can be contended that because the improved maize requires more labour than use of traditional variety of maize, a family with access to labour is likely to adopt improved maize.

Number of Farm Sites (X4)

The number of farm plots owned by a farmer is positively (though not significantly) related with the adoption of improved maize seeds (see Table 25). Thus the more plots owned by a farmer a weak chance exists that he would adopt the use of improved maize seeds. The possession of many maize farm plots could increase the chances of a farmer having contact with other farmers who might have adopted the innovation of improved seeds. Thus a farmer may have learned of this innovation through such contracts. Such a farmer might try and even adopt the innovation after

* r = Correlation coefficient.

Table 25. Pearson Correlation Matrix Showing Adoption of Improved Maize Seeds With Some Socio-Economic Variables.

	X1	X2	X3	X4	X5	X6	X7	X8	Xz	Yz
X1 Age	1.00									
X2 Household size	.30	1.00								
X3 Farming as primary occupation	-.08	.02	1.00							
X4 No. of Farm Plots	.03	.26	.09	1.00						
X5 Awareness	-.03	.10	.07	.11	1.00					
X6 Preference for improved seeds	.00	.03	.04	.04	.56	1.00				
X7 Availability of extension advice	-.06	.09	.05	.10	.74	.51	1.00			
X8 Availability of complementary inputs	.05	.13	.01	.05	.39	.27	.47	1.00		
Xz Time lapse between Awareness & adoption	.04	.07	.04	.03	.12	.10	.14	.21	1.00	
Yz Adoption of maize	.00	.13*	.03	.07	.22*	.17*	.25*	.44*	.57	1.00

* Variables significant at α = .01.

n = 689.

such awareness. There is also the possibility that different soil types (some of which could be very suitable to improved maize technology) exist on the plots farmed by farmers. This may serve as encouragement to farmers to grow improved maize.

Awareness of Improved Seeds (X5)

It has been discussed earlier that farmers need to be exposed to an innovation before they adopt it. This assertion is confirmed with respect to improved maize seeds in that a positive and significant (at α = .01) relationship exists between awareness and adoption of improved maize seeds (see table 25.) The correlation coefficient value is .22. Thus the more farmers become aware of improved maize seeds the more they would adopt the practice.

The most likely source of information on improved maize seeds to farmers is through extension workers. Infact the availability of extension advice to farmers can be seen to be significantly related with the adoption of improved maize seeds by farmers in the study area (see Table 25). This result seems to corroborate previous findings. For instance Monu reports that "... adoption of cutting virus infected trees from the farm and adoption of wooden trays for fermentation are positively significantly related to extension contact" (Monu, 1980, p. 10). Voh has also reported a positive and significant relationship between adoption of recommended farm practices and contact with various sources

of extension advice (Voh, 1979). The implication of the result obtained for maize therefore is that extension advice must be intensified in the study area as a strategy for increasing the adoption rate for improved maize seeds.

Availability of Complementary Inputs (X8)

This variable (X8) has exhibited a relatively stronger influence on adoption of improved maize seeds than any of variables X1 to X7 discussed earlier. Table 25 shows that X8 is significantly related with the adoption of improved maize seeds. The r value is .44. This shows that the more complementary inputs supplied to farmers (along with improved maize seeds) the higher is likely to be the adoption of improved maize seeds.

Time Lapse Between First Awareness and First Adoption (Xz)

The difference in time periods when farmers learnt (for the first time) of improved maize seeds and the time they first adopted the practice was correlated with adoption of improved maize seeds. The r value for this relationship is .57 and is significant at α = .01.

The inference that could be drawn from this relationship is that the longer the time lapse between awareness and adoption of improved maize seeds in the study area, the higher the adoption rate of the innovation. This trend seems to agree with expectation on a priori basis since over longer time periods farmers are likely to hear and

digest information several more times (or more frequently) than within shorter time periods.

Adoption of Improved Rice Seeds

Table 26 shows the results obtained by correlating the adoption of improved rice seeds with the socio-economic variables specified earlier.

The results obtained are similar even though weaker when compared to those obtained in the case of maize. A notable difference between rice and maize is that age is positively (though weakly correlated with the adoption of improved rice seeds while age did not exhibit any relationship with the adoption of improved maize seeds.

The analysis in Table 26 shows that household size (X2), awareness (X5), preference for improved seeds (X6), extension advice (X7), complementary inputs (X8) and time lapse between awareness and adoption (X9) are all significantly related (at α = .01 or .05, see Table 26) with the adoption of improved rice seeds. The r values for these relationships are .07, .15, .10, .19, .20 and .65 respectively.

Though farming as primary occupation (X3) and number of farm plots (X4) are both positively related with adoption, they are not significant at α = .01.

Table 26. Pearson Correlation Matrix Showing Adoption of Improved Rice Seeds With Some Socio-Economic Variables.

	X1	X2	X3	X4	X5	X6	X7	X8	XR	YR
X1 Age	1.00									
X2 Household Size	.30	1.00								
X3 Farming as primary Occupation	-.00	.02	1.00							
X4 No. of farm plots	.03	.20	.00	1.00						
X5 Awareness	-.03	.10	.07	.11	1.00					
X6 Preference for improved seeds	.002	.03	.04	.04	.56	1.00				
X7 Availability of Extension advice	-.03	.09	.05	.10	.74	.51	1.00			
X8 Availability of complementary inputs	.05	.13	.01	.05	.39	.27	.47	1.00		
XR Time Lapse Between Awareness & adoption	.02	.10	.04	.01	.10	.07	.12	.10	1.00	
YR Adoption of rice	.05	.07	.02	.01	.15°	.10°	.19°	.20°	.65°	1.00

° Variables significant at α = .01.

n = 609.

Adoption of Improved Sorghum Seeds

Similar correlation analysis was also conducted for sorghum as in the case of maize and rice discussed above. The results obtained are reported in Table 27. Unlike the case of maize and rice, age is negatively (but not significantly) correlated with the adoption of improved guineacorn seeds. The weak implication of this relationship ($r = -.01$) is that the older a farmer becomes the less the chances that he would adopt improved sorghum seeds. This trend is in line with expectation particularly as sorghum is a traditional food crop in the area surveyed. Farmers are not likely to change or experiment with their traditional food crops. Furthermore the result obtained for sorghum agrees with Voh's findings on farmers' adoption of recommended farm paractices. Voh reported a negative and non-significant correlation between farmers' age and adoption of recommended farm practices (Voh, 1979).

Another notable difference about the results obtained for sorghum is that farming as primary occupation is negatively (but not significantly) correlated with the adoption of sorghum. The r value is -.02. This suggests that those with farming as a primary occupation are more conservative than those who have other primary occupations. This conservativeness may be due to cautiousness of farmers in trying new ideas since a slight mistake may lead to great loss in income to the farmers.

Table 27. Pearson Correlation Matrix Showing Adoption of Improved Sorghum Seeds With Some Socio-Economic Variables.

		X1	X2	X3	X4	X5	X6	X7	X8	XG	YG
X1	Age	1.00									
X2	Household Size	.03	1.00								
X3	Farming as primary occupation	-.00	.02	1.00							
X4	No. of farm plots	.03	.20	.00	1.00						
X5	Awareness	-.03	.10	.07	.12	1.00					
X6	Preference for improved seeds	.002	.03	.04	.05	.50	1.00				
X7	Availability of extension advice	-.06	.09	.05	.10	.74	.51	1.00			
X8	Availability of complementary inputs	.05	.13	.01	.05	.39	.27	.47	1.00		
XG	Time lapse between awareness and adoption	-.06	.02	-.02	.04	.11	.09	.14	.24	1.00	
YG	Adoption	-.01	.10*	-.02	.00	.14*	.41*	.24*	.41*	.64*	1.00

* Variables significant at α = .01.

n = 609.

Household size (X2),awareness (X5),preference for improved seeds (X6), extension advice (X7), inputs availability (X8) and time lapse between awareness and adoption (XG) are all significantly related to the adoption of improved sorghum seeds. The r value are respectively .10, .00, .14, .24, .41 and .64 (see Table 27).

Adoption of Improved Millet Seeds

The adoption trend for millet is very similar to sorghum. Except for age, all other variables move in the same direction with the adoption of millet as is the case with sorghum discussed earlier. Like in the case of maize and rice, age exhibits positive relationship with the adoption of improved millet seeds (see Table 28). The r value for this relationship is .05 (same as for rice) and is not significant at α = .05.

Household size (X2), number of farm plots (X4), awareness (X5), preference for improved seeds (X6), extension advice (X7), availability of complementary inputs (X8) and time lapse between awareness and adoption (X8) all exhibit positive and significant relationships with the adoption of improved millet seeds. The r values are .09, .08, .13, .10, .17, .35 and .70 respectively (see Table 28).

In general availability of complementary inputs and time lapse between awareness and adoption have exhibited the most significant influence on the adoption of each of the four crops.

The high influence of complementary inputs on adoption of improved seeds is due to the importance of the former on the technology of improved

Table 20. Pearson Correlation Matrix Showing Adoption of Improved Millet Seed With Some Socio-Economic Variable.

		X1	X2	X3	X4	X5	X6	X7	X8	X9	X11
X1	Age	1.00									
X2	Household Size	.30	1.00								
X3	Farming as primary Occupation	-.00	.02	1.00							
X4	No. of farm plots	.03	.26	.09	1.00						
X5	Awareness	-.03	.10	.07	.11	1.00					
X6	Preference for improved seeds	.002	.03	.04	.04	.56	1.00				
X7	Extension Advice	-.06	.09	.05	.10	.74	.51	1.00			
X8	Availability of inputs	.05	.13	.009	.05	.39	.27	.47	1.00		
X9	Time Lapse between awareness and adoption	.03	.07	-.002	.08	.09	.00	.11	.25	1.00	
X11	Adoption of Millet	.05	.09	-.07	.08	.13*	.10*	.17*	.35*	.70*	1.00

* Variables significant at α = .01.

n = 689.

seeds. Thus it became imperative to supply farmers with inputs as a means of encouraging the adoption of improved seeds technology.

The significant influence of time lapse between awareness and adoption on adoption of improved seeds emphasises the need to expose farmers adequately and long enough to innovations before they take the decisions to adopt the innovations.

Summary

The influence of some factors on adoption or non-adoption of improved seeds in the study area has been the main concern of this chapter. Level of information available, extent of improved seeds' availability, farmers preference between improved seeds and traditional seeds and the prices charged for the seeds are the major variables that have been discussed.

It was shown within the chapter that quite a high proportion of the sampled farmers in the study area (82 percent) have had prior knowledge about the use of improved seeds. This suggests the existence of fairly adequate information on improved seeds in the study area.

Although farmers in the study area appear to be aware about improved seeds in general, the level of adoption of this innovation can be considered to be low. In fact only 58 percent of the sampled farmers in the 3 states of this study who have heard of improved seeds have adopted the practice. Those who have failed to adopt this innovation

gave many reasons for their failure. The strongest of these reasons as discussed in this chapter is the unavailability of improved seeds. Other reasons include late arrival of improved seeds and inability of farmers to comprehend the technology of improved seeds. It has also been shown in this chapter that the improved seeds of maize, rice, guineacorn and millet were grossly undersupplied to farmers in the study area. This expains why farmers could not get improved seeds.

The undersupply of improved seeds was shown to be most acute for millet where only 29 percent of farmers' requirement in 1978/79 season was met in the 3 states. Except in the case of rice where 54 percent of farmers' request of improved seeds were met in the 3 states, less than 50 percent of farmers requirement of improved seeds of each of other crops studied were supplied during the 1978/79 season.

Some complementary inputs were identified to have been used together with improved seeds in the study area. These inputs are fertilizers, insecticides and herbicides. Fertilizer is the most widely used complementary input. This is followed by insecticides, while herbicides is used only by very few farmers.

It was pointed out in this chapter that all farmers who used improved seeds before preferred them to traditional seeds. The reasons why farmers preferred improved seeds in order of importance are its potential to yield more than traditional seeds, its better response to fertilizer applications, its better taste and its ability to germinate and mature faster than traditional seeds.

The prices charged for improved seeds sold to farmers were also discussed. These prices show elements of subsidy by the governments apparently to encourage the use of improved seeds and are also geared towards relative demand and supply conditions for the seeds.

Finally, the chapter ended with a discussion on correlation analysis between the adoption of improved seeds of each of the four crops studied with some socio-economic variables and some personal characteristics of the farmers. In general household size, farmers awareness, time lapse between first awareness and first adoption, farmers preference for improved seeds, availability of extension advice and complementary inputs were found to be highly significantly related to the adoption of each of the crops studied.

CHAPTER FIVE

THE ECONOMICS OF SEED MULTIPLICATION

The supply of improved seeds of maize, rice, guineacorn and millet in the study area has been shown in chapter 4 to be grossly inadequate. The logical question to be answered therefore is what strategy should be pursued to economically produce large quantities of improved seeds that will cope with farmers' request. This chapter attempts to answer this question. The method employed is to compare the government costs of producing improved seeds directly to that of producing improved seeds through contractors with a view to showing how more improved seeds could be procured at the same cost than what is been procured now.

This Chapter is divided into 5 sections. The first section deals with an identification and enumeration of the major farm operations that are usually carried out in the process of seed multiplication. The second and third sections describe the existing seed multiplication procedure by the government and seed contractors respectively. Particular attention is paid in these sections to the farm operations connected with seed multiplication as identified in section one of the chapter. In section 4 the estimated cost of a unit of government directly produced improved maize seeds is compared with the cost of producing same quantity of improved seeds through the use of seed contractors.

Major Farm Operations Carried Out During Seed Multiplication Process

Certain farm operations are basic to any seed production venture, either by the government or by private individuals who act as seed contractors. These farm activities generally include selection of seed production sites, land clearing, harrowing, ridging, seed planting, fertilizer application, herbicides spraying, weeding, thinning, seed harvesting, seed transportation, seed processing and seed storage. A detailed description of how and when these activities are carried out is outside the scope of this thesis.

Seed Multiplication by the Government

Until recently when some private farmers were involved as seed contractors, seed multiplication in Nigeria has been the sole responsility of the government. As pointed out in chapter 3, the seed policy of Nigeria made it mandatory for each state government in the federation to set up a seed multiplication project. Accordingly each state now has an alsmost autonomous seed multiplication and distribution project. The Federal Department of Agriculture (FDA) through its agency, the National Seed Service, is also committed to the multiplication of improved seeds for crops such as rice, maize, guineacorn, millet, groundnuts, etc.

This study shows that government's direct efforts in seed multiplication takes place at some selected farm centres. The decisions as to

the seeds of crops to multiply and at which farm centre as well as the number of hectares to devote to such crops are usually made at the headquarters of the state ministry of agriculture. For instance the crops whose seeds were multiplied at selected farm centres in Kaduna, Kano and Plateau states during the 1979/80 season are presented in Tables 29, 30 and 31 respectively.

Discussions with the officials of the ministries of agriculture show that the crops that are considered to thrive best in a given area are normally planned to be produced in such an area. Rainfall records and results of experimental yield trials are the only variables that

Table 29. Selected Government Seed Farms In Kaduna State and The Crops Multiplied on Each Farm 1979/80.

Farm Centre	LGA	Crop Multiplied	No. of Hectares
Kafinsoli	Kankia	Millet	30
		Sorghum	19
		Groungnuts	1
Maigana	Zaria	Sorghum	20
Brinin Gwari	Brinin Gwari	Rice	4
		Maize	13
		Groundnuts	2
Saminaka	Saminaka	Rice	3
		Maize	25
		Groundnuts	2
Zonkwa	Kachia	Maize	28
		Soyabeans	1
Sabongida	Jema'a	Rice	3
		Maize	6
		Soyabeans	1
		Ginger	0.02

Source: Kaduna State Ministry of Agriculture and Natural Resources, Kaduna.

Table 30 . Selected Government Seed Farms In Kano State and The Crops Multiplied on Each Farm 1979/80.

Farm Centre Location	LGA	Crop Multiplied	No. of Hectares
Kadawa	Rano	Sorghum Maize Rice Millet Cowpea	50 20 10 10
Kaffin Hayaki	Tudun Wada	Sorghum Maize Rice Millet Cowpea	35 20 5 10 5
Panda	Gaya	Sorghum Sesame Millet Groundnut Maize	20 10 10 20
Killa	Brinin Kudu	Rice Maize Millet	5 10 10
Toma	Danbatta	Sorghum Millet Rice Cowpea Sesame	10 10 5 10 20
Sada	Kazaure	Millet Sorghum Groundnut	5 10

Source: Kano State Ministry of Agriculture, and Natural Resources, Kano.

Table 31 . Government Seed Farm In Plateau State and The Crops Multiplied On Each Farm 1979/80.

Farm Centre Location	LGA	Crop Multiplied	No. of Hectares
Gangnun	Lantang	Rice	27
Riyom	Barikin Ladi	Rice Irish Potato	N.S.*
Vom	Jos	Rice	4

Source: Ministry of Agriculture and Natural Resources, Plateau State, Jos.

* N.S. = Not Specified.

are considered in deciding which crop is to be produced in what area. This study shows that no soil test analysis was conducted to determine the fertility of each potential seed farm. The result of such analysis would have complemented other variables to ensure that the crops most suitable to a given area are produced there.

A total of 15 government seed farms were covered in this study. This is made up of 6 government seed farms each from Kaduna and Kano States, and 3 of such farms from Plateau State. The 6 government seed farms selected each from Kaduna and Kano States are from a total of 8 and 11 such farms respectively in each state. At the time of this study, only 3 government seed farms were involved in multiplying improved seeds in Plateau State. Most of the discussions in this chapter are

limited to one production season (1979/80) since paucity of data prevents a time series analysis to be undertaken. However, the total quantities of improved seeds for maize, guineacorn, rice and millet distributed by the seed multiplication and distribution projects in the study area, particularly between 1976 and 1979 are presented in Tables 32 , 33, and 34 .

Table 32 . Quantities of Improved Seeds (In Kg) Distributed By the Kaduna State Seed Multiplication and Distribution Project (1978/79).

Year	G/Corn	Maize	Rice	Millet
1978	66,402	117,960	29,503	63,701
1979	54,479	105,850	30,902	53,900

Source: Ministry of Agriculture and Natural Resources, Kaduna State, Kaduna.

Table 33 . Quantities of Improved Seeds (In Kg) Distributed By The Kano State Seed Multiplication and Distribution Project (1976-1979).

Year	G/Corn	Maize	Rice	Millet
1976	43,688	12,192	12,700	17,272
1977	32,512	10,160	24,892	18,288
1978	91,440	4,064	26,416	16,764
1979	29,464	17,272	8,128	17,272

Source: Ministry of Agriculture and Natural Resources, Kano State, Kano.

Table 34 . Quantities of Improved Seeds (In Kg) Distributed By the Plateau State Seed Multiplication And Distribution Project (1978-1979).

Year	G/Corn	Maize	Rice	Millet
1978	N.A.	30,960	51,613	N.A.
1979	N.A.	41,290	82,580	N.A.

N.A. = Not Available
Sources: Ministry of Agriculture and Natural Resources, Plateau State, Jos.

In 1979/80, the 3 states of this study devoted a total of 164 hectares to the production of improved sorghum seeds. Similar figures for the improved seeds of maize, millet and rice are 127, 75 and 66 hectares respectively (See Table 35).

Table 35 . Number of Hectares Devoted to Seed Multiplication For Each Crop In Sampled Seed Farms In Each State (1979/80).

State	C R O P S			
	Maize	Rice	Sorghum	Millet
Kaduna	72 Hectares	10 Hectares	39 hectares	30 Hectares
Kano	55 Hectares	25 Hectares	125 Hectares	45 Hectares
Plateau	- "	31 "	- "	- "
Total	127 Hectares	66 Hectares	164 Hectares	75 Hectares

Source: Field survey, 1979/80.

The relative emphasis placed on the production of improved seeds of each crop can be judged by the number of hectares devoted to such crop by that state. Furthermore the magnitude of the hectares devoted to each crop in 1979/80, generally reflects what has been the past trend of the quantities of the improved seeds of each crop distributed to farmers in the corresponding state. (Compare Tables 32 , 33 and 34 with Table 35).

Table 35 shows that the highest number of hectares is devoted to maize production in Kaduna State in 1979/80. Correspondingly maize has the largest quantities of improved seeds (among the 4 crops of this study) distributed to farmers in Kaduna State in 1978 and 1979 (see Table 32). The reverse is the case for rice to which only 10 hectares were devoted in the state during the 1979/80 production season.

In Kano State, the picture looks different from the case in Kaduna State. Sorghum which is second in importance in Kaduna State (in terms of number of hectares put to production, and in terms of quantity distributed in 1978 and 1979) is mostly emphasised in Kano State. This is because improved sorghum seeds production received the highest number of hectares (125 hectares) in Kano State in 1979/80 production. Table 33 also portrays that the improved seeds of sorghum has had the largest quantities distributed to farmers in Kano State for the past 4 years.

Almost all the farm operations on government seed farms are mechanised. The state ministry of agriculture in each state is the source of all inputs such as tractors, foundation seeds, fertilizers, herbicides, insecticides, extensions advice.

The seed multiplication project of each state is being managed by a cadre of skilled, semi-skilled and unskilled labour (see Table 36).

Discussions show that officers in the rank of Higher Agricultural Superintendent and above were concerned mainly with decision making and supervisory duties. Seed farm operations were directly under the control of Agricultural Superintendents. Whenever extra hands are required to cope with some farm activities (particularly harvesting) casual labourers were usually employed, and such labourers are laid off when there is less to do on the farm.

Table 36 . Staff Situation in Kaduna, Kano and Plateau States' Seed Multiplication Projects As At March, 1980.

State	P.A.O	A.O	H.A.S.	A.S.	A.A.	F.O.	A.ATT	Tractor Diver
Kaduna	-	1	1	9	15	16	30	13
Kano	-	2	2	19	7	14	N.S	N.S
Plateau	1	1	-	2	6	8	N.S	N.S

Sources: (a) Ministries of Agriculture, Kaduna, Kano and Plateau States
(b) NSS, FAO/UNDP, 1979.

N.S. = Not specified
A.O. = Agricultural Officer
A.S. = Agricultural Superintendent
F.O. = Field Overseer
P.A.O. = principal Agric. Officer
H.A.S. = Higher Agric. Superintendent
A.A. = Agricultural Assistant
A.ATT = Agricultural Attendents

Improved seeds harvested on government seed farms are dried and processed. Different arrangements exist for the processing of improved seeds depending on each state. For instance, in Kano State, all improved seeds produced from various seed farms were brought to the state ministry of agriculture, Headquarters, Kano for cleaning, bagging and storage until the beginning of next production season. In Kaduna State all improved seeds harvested were usually cleaned, bagged and stored at the farm sites. In Plateau State the rice produced on the government seed farms were conveyed to Bokkos farm project[1] where they are cleaned and bagged. They were then transported back to Bukuru where they were stored until the following production season.

Some constraints militated against seed multiplication activities on government seed farms in the 3 states of this study. The farm managers were asked to enumerate these problems. Table 37 summaries the responses obtained. It can be seen from the table that delay in releasing funds appears to be the most common constraint to seed multiplication activities in the study area. All the sampled seed farms faced this problem. Farm managers complained that delay in releasing funds often brought work on stores (for seeds) construction to a halt and prevented timely settlement of staff claims particularly overtime allowances. Lack of money to buy tractor spare parts and to purchase fuel when the need arose, were other areas that hampered seed farm activities.

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1 Bokkos Farm Project is a large scale farm owned by the government of Plateau State. Installed on this farm are some crop processing machines.

Table 37 . Number of Government Seed Farms Facing Different Problems In Seed Multiplication Process.

Nature of Problems	Kaduna	Kano	Plateau
Shortage of Skilled Staff	1	3	-
Untimely arrival of Seeds	2	3	-
Delay in releasing funds	6	6	3

Source: Field Survey, 1979/80.

In Kaduna State, only one farm manager, the one at Saminaka, indicated the need for more skilled manpower to assist in technical supervision of seed farm activities. The government seed farms at Panda, Killa and Toma in Kano State were in need of agronomists in order to improve on the efficiency of the current seed multiplication.

The four government seed farms in Plateau State did not appear to have the problems of unskilled manpower and late arrival of foundation seeds. About 33 percent and 50 percent of sampled seed farms in Kaduna and Kano States respectively, encountered the problem of late arrival of improved seeds to the farm gates during the 1979/80 production season[1]. The implication of late arrival of seeds is that improved seeds would be planted late and this could result in decreased output.

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[1] See Table 37 . Six government seed farms were sampled each in Kaduna and Kano States.

When asked to suggest how the existing seed multiplication could be improved, the farm managers submitted many suggestions. These suggestions are shown in Table 38 .

Table 38 . Suggestions For Improving on The Existing Seed Multiplication In The Study Area.

Suggestions	No. of farm Managers	Percentage of Total Respon-dents*
1. Provision of Adequate incentives (staff quarters, car loan, training, e.t.c.)	11	73
2. Timely release of funds	8	53
3. Provision of adequate equipment and vehicles.	4	27
4. Appointment of seed merchants	1	7
5. Locational Specialization in seed production.	1	7

Source: Field Survey, 1979/80.

* The total number of farm managers sampled is 15.

It can be seen from Table 38 that the consensus of the farm managers was the provision of adequate incentives to government staff directly involved in seed multiplication. Also there was an explicit request for timely release of funds meant for seed multiplication.

Seed Multiplication by seed Contractors.

It has already been pointed out in chapter 3 that one of the major participants in the seed multiplication scheme in Nigeria are the seed

contractors. Seed contractors are private individual farmers or groups of farmers or institutions who are employed by the government to produce improved seeds according to specified terms of agreement. The need for seed contractors arises because of government's inability to cope with the demand for improved seeds by farmers.

The involvement of contractors in the production of improved seeds is not peculiar to Nigeria. As pointed out under the literature review in chapter one, countries with advanced seed industries have the production of the bulk of their improved seeds in the hands of seed contractors. For instance "up to 30 percent of all seed production in Denmark is carried out by farmers under contract to cooperatives, the remaining 70 percent being produced under contract to private seed firms" (Organization for European Economic Cooperation Paris 1955, p. 45). Furthermore in Belgium, certified seed is produced by farmers under contract to approved seed firms (Ibid, p. 35).

The two main arms of the government employing seed contractors in Nigeria as at now are the National Seed Service, on behalf of the Federal Department of Agriculture, and the state seed multiplication projects acting on behalf of each state government.

This study shows that the process of appointment of seed constractors by the NSS seems to be more formalised than the procedures undertaken by state governments in the appointment of seed contractors.

Before selecting seed contractors, the National Seed Service puts up advertisement requesting interested persons to apply. Applications are made on forms obtainable from the NSS (see appendix VI). The NSS has some laid down criteria for selecting seed contractors. These criteria are adequately spelt out in "Technology of Seed Production and Certification in Nigeria" (NSS and FAO/UNDP 1979, p. 25). Important among these conditions are:

1. The need for the seed farm to be easily approachable to facilitate technical guidance, supervision, field inspections and movement of seed for processing.

2. The farm size and location should permit sufficient isolation of seed fields.

3. The grower should be an educated and enlightened individual conscious of his responsibility to produce seeds of good quality.

4. Adequate resources should be available to a prospective seed grower for acquiring equipment and for purchase of foundation seed and complementary inputs.

5. Essential structures such as a covered shed, threshing floor, and fertilizer store should be existing on the farm. He should have the capacity to wait for payment for his seeds, till it is processed, tested and approved.

The seed contractors' applications are scrutinized and their seed farms' locations are inspected. Those found suitable according to the NSS standards are selected.

The selected seed contractors are then made to enter into agreement with the National Seed Service. A model of the type of agreement usually entered into between the NSS and appointed seed contractors is shown in appendix VIII. The list of some NSS contract seed growers is also provided in appendix IX.

The selection of seed contractors by state governments in the study area appeared to rest solely on recommendations of Divisional Agricultural Officers. The latter merely nominate farmers that they consider "progressive" as potential seed contractors. These are farmers that usually cooperate with agricultural officials and respond quickly to agricultural innovations introduced into the village. There was no evidence to show that formal advertisements were put up prior the selection of state government seed contractors at the time of this study. The selection of seed contractors on the basis of one man's recommendations is unsatisfactory as it can be fraught with series of biases.

This study shows that the criteria for selecting seed contractor growers at state level in the study area were not as stringent as those of the NSS. The major considereation in the selection of a seed grower was that he should possess adequate resources (particularly land and finance)

with which he could operate a seed production contract. However, this does not mean that all those who meet these conditions automatically become seed contractors. The quantity of improved seeds to be produced by the government and the amount of money voted for that purpose impose limitations on the number of contractors to be selected.

Apart from a thorough explanation of the terms of the contract, no formal training was given to the seed contractors about improved seeds production.

A total of 10 seed contractors were interviewed in the study area. This number consists of 7 and 3 seed contractors from Plateau and Kano States respectively. As pointed out earlier there are no seed contractors employed by the Kaduna State government as at the time of this study. The only 2 seed contractors identified in Kaduna State (Bala Kaya and Sons Limited and the Polytechnic, Kaduna) were employed by the NSS and were not covered in this study. An evaluation of the performance of the NSS seed contractors could be an area of further research.

All the sampled Plateau State government seed contractors produced only the improved seeds of maize (see Table 30)[1]. Two of the 3 contractors sampled in Kano State produced only the improved seeds of groundnuts. The third contractor in Kano State produced guineacorn and Millet improved seeds on contract to the government of Kano State.

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[1] Rice contract seed growers located in Plateau State are all in the employment of the NSS and not that of the state government.

Table 39 . Distribution of Improved Seeds Contractors By State and By Crops Produced.

State	No. of Contractors	Crops Produced
Plateau	7	Maize
Kano	2	Groundnuts
Kano	1	G/Corn, Millet

Like the NSS seed contractors, selected seed contractors at state level also had some specified conditions to abide by. This study shows that some identical conditions prevail for the contractors in both Kano and Plateau States. Some of these conditions are:-

a) The contract grower shall use for planting the seed supplied by the Ministry of Agriculture and Natural Resources in each state.

b) The seed grower should strictly adopt those cultural and other practices which are considered by the ministry to ensure the genetic and physical purity of the seed.

c) The land the contractors would use for planting a given crop must not have had the same crop grown on it the previous year.

d) The seed production plot must be well isolated from field of other verieties.

This information was obtained from the officials in charge of the states ministries of agriculture of the two states.

Kano State has some more specific standards which include:-

1. At least 96 percent seed purity. This means that at least 96 percent of the seeds should produce normal seedlings when planted. In order words the sum total of broken seeds, non viable seeds, seeds of other crops, and under-sized seeds should not exceed 4 percent of any sample from the seeds under consideration.

2. Inert matter (maximum) 4 percent. This means that all foreign matter not seed, such as stones, sticks, chaffs and so on should not exceed 4 percent of sample of the seed under test.

3. Germination percentage 80 (minimum). This condition requires that at least 80 percent of the seed sample produces normal seedlings when planted.

4. Moisture content 10 percent (maximum). This condition merely describes the extent of dryness required of the seed under consideration. To be acceptable the moisture content of sampled seeds should not exceed 10 percent of the weight of the sampled seeds.

5. Other crops - Nill. This condition stipulates that the seeds of other crops must not be present amongst those under consideration.

Field survey and discussions show that the involvement of contractors in seed production in the study area can be regarded as a recent event. All the seed contractors identified and interviewed in the study area were appointed as seed contractors for the first time in the 70s. This suggests that government's inability to produce enough improved seeds by direct efforts to meet farmers' demand started only in the early 70s. The distribution of the seed contractors according to the year they were first appointed as seed contractors is presented in Table 40 .

Table 40 . Distribution of Seed Contract Growers According to When They Were First Appointed By The Government.

State	Year of Appointment					
	1974	1975	1976	1977	1978	1979
Kano	-	-	-	-	3	-
Plateau	1	3	2	-	-	1

Source: Field Survey, 1979/80.

Table 40 shows that the 3 seed contractors that were interviewed in Kano State were employed for the first time in 1978. This could be the beginning of the time it was becoming increasingly difficult for the government of Kano State to meet farmers demand for the improved seeds of groundnut, guineacorn and millet.

The involvement of seed contractors in Plateau State seed multiplication project started as early as 1974, when 1 seed contractor was appointed. In the following year, 1975, 3 contractors were appointed (see Table 40). None was employed in 1977 and 1978 in Plateau State. 'Lack of Fund' was the reason given at the state ministry of agriculture for non appointment of any seed contractors in the state in 1977 and 1978. One other maize contractor was appointed in Plateau State in 1979.

All the seed contractors interviewed had farming as their primary occupation. Eighty percent of them engaged in other activities to supplement income from farming. These activities include livestock keeping, petty trading, transporting and village administration. While it is true that farmers need to diversify and not "put all their eggs in one basket", it is equally true that seed multiplication requires adequate attention in order to ensure that quality seeds are produced. Only seed contractors who can devote full attention to achieving this objective should be encouraged to continue production. However, such seed contractors must be adequately remunerated.

The possession of land appears to be one of the factors favouring the selection of a farmer as a seed contractor. Ninety (90) percent of the seed contractors interviewed were producing improved seeds on family inherited land. Only one contractor in Plateau State was operating on 'borrowed' land and he claimed not to be paying anything in return for the use of the land.

The usual terms of the contracts, in general, required appointed contractors to buy foundation seeds from the government and multiply the seeds for delivery to the government after harvest. Contractors were expected to produce the seeds according to conditions specified by the government. Supplementary inputs like fertilizers, herbicides, and so on were to be applied to the seed farms by the contractors. After harvest the improved seeds were to be delivered to government seed depots.

The government undertakes the processing of improved seeds produced by contractors and when such processed seeds are tested and approved by the government, the seeds are purchased from the contractors according to the terms of the contract. This study shows that the terms of purchase of contractors' seeds in Kano State was different from that in Plateau State.

In Kano State, the seeds of contractors who meet the minimum standards specified by the ministry of agriculture are purchased at prevailing market price per tonne. After this, such contractors receive a reward of 5 percent of the market price of each tonne of processed improved seeds they produce. The Ministry reserves the right "to reject purchase completely or purchase only at market price or even at lower price depending upon the degree of fall in standards" (Kano State Ministry of Agriculture and Natural Resources, 1977).

In Plateau State, the purchase of improved seeds produced by contractors that meet the required conditions was fixed at ₦22 per bag (or ₦220 per tonne) in 1978/79. The costs of foundation seeds and any other inputs supplied by the government were deducted from the total worth of each contractor's seeds in the two states. Seed contractors are not however charged for extension services and technical supervision of seed farms.

Prompt settlement of claims can be a strong incentive to continuous and efficient production of improved seeds by seed contractors. Improved seed contractors in the study area do not appear to wait for too long a time before their contract claims are settled by the government. For instance the longest time period within which seed contractors received their money in 1978/79 production season was 3 months after delivery and acceptance of improved seeds by the government.

Table 41 is presented the time period when seed contractors claims were settled in 1978/79.

Table 41 . Time Of Payment of Contract Money After Delivery And Acceptance of Improved Seeds (1978/79).

Time of Payment	No. of Contractors	
	Plateau State	Kano State
Immediately after delivery	-	2
1 - 3 months after delivery	6	-
Above 6 months after delivery	-	-
Not applicable (see text)	1	1

Source: Field Survey, 1979/80.

As shown in Table 37, two of the seed contractors in Kano State were paid thier contract money immediately after their seed consignment were received and approved by the government. These 2 seed contractors produced and supplied groundnut improved seeds in that year. The third sampled seed contractor in Kano State, who produced guineacorn and millet claimed that his seeds were not purchased by the government. He therefore had to sell his seeds in the local market. It was discovered that the government rejected this contractor's seeds because they failed to meet government's standards.

The longest period when seed contractors in Plateau state got paid for their seed delivery was 1 to 3 months after delivery. Six maize seed contractors were paid within this period (see table 41). The seventh seed contractor did not produce seeds in 1978 since he was appointed as a seed contractor only in 1979 (seed Table 41).

Sampled seed contractors in the study area received various types of advice from the government extension workers on improved seeds production. Such advice include seed spacing, seed rate, fertilizer application, etc. They all stated that these technical advice were easy to follow.

Government Costs In Producing Improved Seeds

This section is concerned with the analysis of government costs in producing improved seeds directly as well as through the use of seed

contractors. The costs considered are only with respect to improved maize seeds. This is the only crop for which information on cost of production was available.

The costs to the government of producing 1 tonne of improved maize seeds directly were compared to what the government paid to the contractors for producing the same quantity of improved maize seeds. The data used are those of the National Seed Service, Samaru. The NSS figures were considered as the closest substitute for state government costs which were not available to the author[1].

Since the production of improved seeds by the state governments are based on the technical recommendations and advice of the NSS, it was felt that the latter's cost structure of producing improved seeds could be a good representation of those of the states.

The NSS carried out an experiment in 1979 to compare improved maize seeds production by Zero-tillage and by conventional methods[2]. The costs of various operations and inputs used in the experiments are as presented in Table 42 and 43 .

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[1] The state governments' estimates from which this information could have been obtained were not specific as to how much money was voted for given quantity of improved seeds to be produced. The problem was further compounded by lack of adequate record keeping at government seed farms.

[2] For details of this experiment, see Cropping Scheme Meeting, 1980: Activities of the National Seed Service, Samaru Pp. 9-12.

Table 42 . Cost of Production of Maize By Zero-Tillage Method

	Cost Item	Cost/Hectare (₦)
1.	Harrowing to destroy ridges and cut grass	12.50
2.	Perquat application at the of 5 lit/ha.	30.00
3.	Cost of spraying perquat	5.00
4.	Basal dose of fertilizer (NPK)	80.00
5.	Cost of Planting and fertilizer application	10.00
6.	Cost of seed at the rate of 15 kg/ha.	4.50
7.	Cost of Atrazin-pre-emergence spray 5kg/ha. at ₦5/lit.	25.00
8.	Cost of spraying Atrazin	5.00
9.	Second doze of fertilizer (CAN)	52.50
10.	Fertilizer application with land labour	15.00
11.	Plant protection chemicals + application	25.00
12.	Cost of guard and watch	32.00
13.	Cost of harvesting by land labour	50.00
14.	Cost of transporting Maize cobs for drying	3.50
15.	Cost of Shelling with cron sheller	20.00
	Total cost per hectare	₦370.00
	Yield of maize per hectare Cost of production per tonne	=3.3 Tonnes =₦114.50

Source: National Seed Service, Samaru, Zaria.

Table 43 . Cost of Production of Maize By Conventional Method

	Inputs and Operations	Cost per ha. (₦)
1.	Seed bed preparation (two harrowing) at 12.5 each	₦25.00/ha.
2.	Basal dose of fertilizer 60kg N, 60kg P2 05, 60kg K20 (400kg 15:15:15) at 220N per tonne	₦88.00/ha.
3.	Fertilizer broadcasting with spreader	6.00/ha.
4.	Cost of planting with the tractor driven planter	10.00/ha.
5.	Cost of seed at the rate of 15/ha.	4.50/ha.
6.	Cost of Atrazin pre-emergence spray 5kg/ha at the rate of 5/lit.	25.00/ha.
7.	Cost of spraying Atrazin	5.00/ha.
8.	Second dose of fertilizer 60kg N/ha. (250 kg CNH) at 210 N per tonne	52.50/ha.
9.	Fertilizer application with hand labour	15.00/ha.
10.	Interculture with tractor	10.00/ha.
11.	Plant Protection chemicals and cost of application	25.00/ha.
12.	Cost of guard and watch (one man for two hectare for one month)	32.00/ha.
13.	Cost of harvesting by hand	60.00/ha.
14.	Cost of transporting maize cobs to drying and shelling floor	5.00/ha.
15.	Cost of shelling with cron sheller	20.00/ha.
	Total cost per hectare	₦383.00
	Total yield of Maize per hectare Cost of Production per tonne	= 4.10 Tonnes = ₦93.40

Source: National Seed Service, Samaru, Zaria.

The costs of operations such as harrowing, inter-cultivation, planting, fertiliser application, spraying of herbicides and so on were the actual costs charged by the estate department of IAR, Samaru, to the National Seed Service for the two methods of maize production.

It can be observed from the two tables that it cost the NSS ₦114.50 to produce a tonne of improved maize seeds by the zero-tillage method and ₦93.41 by the conventional method. The two methods thus give an average cost of ₦103.96 to produce one tonne of improved maize seeds.

In 1979 the National Seed Service paid ₦250 per tonne for contractor produced unprocessed improved maize seeds. Plateau State who also used maize seed contractors paid ₦220 per tonne of unprocessed seeds.

These figures show that the government paid more than twice its own cost of producing improved maize seeds to get the same quantity produced by seed contractors within the same time period.

The inability of the government to meet the seed requirement of the farmers must have made it inevitable to engage seed contractors. And the relatively much higher price paid to the contractors were probably meant to serve as incentives to get farmers to participate. If this assertion is true, then the government must start thinking about reviewing seed contract price downwards, as soon as many seed contractors can be made to prodice seeds on competitive basis. This will enable the government to procure more improved seeds at same cost as is now been procured.

Summary

The major concern of this chapter has been the description of improved seeds production by the government and by seed contractors. The major farm operations normally carried out during seed production exercise were identified to include land clearing, ridging seed planting, fertiliser application, weeding, harvesting and processing.

The appointment of seed contractors, particularly at state level, does not appear to be on any competitive basis. Too much reliance is placed on one man's recommendation in the selection of seed contractors. It was pointed out that this procedure is unsatisfactory, since it is prone to bias and favouritism which may prevent the choice of the right type of people.

It was pointed out in the chapter that the government paid more than twice its own costs to get same quantity of improved maize seeds produced through the use of seed contractors. This was attributed to the need of the government to provide incentives of farmers to get them to participate in seed production. A review of the contract price as soon as improved seeds could be produced on competitive basis was suggested.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

Seed Multiplication and Distribution is one of the agricultural strategies embarked upon by the Federal Government of Nigeria to boost food production and to avert acute food shortages in the years ahead.

Although this programme has existed for quite a long time, there has never been an assessment of how the system is performing. Published information monitoring the activities of the institutions involved in the programme are scarce to come by. This situation has left many questions still unanswered. Why are many Nigerian farmers unable to avail themselves of improved seeds? What institutions are involved in the seed multiplication and distribution system?, and what problems are these institutions encountering? The answers to these questions and many others have been the main concern of this thesis.

Organizational Set up of Seed Multiplication and Distribution Pattern

This study has revealed that the existing seed multiplication and distribution system is dominated by government monopoly. Four government institutions were identified to be involved in running the present seed industry. These institutions are:

(a) The National Seed Committee (NSC)

(b) The National Seed Service (NSS)

(c) The State Seed Multiplication Projects (SSMP)

(d) The National Seed Certification Unit (NSCU)

The functions of each of these institutions were discussed in Chapter 3 of this thesis. It was pointed out that the National Seed Committee formulates seed policies while the NSS ensures the supplies of foundation seeds to the State Seed Multiplication Projects. The NSS among other functions also organizes seed improvedment training courses and helps the states to set up processing and storage facilities.

It was discovered that the NSS is not only under-equiped and under-staffed, its existing staff are also saddled with the functions of seed certification due to inexistence of a separate seed certification unit. It was pointed out that this situation can hamper the efficiency with which improved seeds are produced since the attention of NSS staff could become divided between seed production and seed certification.

The State Seed Multiplication Projects are charged with the responsibility of producing and distributing certified seeds to farmers in their respective states. Apart from the states' Ministry of Agriculture, farmers in the study area could obtain improved seeds of rice, maize, guineacorn and millet from the NSS, Divisional Agricultural Officers and from village heads. The study shows that the majority of farmers interviewed expressed preference for supply of improved seeds by the Ministry of Agriculture through the Local Government Areas.

Late arrival of improved seeds to farmers' gates, inadequate seed quantities and village politics resulting in some farmers not getting seeds while others have excess were identified to be the major defects in the existing improved seeds distribution systems.

Problems Encountrered In Seed Multiplication and Distribution System In Nigeria.

The major problems facing the existing seed industry in Nigeria were identified to be financial constraints, transportation bottlenecks, shortage of qualified personnel, inadequate seed processing and storage facilities and consequent inability to meet farmers demand for improved seeds. Each of these problem areas were discussed in this thesis.

Financial constratints, ranging from complete unavailability to inadequate and untimely release of funds appeared to be the most serious problem faced in the states seed multiplication projects.

It was shown that the improved seeds of maize, rice, guineacorn and millet were grossly under-supplied to farmers in the study area in 1978/79 season. The under-supply of improved seeds was most acute for millet for which only 29 percent of farmers' requirements was met in 1978/79 growing season. Only in the case of rice was 54 percent of farmers' request for improved seeds were supplied. In the case of guineacorn and maize, less than 50 percent of farmers request for improved seeds were supplied.

Factors Influencing the Adoption of Improved Seeds

The influence of some factors on adoption or non-adoption of improved seeds in the study area were examined in chapter 4 of this thesis. These factors are level of information available to farmers, extent of improved seeds availability, fermers' preference between improved seeds and tradtional seeds and the prices charged for the seeds.

It was shown that farmers in the study area appeared to be highly informed about existence of improved seeds. However only about half of sampled farmers in the study area who have heard of improved seeds have adopted the innovation. Reasons given by non-adopters include unavailability of improved seeds and inability to comprehend the technology of improved seeds.

The availability of complementary inputs like fertilizer and insecticides seem to encourage farmers to use improved seeds of maize, rice, guineacorn and millet. Fertilizer constitutes the most widely used complementary inputs by farmers on their farms. This is followed by insecticides while herbicides were used only by very few farmers.

All farmers who used improved seeds preferred them to traditional seeds. The reasons advanced for this include improved seeds' potential to yield more than traditional seeds, better response of improved seeds to fertilizer, improved seeds' better taste as well as the ability of improved seeds to germinate and mature faster than traditional seeds.

It was pointed out that prices charged for improved seeds by the government were tailored towards encouraging farmers to purchase and use improved seeds.

Seed Multiplication By Contractors

Although the bulk of the present seed production in the study area is by the government, a few 'progressive farmers' were employed by the government to produce improved seeds on agreed terms. It was pointed out that the appointment of such 'seed contractors' were not on any competitive basis, particularly at the state level. Too much reliance was placed on one man's recommendation in the selection of the seed contractors. This procedure is unsatisfactory since it can be prone to bias and favouritism.

The costs of production of improved maize seeds by the government directly were compared to the price paid by the government to contractors to get same quantity of improved maize seeds produced. This analysis showed that the government paid more than twice its own costs to get the same quantity of improved maize seeds produced by contractors.

Problems and Limitations of the Study

Three problems of this study need to be isolated for discussion. First is the dearth of data on many of the states' seed multiplication activities and on the activities of seed multiplication contractors. This study has shown that many states did not keep adequate and up to date records on quantity of seeds received or produced as well as the

sources of the seeds. The quantity of seeds distributed to farmers in some places were not easily obtained.

Records of operations and the associated costs were also not adequately kept by many seed farms. In a few places where these records existed, they were lumped together thus making it difficult to estimate the cost of seed production on government seed farms in the States.

Another problem encountered in this study concerns an aspect several people have written about, namely, the effect of illiteracy on the accuracy of data collection (Norman, 1973, Ejiga, 1977). Most of the respondents in this study were illiterates who could not read or write to aid in record keeping. This means that farmers had to rely on memory recalls in their answers to the questionnaires. Lack of record keeping by the farmers made it impossible to cross check the information they gave. It is important to stress therefore that great caution need to be exercised in making any general statement from the findings of this study.

The third and major problem and limitation of this study concerns data on quantities of improved seeds. Most of the respondent farmers are not familiar with the scientific and standard system of measurements. Consequently, quantities of improved seeds required and obtained by most farmers were given in local unit, the "mudu". The quantities

involved were converted to standard units using sample weights of measures. It should be pointed out that the accuracy of the results obtained from this conversion exercise depends largely on the representativeness of the average weight of a "mudu" as well as the accuracy of information obtained from farmers as regards the number of mudus of improved seeds reported. Caution must therefore be exercised in the interpretations of the results obtained from improved seeds requested and obtained by farmers.

The final limitation of this study is with respect to the comparison of government costs in producing improved seeds directly to the price paid to seed contractors. The nalysis was based on data obtained from only one trial experiment. There may be need to analyse several years' results before a conclusive statement can be made as regards government costs in producing improved seeds.

RECOMMENDATIONS

For the Seed Multiplication and Distribution Programme in Nigeria to achieve the stated objective of boosting food production, immediate steps must be taken to alleviate the problems that are currently militating against the programme. In this connection the following suggestions should receive urgent attention:

a) Adequate Financial Commitment: At the root of most problems facing the seed industry in Nigeria today is lack of sufficient funds. It is therefore suggested that adequate funds be made

available for the seed multiplication programme at both Federal and State levels. This will enable more improved seeds to be produced through expansion of seed farms. Funds devoted to the seed multiplication programme must be released early enough so that activities like land clearing, ridging, planting, harvesting and processing do not suffer delays.

b) Training:- Adequate knowledge about seed technology is very essential to the production of good quality seeds. Significant emphasis must therefore continue to be placed on the training of all those involved or to be involved in seed production. Training programmes must be designed to cover seed contractors as well as the staff of states seed projects. The various facets of seed production such as seed multiplication, seed processing, and seed storage must be adequately treated during seed training programmes. The efforts of the NSS in organizing annual seed improvement courses is highly commendable. In order to increase the number of beneficiaries from this training scheme, serious thought should be given to organizing two such courses within a year.

c) Adequate Fleet of Vehicles:- The government of each state in the Federation should ensure that, based on needs, adequate number of vehicles are allocated to the seed multiplication

and distribution project. These vehicles must not be allowed to suffer constraints like lack of spare parts and unavailability of fuel. The availability of well maintained fleet of vehicles will facilitate the job of seed haulages and inputs conveyance to the seed farms as well as farm inspections by agronomists.

d) Adequate Publicity on Improved Seeds:- More publicity need to be given to the use of improved seeds among Nigerian farmers. Campaign vans can be used to get to farmers in their villages particularly just before the growing season. Farmers should be educated as regards where, when and how they can obtain improved seeds. Demonstration farms can be set up so that farmers get more practical knowledge concerning seed rate, seed spacing, fertilizer application and so on.

e) Processing and Storage Facilities:- It is one thing to produce good quality seeds, it is another to retain and preserve the quality through good processing and efficient storage. All the states should give priority attention to possessing seed processing machines that will be able to cope with the seeds produced within the states. The farmers in the state should be allowed to enyoy the services of these processing facilities on subsidized basis. This is likely to serve as an additional

incentives to using improved seeds.

The stores in which improved seeds are stored prior to disposal should be kept clean and out of reach of snakes, rodents, insects and so on. As much as possible improved seeds should be stored separately from other products to prevent contamination.

f) Complementary Inputs:- Since improved seeds perform optimally in the presence of all other complementary inputs, the government must make adequate quantities of fertilizers, herbicides, credit, insecticides and so on available to farmers along with the supply of improved seeds. It is important to ensure that these inputs get to farmers at the right time.

g) Selection of Seed Production Areas:- The production of selected improved seeds in each state should take place in locations that are most suitable. This will involve a pre-production soil analysis. Other factors to consider in deciding which crop to produce in each area should include absence of natural hazards like floods, droughts etc., diseases and insects and labour availability.

h) Improved Seeds Marketing:- Any organization going to be involved in seed marketing should emphasize:

1) Marketing research to find out which seeds are demanded by farmers in a particular area;

2) demand assessment so that farmers can get as much improved seeds as they will use judiciously;

3) mapping out easily accessible sale points where seeds can be obtained by farmers;

4) maintaining close link with farmers to know their complaints and feeling concerning each type of improved seeds.

i) Incentives to Workers:- In order to create favourable environment for seed production workers, adequate incentives must be created. These incentives should cover provision of cheap accommodation as well as vehicle loans. Prompt settlement of the claims of the staff of the seed multiplication project should be given adequate consideration as this could constitute an incentive to workers.

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APPENDIX I

IDENTIFYING CHARACTERISTICS OF RICE VARIETIES

Characteristic	FARO-11 (OS-6)	FARO-12 (SIL 140/10)	FARO-13 (IR-8)	FARO-15 (FRRS-162-B11 - 1)	FARO-19 (IR-20)	FARO-25 (FARO x 50/30)	DOS 73
Plant Height	tall, lodging	tall non-lodging	short, erect, non-lodging	intermediate, non-lodging	intermediate, non-lodging	tall lodging	semi dwarf
Tillering capacity	low	low	high	high	high	medium	high
Stem base	green	purple	green	green	green	green	green
Leaves	Long, broad and droopy	narrow, long erect	short, broad erect	short, broad erect	medium, long lax	long, broad lax	-
Leaf sheath	green	purple	green	green	green	green	-
Panicle	fully exerted	semi-exerted and dropping	short dense	fully exarted medium dense	fully exerted	fully exerted dropping	fully exerted
Flag leaf	dropping	erect late	erect	erect	erect	erect	erect
Apiculus colour	pink to straw	purple to brown	green to straw	green to straw	green to straw	pink to straw	-
Awns	none	none	occasional	occasional	occasional	none	-
Maturity	110-115	140-145	135-140	145-160	140-145	115-120	135
Seed type	(B type)	(B type)	(B type)	(B type)	(B type)	(B type)	medium bold
Classification	upland	swamp	swamp	swamp	swamp	upland	swamp

Source: Technology of Seed Production and Certification in Nigeria National Seed Service, FAO/UNDP, Ibadan, 1979.

APPENDIX II

IDENTIFYING CHARACTERISTICS OF MAIZE VARIETIES

Name of Variety	Kind	Maturity (days)	Plant-type	Ear type	Ear Place
FMRI - 7 (Western yellow)	yellow, dent	120-130	tall plants, liable to lodging	one large ear	high
FMRI - 23 (096 Ep6)	yellow to deep yellow dent	120-130	tall solcust plants which remain green	large and long two ear per plant	high
FMRI - 25 (NCBR B02u)	white composite	100-110	small plants with more upright leaves than the average	one small	low to medium
FMRI - 27 (TZPB)	white dent composite	115-120	medium tall	one large with flat seeds	medium
FMRI - 34 (TZB)	white composite semi-dent	115-120	medium tall	one long with rounded seeds	medium

Source: Adapted from Technology of Seed Production and Certification in Nigeria. NSS,FAO/UNDP. Ibadan, 1979.

APPENDIX III

IDENTIFYING CHARACTERISTICS OF SORGHUM VARIETIES

Name of Variety	Area Recommended	Type	Plant Height (cms)	Maturity (days)	Shape of	Seed Colour	Leaves
H. P. - 3	Northern Sudan Savannah	Dwarf	130	105-110	Medium compact	Cream	-
H. P. - 6	" "	semi-dwarf	140	100-105	Medium compact	Cream	-
S. A. 5	" "	" "	160	110	Medium	Yellow	dark
Nano Dulk	Sudan Savannah	Medium tall	180	130-140	Semi-compact large	White	dark green
D. Z. I.	" "	Medium tall	190	145-150	Compact long	Yellow	-
L. - 187	Guinea Savannah	Semi-dwarf	180	160-165	Large Semi-compact	Yellow	Large dropping
L. - 1499	" "	tall	200	155-165	Large, loose	White 7	upright
L. - 191	" "	Medium tall	190	155-160	Semi-compact pointed	Cream	-
SK - 5912	" "	tall	210	170-175	Compact elliptical	Yellow	-
C - 7-44	Southern guinea	Very tall	400	180	Large, loose	White	-
FDI	" "	Very tall	400	180	Medium loose	Yellow	-

Source: Technology of Seed Production and Certification. NSS, FAO/UNDP, Ibadan, 1979.

APPENDIX IV

IMPORTANCE OF CEREALS IN VARIOUS STATES IN NORTHERN NIGERIA

Consumption in Kg per capita per seek						
Cereal crops	Kaduna	Kano	Benue and Plateau	Bauchi, Borno and Gongola	Kwara	Niger and Sokoto
Sorghum	1.98	1.78	0.80	1.60	1.17	1.74
Millet	1.46	1.91	0.67	1.78	0.03	0.79
Maize	0.08	n	n	0.70	n	0.96
Rice	0.01	0.01	0.005	0.01	0.27	0.05
Wheat	0.005	n[1]	n	n	n	n
Population[2] (million)	5.9	8.3	6.4	7.1	2.4	8.2

Source: Adapted from Abalu and D'Silva, 1979 as computed from Federal Office of Statistics.

Notes: 1. n = negligible

2. 1978 Estimates.

APPENDIX V

SOME NATIONAL SEED SERVICE SEED PRODUCTION CONTRACTORS IN NORTHERN NIGERIA

CONTRACTOR	LOCATION	SEED PRODUCED
Bokkos Farm Project	Bokkos, Plateau State	Rice, Maize
Lonkat Cooperative Growers	Lonkat, Plateau State	Rice, Maize
Lantang Cooperative Growers	Lantang, Plateau State	Rice, Maize
Lafia Cooperative Growers	Lafia, Plateau State	Rice
Gangnum Cooperative Growers	Gangnum, Plateau State	Rice, Maize
Kaduna Polytechnic	Kaduna State	Rice, Maize, Wheat
Bala Kaya & Sons Seed Growers	Kaduna State	Rice, Maize, Millet, Sorghum
Funtua A. D. Project	Funtua, Kaduna State	Maize, G/Nuts
Gusau A. D. Project	Gusau, Sokoto State	Maize, G/Nuts

Source: Culled from Project Report on National Seed Multiplication NSS, FAO/UNDP, Ibadan, 1978.

APPENDIX VI

PLANNED ESTIMATED EXPENDITURES ON SEED MULTIPLICATION IN THE 1975-80 DEVELOPMENT PLAN

State	Total Expenditure	1975-76	1976-77	1977-78	1978-79	1979-80
Kano	20,961,000	1,650,434	2,908,464	4,201,934	5,465,134	6,735,034
Kaduna	500,000	50,000	75,000	100,000	125,000	150,000
Benue-Plateau	1,500	300,000	300,000	300,000	300,000	300,000
Kwara	3,500,000	382,000	547,000	690,000	855,000	1,026,000
North-Eastern State*	1,435,300	250,000	250,000	250,000	285,300	400,000
North-Western State**	500,000	50,000	75,000	100,000	125,000	150,000

Source: Third National Development Plan Vol. II.

* North-Eastern State had since been broken down into Gongola, Borno and Bauchi States.

** North-Western State is now made up of Sokoto and Niger States.

APPENDIX VII

Application for Seed Production

The Project Co-Manager,
National Seed Service,
Ibadan, Samaru, Jos.

or

The Project Manager,
State Seed Multiplication Unit,
(Address).

Dear Sir,

I/We am/are interested in taking up seed multiplication on your behalf on my/our farm. Request that a programme of .....(tons) of foundation certified seed of .....(crop) may kindly be alloted for the crop season.....

The following particulars are given:-

1. Name and mailing address of the grower .....
2. Farm address and routing .....
3. State the equipment available for farm operations .....
4. Whether the farm is equipped with a shed, threshing floor, fertilizer store etc. .....
5. Area of the farm (ha) .....
6. Soil type .....
7. Previous experience in seed production.....
8. Can you provide necessary isolation .....

I agree to abide by your regulations and am willing to enter into contract agreement for the said programme for seed production.

Date:.....

Yours truly,
(Signature of the grower)

APPENDIX VIII

Model Agreement for Contract Seed Production

SCHEDULE

Agreed between the National Seed Service (heretoafter called NSS), Federal Department of Agriculture, P. M. B. 5471, Moor Plantation, Ibadan on the one part and (Name and Address of Seed Grower).

.....

(heretoafter called grower), the other part to carry out - foundation certified improved seed production of .....(crop and variety) to the extent of .....tons (processed seed) during the crop season 1979..... on the farm of the said grower and which seed will be procured by NSS at the rate of N.....per ton of processed seed provided it meets the required quality specification.

Whereas both parties have discussed and mutually agreed to the terms and conditions attached and forming part of this schedule, this agreement is signed on this .....day of .....19.....

to give effect to the stipulated contract for seed production.

1.....
Representative, National Seed Service

2 .....
Seed Grower

3.....
Witness

APPENDIX IX

LIST OF SOME CONTRACT SEED GROWERS

	Agency	Location
1.	Bokkos Farm Project	Bokkos Plateau State
2.	Lonkat Cooperative Contract Growers	Lonkat Plateau State
3.	Langtang Cooperative Rice Growers	Sabongida Plateau State
4.	Lafia Cooperative Rice Growers	Lafia Plateau State
5.	Gagnum Cooperative Growers	Gagnum Plateau State
6.	Bendel Food Production Board	Benin Bendel State
7.	Bendel/Tiffany Farms	Tiffany Bendel State
8.	ADA Rice	Uzo-Uwani Anambra State
9.	Agricultural Development Corporation	Ezilo Anambra State
10.	World Bank Rice Project	Ogbojo Anambra State
11.	Norcap Centre	Abakaliki Anambra State
12.	Equatorial Guinea Resettlement Farm	Iheamufu/Ishieke Anambra State
13.	Pioneer Farms Okaka	Okaka Oyo State
14.	River Valley Farm Enterprises	Iseyin Oyo State
15.	Onigbogi Farms	Ilora Oyo State
16.	I.A&T Seed Production Programme	Ilora/Ikenne University farms
17.	Kaduna Polytechnic	Kaduna Institutional farm
18.	Bala Kaya & Sons Seed Growers	Kaduna Road Kaduna State
19.	Funtua Agric. Development Project	Funtua Kaduna State
20.	Gusau Agric. Development Project	Gusau Sokoto State
21.	Godwin farms	Eruwa-Abeokuta Ogun State
22.	Egba-Owode Coop. Rice Growers	Owode Ogun State
23.	Ogere Coop. Growers	Ibadan-Express Way Ogere, Ogun State
24.	Norcap Farm, Ikwo Coop. World Bank programme	Anambra State.

Source: NSC, FAO/UNDP, 1979, p. 37.

APPENDIX X

SEED MULTIPLICATION AND DISTRIBUTION SYSTEM
IN KADUNA, KANO AND PLATEAU STATES OF NIGERIA

FARMER'S QUESTIONNAIRE

1. Date of interview _____

2. Name of Enumerator _____

3. Farmer's State _____ 4. Farmer's Local Govt. Area _____

5. Farmer's Village/town _____ 6. Age of Farmer (approx) _____

7. No. of farmer's wives _____

8. No. of farmer's children:

Age	Males	Females
a. 1-5 years		
b. 6-10 years		
c. 11-15 years		
d. 16-20 years		
e. 21-25 years		
f. Above 25 years		

9. How many of your children now work for you on your farm? _____

10. Farmer's occupation (in order of importance)

1st _____
2nd _____
3rd _____
4th _____
5th _____
6th _____

11. How many farm sites do you have? _____

12. What major crops have you grown over the past 3 years?:

Year	Crops	Quantity produced	
		Units	No. of Units produced
Last year	a.		
	b.		
	c.		
	d.		
2 years ago	a.		
	b.		
	c.		
	d.		
3 years ago	a.		
	b.		
	c.		
	d.		

13. Have you heard of improved seeds before:

a. Yes _____

b. No _____

14. If Yes, for which crops and since when?

Crop	When heard of (first time)
a.	
b.	
c.	
d.	
e.	
f.	
g.	
h.	

15. Have you used improved seeds before? a. Yes _____

b. No _____

16. If Yes, for which crops and for how long?

Crop	How long used (in years)
a.	
b.	
c.	
d.	
e.	
f.	
g.	
h.	

17. Have you noticed any difference between the improved seeds you used and the traditional seeds you were using before?

a. Yes _____

b. No _____

18. If Yes what is the nature of the difference

a. .....

b. .....

c. .....

d. .....

e. .....

19. If you used improved seeds last year, from where did you obtain them and what prices did you pay?

Crops	Source	Units	Price/Unit	No. of units purchased last season
a.				
b.				
c.				
d.				
e.				
f.				
g.				
h.				

20. Which are your regular sources of improved seeds and which do you prefer and why?

Sources	Rank	Reasons

21. If improved seeds were given to you free of charge, state by who

a. State Ministry of Agriculture _____

b. The National Seeds Service, Samaru _____

c. National Accelerated Food Production Project (NAFPP) _____

d. Other farmers _____

e. Others (Please specify) _____

22. When did you get improved seeds last season?

    a. At the time I needed them for planting _____

    b. Long before I wanted them for planting _____

    c. Long after the Planting season _____

23. What quantities of your want of improved seeds did you get last production season?

Crops	Quantity required (Units)	Quantity received (Units)

24. Is the situation getting better or worse for:

    a. Timeliness of arrival of seeds _____

    b. Adequacy of supplies (of seeds) _____

    c. Prices of seeds _____

25. Do you prefer improved seeds to traditional seeds?

    a. Yes _____

    b. No _____

26. If Yes, Why? _____

_____

_____

_____

_____

27. If No, Why? _____

.....

.....

.....

28. How did you dispose of the total quantity of improved seeds you obtained last year?

How used	Proportion used this way
a. Planted	
b. Eaten	
c. Sold	
d. Gifts	
e. Reserved	
f. Others:	

29. Did you get any extension advice concerning the use of the improved seeds?

a. Yes_____ b. _____

c. No _____

30. If yes, do you now know the recommended practices for using improved seeds?

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.....

.....

31. Did you follow these recommended practices during the last production season? _____

.....

32. Were the instructions easy to follow? _____

.....

33. How have these instructions helped you? .....

.....

.....

34. What other inputs did you use last season on your improved seeds farm?

Inputs	Units	Qty of Units	Price/Unit
a. Fertilizer			
b. Herbicides			
c. Insecticides			
Others			

35. If you didn't use any other inputs, why?

a. They were not available at all .....

b. They arrived very late .....

c. They were available but too costly .....

d. I had no money to buy them .....

e. I did not know the benefits .....

f. Others (Please specify) .....

.....

36. What problems have you faced in the use of improved seeds?

.....

.....

.....

37. What help will you like from government concerning the use of improved seeds?

.....

.....

.....

APPENDIX XI

SEED MULTIPLICATION AND DISTRIBUTION SYSTEM IN KADUNA, KANO AND PLATEAU STATES OF NIGERIA

SEED CONTRACT GROWER'S QUESTIONNAIRE

1. Date of Interview _____
2. Name of Interviewee _____
3. Name of Seed contractor _____
4. Contractor's State _____
5. Contractor's L.G.A. _____
6. Contractor's town/village _____
7. Contractor's age _____
8. No. of Wives of contractor _____
9. No. of Children of contractor:

Age	Males	Females
1-5 years		
6-10 years		
11-15 years		
16-20 years		
21-25 years		
Above 25 years		

10. How many of these children work for you on the farm?

_____

11. Rank your occupations in order of importance

a. .....

b. .....

c. .....

d. .....

e. .....

12. When did you become a government seed contract grower? .....

13. How did you become a contract seed grower? .....

.....

.....

14. What are the usual terms of contract? .....

.....

.....

.....

15. What are the steps in obtaining a contract? e.g., after seeing advertizement and you applied and interviewed, what type of information did you supply in your application that has aided your been appointed?

.....

.....

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.....

.....

.....

16. Supply these information on the quantities of seeds you have produced for the past 3 years:

Year	Crops (seed type)	Quantity of foundation seeds (units)	Price per unit	Total Hectares planted	Quantity produced (units)
Last Year	a.				
	b.				
	c.				
	d.				
2 Years ago	a.				
	b.				
	c.				
	d.				
	a.				
	b.				
	c.				
	d.				

17. Give estimate of your expenses on the following items for the past 3 years in the course of multiplying seeds:

Year	Crops	Labour N	Equipment N	Fertilizers N	Herbicides N	Others
Last year	a.					
	b.					
	c.					
	d.					
2 Years ago	a.					
	b.					
	c.					
	d.					
3 Years ago	a.					
	b.					
	c.					
	d.					

18. Do you own tractors? a. Yes _____ b. No. _____

19. If Yes, how much did you buy each one, and when?

Tractor	Purchase price	When purchased
a.		
b.		
c.		
d.		

20. How did you obtain the land on which you produced seeds last season?

21. If you have been paying rent on land, give estimate of the amount of rent you paid for the areas of land which you produced seeds.

Year	Crops	Total Hectare Used	Amount of rent paid on these Hectares
Last Year	a.		
	b.		
	c.		
	d.		
2 Years ago	a.		
	b.		
	c.		
	d.		
3 Years ago	a.		
	b.		
	c.		
	d.		

22. What do you normally do with your seed output? _____

a. _____
b. _____
c. _____
d. _____

23. If you have been selling your seed output to the government, what prices were you paid and what quantities did you supply?

Year	Crops	Quantity sold (Units)	Price Obtained/ unit
	a.		
	b.		
	c.		
	d.		
	a.		
	b.		
	c.		
	d.		
	a.		
	b.		
	c.		
	d.		

24. Who else did you sell your seeds output to last year and what price?

Seed Buyer	Quantity bought (unit)	Price/Unit
a.		
b.		
c.		
d.		
e.		
f.		

25. Who was responsible for transporting your seed output to government depot?

a. myself _____

b. The Govt. _____

26. If you transported the seeds, to which seed depot? _____

27. Approximate distance of the depot from contractor's farm _____ Kilometres

28. If you were paid for transporting the seeds last year, at what rate?

Crops	Total quantity transported (Units)	Distance Covered	Amount paid kil/₦
a.			
b.			
c.			
d.			
e.			
f.			

29. By what mode of transportation did you convey your seeds to the depot?

_____

_____

_____

_____

_____

30. Estimate your cost of transportation for each crop you produced and transported last season

Crop	Quantity transported (Units)	Transportation cost (₦)
a.		
b.		
c.		
d.		
e.		
f.		

21. After delivering your products to the government when were you paid?

a. Immediately _____

b. 1-3 months after delivery _____

c. 4-6 months after delivery _____

d. 7-9 months after delivery _____

e. 10-12 months after delivery _____

f. Above 1 year after delivery _____

32. Give estimates of your expenses on the following operations during last seed production season

Crops	Total quantity produced (Unit)	Land Clearing	Ridging	Seed Planting	Weeding	Harve-sting	Proce-ssing	Others
a.								
b.								
c.								
d.								
e.								
f.								
g.								
h.								

33. What form of extension advice did you get and from who (during last year production season?

Advice	Sources

34. What recommended practices did you receive for the seeds produced concerning spacing, fertilizer levels, spraying etc.

Crops	Time of Planting	Spacing	Seed Rate	Fertilizer level	Others

35. Were the recommendations followed?

Yes _____

No _____

36. If No, Why?

_____

_____

_____

37. If you didn't process the seeds by yourself (i.e., on your farm) where did you process them? _____

38. Which of the conditions of your contract did you find very difficult to abide with and why? _____

39. What are the major problems you have been encountering (facing) since you were appointed a government seed contract grower?

40. Suggestions to improve conditions for seed contracting_____

41. What form of helps do you need to assist you in seed contracting?

APPENDIX XII

SEED MULTIPLICATION AND DISTRIBUTION SYSTEM IN KADUNA, KANO AND PLATEAU STATES OF NIGERIA

QUESTIONNAIRE FOR GOVY. SEED MULTIPLICATION FARMS

1. Date of interview _____
2. Name of enumerator _____
3. Name of Farm Centre _____
4. State in which seed farm is located _____
5. LGA in which seed farm is located _____
6. Date of establishment _____
7. What are the main activities of the farm centre (e.g., seed multiplication, experiments commercial production etc) and what proportions of the farm centre land were allocated to each activity.

Farm Activity	Land Allocated last year (Hectare)	Land Allocated this year (Hectare)
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

8. What criteria are used in deciding the land allocation?

a. _____

b. _____

c. _____

d. _____

e. _____

9. Historical data on seeds produced:

Year	Crop 1___		Crop 2____		Crop 3____		Crop 4_____	
	Hectare Planted	Total yield (units)	Hectare planted	Total yield (units)	Hectare planted	Total yield (units)	Hectare planted	Total yield (units)
1978								
1977								
1976								
1975								
1974								
1973								
1972								
1971								
1970								
1969								
1968								
1967								
1966								

10. Historical Data on quantity of foundation seeds received:

Year	Crop 1 ____		Crop 2 ___		Crop 3 ___		Crop 3 ___	
	FSR*	Hec.	FSR	Hec.	FSR	Hec.	FSR	Hec.
1978								
1977								
1976								
1975								
1974								
1973								
1972								
1971								
1970								
1969								
1968								
1967								
1966								

11. Description of processes involved in seed production: e.g.,

a. Seeds and instructions are received at about _____(time of year)

b. Materials arrive at about _____(time of year)

c. Planting takes place at about _____(time of year)

d. Harvesting at about _____(time of year)

e. Processing at about _____(time of year)

f. Others (please specify) _____ " "

_____

_____

* Note FSR = Quantities of foundation seed received and planted.

12. What proportion of the farm centre financial vote was expended on seed production

Year	Total vote for farm centre (₦)	Amount spent on seed multiplication (₦)
1978		
1977		
1976		
1975		
1974		
1973		
1972		
1971		
1970		

13. Rank the farm operations you carried out (last season) in terms of total expenditures on these operations in the process of seed multiplication.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

14. Was there any extension advice* on how to produce the seeds given? by whom? and was the advice always followed?

Extension advice	Source of Advice	Followed or not
a. Time of planting		
b. Spacing		
c. Fertilizer levels		
d. Spraying		
e. Seed rate		
f.		
g.		
h.		

*e.g., of extension advice includes time of planting, spacing, fertilizer levels, spraying etc.

15. What are the recommended practices concerning spacing, fertilizer levels, spraying etc., for each crop?

Crop	Time of planting	Spacing	Seed rate	Fertilizer level

16. If you didn't follow the recommended practices, why?_____

17. Where were the seeds processed?

_____

_____

_____

_____

18. How were the seeds tested and certified?

_____

_____

_____

_____

19. What do you normally do with the proceeds of the farm?

_____

_____

_____

20. Did you operate a bank account for the seed farm?

Yes _____

No _____

21. If yes, what benefit have you derived from it?_____

_____

_____

_____

_____

_____

_____

22. What other inputs did you use last production season with respect to seed production?

Inputs	Source	Total quantity used (Units)	Total expenditure (if you purchased it) (₦)

23. What do you normally do with the proceeds resulting from seed multiplication?

_____

_____

_____

_____

24. What major problems did you face in the course of seed multiplication?

a. Shortage of skilled staff _____

b. Untimely arrival of seeds _____

c. Delay in releasing funds _____

d. Others (please specify) _____ _____ _____

25. What suggestions can you give towards improving on the present system of seed multiplication on the farm centre?

_____

_____

_____

APPENDIX XIII

SEED MULTIPLICATION AND DISTRIBUTION SYSTEM
IN NORTHERN NIGERIA

FORM SQRE 1

1. Date .....

2. State .....

3. Major food crops under the seed multiplication programme in the State.

a. .....

b. .....

c. .....

d. .....

e. .....

f. .....

g. .....

h. .....

4. What quantity of foundation seed for each crop did you receive last production season and from where?

Crops	Source(s)	Quantity received
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

5. What quantity of received foundation seed did you plant last production season?

Ccrops	Quantity planted	Area Planted (Hectare)
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

6. Total output obtained last season and estimate of expected output this season.

Crops	Output last Season (units)*	Expected Output this season
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

* Please specify the unit of output.

7. Give estimate of total quantity of improved seeds demanded by farmers in the state last season.

Food Crops	Quantity Demanded by all farmers (unit)
a.	
b.	
c.	
d.	
e.	
f.	
g.	
h.	

8. Give estimate of quantity of improved seeds distributed (or sold) to farmers last season and this season.

Food Crops	Quantity Distributed last season	Quantity Distributed this season
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		

9. Give a brief description of improved seed distribution procedure in your state.

.....

.....

.....

.....

.....

.....

10. What do you consider to be the major problems of seed multiplication and distribution in your state?

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