



**MULTI-AGENCY PARTNERSHIPS FOR
TECHNICAL CHANGE IN WEST
AFRICAN AGRICULTURE:**

**NIGERIA CASE STUDY REPORT ON RICE PRODUCTION
PREPARED BY**

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FOR

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ACRONYMS

ADP	Agricultural Development Programme/Project
BPG	Best Practice Guidelines
CBDD	Capacity-Building for Decentralised Development
CBO	Community-Based Organisation
DFID	Department for International Development
EDO	Eco-systems Development Organisation
FO	Farmers' Organisation
FoN	Federal Government of Nigeria
FUAs	Fadama Users' Associations
GNP	Gross National Product
GO	Government Organisation
IBRD	International Bank for Reconstruction and Development
IFAD	International Fund for Agricultural Development
IKS	Indigenous Knowledge System
IVC	Inland Valley Consortium
M-APs	Multi-Agency Partnerships
MLAs	Multi-Lateral Agencies
NARS	National Agricultural Research System
NERICA	New Rice for Africa
NCRI	National Cereal Research Institute
NGO	Non-Governmental Organisation
NFDP	National Fadama Development Programme
ODI	Overseas Development Institute
PAP	Poverty Alleviation Programme
RNR	Renewable Natural Resources
RNRKS	Renewable Natural Resource Knowledge Strategy
RRI	Regional Research Institutions
SEM	Socio-economic methodologies (component of RNRKS)
WARDA	West African Rice Development Association
Winrock	Winrock International Institute for Agricultural Development
WNAD	West and North Africa Division

Currency

During the study period, November 2001-November 2002, exchange rates were;

US\$	UK£
1.00	0.68
N130.00	N200.00

EXECUTIVE SUMMARY

Although rice is a traditional crop in Nigeria, local production was limited until recently. Internal demand is growing and, at the same time, rice is a major commodity of world trade. Nigeria is therefore under pressure from international bodies not to restrict imports; production under local conditions to match prices of rice produced on large mechanised farms therefore represents a considerable challenge.

Considerable effort has gone into breeding rice for West African conditions by both WARDA and national research and dissemination institutions such as the NCRI. DFID therefore commissioned a three-country study, MAPs (Multi-Agency Partnerships) to be co-ordinated by the Overseas Development Institute, on the effectiveness of linkages between local, national and international institutions in disseminating improved technologies for rice production.

The study was conducted in two phases; a literature review and a nationwide survey of rice farmers, intended to both describe the situation of rice producers, and to explore the policy environment. Survey techniques were designed to parallel similar studies conducted in Mali and Ghana. This report is a synthesis of the field study conducted in 2001 by EDO, Jos.

A key finding is that despite considerable national and policy emphasis on irrigated rice and large-scale schemes, these now represent an extremely small proportion of rice production. The decline of subsidised inputs during the 1990s has meant that almost all cereal staples are produced in low-input environments on small farms.

The main conclusions are as follows;

- ❖ The absence of a clear government policy on rice production and imports in Nigeria despite increasing internal demand.
- ❖ Very low levels of use of inputs traditionally supplied by government e.g. fertilisers, herbicides, seeds, insecticides, credits and tractors.
- ❖ Almost complete failure of the private sector to meet this 'market gap', except in the case of fertilisers.
- ❖ Near-total collapse of large- and medium-scale rice schemes.
- ❖ Institutional failure of the formal extension system.
- ❖ Only poorly developed farmers' associations, NGOs/ CBOs serving small-scale producers.
- ❖ Increased demand for labour for crucial activities like weeding, harvesting and threshing that cannot be fully met due to high levels of urban migration.
- ❖ Failure of government to assist in processing technology with consequent quality problems in comparison to imported rice.
- ❖ Bodies charged with breeding and disseminating varieties appropriate to farmers, notably the NCRI (national cereals research institute) and WARDA have no effective impact on the ground. Despite a clear awareness of desirable characteristics by farmers this is not effectively communicated to plant-breeders.
- ❖ An absence of action-research on rice–fish culture and other innovative technologies that could add value to rice production.
- ❖ An absence of descriptions of the diverse low-input rice production techniques found in Nigeria that could be disseminated more widely.

At both state and national level, the extension services are extremely ill-adapted to this situation and with 93% of all farmers not visited by extension agents, the potential for partnerships will remain limited until pending a major re-orientation of government services. At the same time, poor private sector development has limited the economies of scale that could be obtained by effective FOs and these are in turn weak. Continual changes in government policy regarding imports (as well as tolerance of unofficial imports) due to the influence of urban lobby groups do not assist producers in longer-term investment plans. M-APs *could* facilitate effective linkages between research, adaptive research and extension if stakeholders were to be in closer contact with one another and feedback was on a more continuous basis.

1. General introduction

1.1 Objectives of the case study

The first phase of this DFID-funded Multi-Agency Partnerships (M-APs) project covered a literature review and description of the rice growing systems in Nigeria. The key players in the rice enterprise were identified and described. A detailed assessment of the role of each stakeholder was made. The interface with regard to governmental policy on the distribution of improved rice seeds to smallholder farmers was analysed in the light of the reality on the ground regarding formal research and extension services. It was noted that both institutions are moribund largely due to scarcity of funds, inefficiency and lack of commitment on the part of government officials and field workers. Even when funds were available, the extension component as spearheaded by the Agricultural Development Project (ADP) had no efficient feedback mechanism with which to liaise between researchers and farmers. M-APs, as a conceptual model, seeks to promote a rapid response to farmers' needs by both extension and research. This would become possible if forums were created at village, local government, state and federal levels in which problems could be discussed collectively and solutions arrived at on the spot. M-APs aims to bring together all major stakeholders in the rice business for face-to-face interactions. The partnership will involve research organisations (e.g. WARDA, IRRI, NCRI), extension practitioners (e.g. ADPs, NAERLS), multilateral organisations (e.g. FAO, UNDP, World Bank); marketers/millers, seed and other inputs supply companies; and farmers' organisations (e.g. Apex Farmers' Co-operatives, *Fadama* Users' Associations and community-based organisations such as *adashe* and labour exchange groups).

This case study report¹ presents the findings of a national rice survey conducted in two phases. In the first phase, a questionnaire was administered in order to gather data from government officials on the condition of the rice industry in two states in each of the six geo-political zones of Nigeria: North-East, North-West, North-Central, South-East, South-West and South-South. The primary concern of the survey was to engage in face-to-face interactions with officials and farmers. For the remaining 24 states and Federal Capital Territory (FCT Abuja), the state questionnaire was given by hand to officials to complete and return. The primary data collected from these structured and unstructured interviews were incorporated into a review and description of the rice systems in Nigeria. The information was also used in preparing this case study report. The first phase took place between October and December in 2000. Questionnaires were also administered to 27 villages and a few individual farmers during that phase. In the second phase, which took place between February and April, 2001, more individual farmers' questionnaires were administered in notable rice growing areas to bring up the number of potential respondents to 1000. This case study focuses mainly on an analysis of the individual farmer's questionnaires. However, primary data and analyses of the questionnaires issued at state and village level are also presented here in order to give a more complete picture (see chapters 2 and 3). There are therefore three perspectives presented in this case study: official, semi-official and unofficial. These represent state governmental positions, the consensus reached by a group of farmers in a village as a result of a brief discussion, and the frank position of individual farmers whose responses are not influenced by the opinion of other farmers.

The broad objective of the M-APs surveys was to identify the socio-economic factors the farmer has to contend with in producing rice. This was to be carried out by an independent researcher in order to avoid the pitfalls of a report whose findings might be couched in the controlled language of government and its institutions. It was of paramount importance to know whether the improved rice seeds being developed by WARDA were reaching farmers and whether the farmers' responses to such varieties were being received by WARDA. The specific objectives were to:

- ❖ Identify and describe the socio-economic characteristics of farmers growing rice

¹ I wish to acknowledge the contribution of Dr. Ezekiel G. Best from the Sociology Department, University of Jos, for providing consultancy services during the analysis of the data for this report. The entire staff of CETRA COMPUTERS worked very hard on processing and keying in the data twice due to equipment failures. I acknowledge the warm reception and co-operation I received everywhere I went in Nigeria in the course of the survey. Mr. N.Y. Longmut of the national office of NAPEP (National Poverty Eradication Programme) worked tirelessly in the collection of primary data in several of the states. I appreciate the assistance of other enumerators whose names appear in the appendix. The text of the present report has been edited by Roger Blench and Carole Pegg.

- ❖ Identify and describe the input usage system
- ❖ Describe the problems, if any, farmers face in growing rice, especially with regard to improved seeds
- ❖ Describe what the farmers perceive as a desirable characteristic in an improved seed
- ❖ Describe existing FOs, CBOs and other organisations that might play a role in disseminating new seeds and other technologies to Nigerian farmers
- ❖ Make recommendations on how M-APs may be implemented in Nigeria.

1.2 Methodology

A total of 1000 farmers were interviewed using a set of structured and unstructured questions given in Appendix 1. Experienced enumerators, whose names are given in Appendix 2, administered the questionnaires. Although 46 villages should have been surveyed across the whole country, the village questionnaire (Appendix 3) was administered in only 27 (Appendix 4) because of budget constraints. Considering the size of Nigeria, ideally about 1000 farmers should have been interviewed to cover the 774 local government areas (LGAs). However, the villages covered will illustrate adequately the diversity of the rice growing systems in Nigeria. The village survey provides a check on the official information given by state officials about the condition of rice production in their respective areas. The state questionnaire is provided in Appendix 5. A comparison of both questionnaires is provided for the 12 states visited and for 5 others that sent completed questionnaires.

The 1000 questionnaires were analysed using Microsoft Access 2000 and a simple query and report method. No attempt is made to analyse parameters such as age and sex in relation to production methods, choice of variety and so on. The sample is too small for such detailed analysis and any conclusion drawn will not be a true representation of the situation in the country. However, the strength of this report lies in its ability to capture the diversity of the rice systems and to present for the first time a response that is from farmers themselves. An implicit contribution to this case study is the author's experience as an agricultural extension practitioner.

2. Rice production variables: perspectives of state government officials

2.1 Introduction

Nigeria operates a 3-tier system of government at federal, state and local levels. All tiers of government participate in activities that promote agricultural and rural development. Their functions overlap in almost all the facets of agricultural production. The key areas that are the exclusive preserve of the federal government has to do with the regulation of imports and exploitation of water resources for the purpose of irrigation. M-APS is about co-operation and collaboration. Since the state governments are a kind of clearing house for federal and local government activities in Nigeria, a state questionnaire was prepared and distributed to all 36 states and FCT to get their perspectives on rice production. This chapter discusses the responses of state government officials. The 1999 Constitution of the Federal Republic of Nigeria that ushered in the present democratic government gives supervisory powers to states over local governments. Therefore the involvement of states in M-APS would be crucial and strategic. Only 17 states completed and returned their questionnaires.

2.2 Background information on states surveyed

Table 1 provides background information on rice production according to the 17 states that completed and returned questionnaires. All six geo-political zones, i.e. North-West, North-East, North-Central, South-West, South-East and South-South, were covered in the national rice survey. The trade languages listed in Table 1 have implications for any programme for the dissemination of agricultural extension information. Any programme that uses only the three national languages of Hausa, Yoruba, and Igbo will exclude millions of farmers who speak only trade languages, such as Tiv and Kanuri. The figures that relate to land under actual

rice production reveal that Kaduna State is the most important rice growing state. Kaduna State, Niger State, Kebbi State, Kwara State, Kogi State and Enugu State, all fall under the River Niger drainage system, which is very favourable for rice production. Benue, Nasarawa and Gombe States form part of the Benue River drainage system. This is an equally important rice zone. Yobe, Jigawa and Borno are part of the Hadejia–Yobe–Chad Basin drainage system. Although the total land area under rice cultivation in this zone is comparatively small, the rice culture is well established there and ought to be encouraged. Plateau, Bauchi and Ekiti, given their hilly topography, are supplied with drainages that are of local origin. Ebonyi is part of the Cross River drainage system; and Zamfara and Kebbi fall under the Sokoto- Rima River drainage system that flows into the Niger.

S/No.	State	Geo-political zone	Trade languages in addition to English	Actual land area under Rice ('000 Ha)	Local government areas
1	Kaduna	North-West	Hausa	261	23
2	Benue	North-Central	Tiv	135	23
3	Gombe	North-East	Hausa	100	11
4	Kebbi	North-West	Hausa	95	21
5	Enugu	South-East	Igbo	65	17
6	Nasarawa	North-Central	Hausa	52	13
7	Ebonyi	South-East	Igbo	40	13
8	Ekiti	South-West	Yoruba	40	13
9	Kogi	North-Central	Yoruba	37	21
10	Bauchi	North-East	Hausa	35	20
11	Plateau	North-Central	Hausa	35	17
12	Jigawa	North-West	Hausa	33	27
13	Borno	North-East	Kanuri, Hausa	32	27
14	Kwara	North-Central	Yoruba	29	16
15	Katsina	North-West	Hausa	24	34
16	Yobe	North-East	Kanuri, Hausa	5	17
17	Zamfara	North-West	Hausa	Not available	14

2.3 Status of rice projects

Table 2 displays the status of rice projects in the states surveyed. The Federal Government is sponsoring state projects such as community seed and special rice programmes (SRP). The SRP is a small programme involving the cultivation of 50 ha. *per* state annually. The community seed programme is not only rice specific but also includes other crops such as maize, cassava and sorghum.

S/No	State	Programme	Year	Recent status/comments
1	Bauchi	National Accelerated Food Production Project (NAFPP)	1975	Defunct but was instrumental to popularisation of state rice production.
2	Benue	Community Seed Programme Special Rice Programme	1995 1998	On going but inputs are received late.
3	Borno	Special Rice Project Accelerated Wheat Project	1998 1997	On going On going
4	Ebonyi	Special Rice Programme	1998	On going but input delivery always late.
5	Ekiti	Information not provided		
6	Enugu	Special Rice Project	1998	On going

S/No	State	Programme	Year	Recent status/comments
7	Gombe	Information not provided.		
8	Jigawa	Special Rice Programme	1998	On going
9	Kaduna	Community Seed Development	1995	On going
		Special Rice Programme	1998	On going
10	Katsina	Special Rice Programme	1998	Terminated by 2000.
11	Kebbi	Special Rice Project	1997	On going
		Sassakawa Global 2000	1999	On going
		Community Seed Production	1996	On going, WARDA is involved.
12	Kogi	Special Rice Programme	1998	On going
		Community Seed Development	1995	On going WARDA is involved.
13	Kwara	Special Rice Project	1998	To be terminated by 2000.
14	Nasarawa	Special Rice Programme	1997	On going
		Community Seed Development Programme	1998	On going
		Rice Out-growers Programme	1987	On going
15	Plateau	Special Rice Programme	1987	On going
		Community Seed Programme	1998	On going
		Rice Out-growers Programme	1998	On going
16	Yobe	Information not provided		
17	Zamfara	Information not provided		

2.4 State rice policies, problems and partnership

Table 3 and Table 4 provide summaries of rice production policies by states, organisations in partnership with them, and explanations of problems in implementing those policies.

S/No.	State	Rice production policy	Problems with policy implementation
1	Bauchi	Information not provided	Information not provided
2	Benue	Information not provided	Information not provided
3	Borno	Procurement and distribution of quality seeds to out-growers	Lack of land preparation machines and credit to contact farmers; non-availability of improved seeds; lack of water pumps and other inputs
4	Ebonyi	Encouragement of farmers through inputs subsidy	Late arrival of inputs for farmers
5	Ekiti	Information not provided	
6	Enugu	Use of high-yielding varieties and expansion of upland rice cultivation	Scarcity of high yielding varieties
7	Gombe	Information not provided	
8	Jigawa	To produce enough rice for local consumption and sales to other states in Nigeria	Inadequate supplies of inputs
9	Kaduna	Self-sufficiency in rice production	Insufficient supplies of production inputs and their high cost
10	Katsina	Provision of inputs as loans to farmers to boost rice production	Impurity of seeds and late arrival of inputs for the Special Rice Project
11	Kebbi	Boosting of rice production through government agencies	Annual flooding, withdrawal of subsidy on fertilisers and frequent change in state governors during military era
12	Kogi	Self-sufficiency in rice production and improvement in productivity	Agronomic constraints and shortage of inputs e.g. farm power, fertilisers, pesticides, herbicides,

S/No.	State	Rice production policy	Problems with policy implementation
		by farmers	credit, and lack of flood control
13	Kwara	Boosting of rice production for cash and food, and promotion of adaptable varieties	Untimely and inadequate release of funds and inputs by federal government; research efforts on new varieties has been minimal
14	Nasarawa	Promotion of new and improved varieties	Inadequate supplies of inputs including tractors and their high costs; lack of credits to farmers
15	Plateau	Boosting of production of high-quality rice through improved seeds and good supplies of inputs	Poor supply of inputs, their high cost and removal of subsidy by government
16	Yobe	Promote production of high-quality rice through improved technology, varieties, and poverty reduction	Poor funding of sector by government and lack of varieties which consumers will like
17	Zamfara	Information not provided	

Entries under the column “rice policy” reveal that no state government has a well-articulated rice policy. If there are policies, the cadres responsible for implementing them are not aware of them. No single written document may be cited as a tool permanently available to officials. The policy statements provided in Table 3 are derived from Federal Government projects that are still being funded. There has been a shift of policy in Jigawa State. Industrial sugarcane production is on-stream. However, the dismal implementation of the policy means that farmers may not be able to sustain that shift. Farmers are already complaining bitterly and are reverting to growing rice because the processing plants have not been established (Madu-West, 2002: 12).

Table 4. Analysis of problems in implementing rice policies

S/No.	Type of problem	No. of states	Magnitude of problem as %
1	Late arrival of inputs for special rice project	9	52.94
2	Lack of credits	5	29.41
3	Lack of improved seeds	4	23.53
4	Lack of land preparation equipment e.g. tractors	3	17.65
5	High costs of inputs	3	17.65
6	Annual flooding	2	11.76
7	Withdrawal of subsidies on inputs	2	11.76
8	Lack of water pumps	1	5.88
9	Mixed seeds for the special rice project	1	5.88
10	Low level of research on new varieties	1	5.88
11	Frequent change in governors under the military and attendant change in policies	1	5.88

Table 4 shows a widespread trend in Nigeria in the scarcity of improved seeds, low level of relevant research and complete breakdown of tractors. Kebbi State provides a good example of how frequent changes in government can militate against policy formulation and implementation. This has serious implications for any sustainable rice programme. It also underscores the importance of consolidating democracy and good governance.

The scarcity of pure seeds that are liked by consumers has created a good environment for the acceptance of WARDA’s New Rice for Africa (NERICA). Local newspapers have carried reports on this technology. Farmers encountered during the survey in Ekiti, Kebbi, Cross River, Plateau, Bauchi and Borno have continued to make enquiries at EDO for new rice varieties.

Annual flooding, as reported in Kebbi and Kogi, is a serious problem. Even at Sarkin Kudu in Taraba State, which is not on the Benue, there was a severe flood in 2001 when the Benue and Shemankar Rivers were full.

Ebonyi State's experience of the late release of inputs such as seeds, chemicals and fertilisers during the Special Rice Programme is common to most states, though official policy might have concealed the information for this survey. It is interesting to note that Kebbi State and Kogi State have direct contact with WARDA. This is unexpected because WARDA should work formally only through NCRI.

Table 5 shows agencies that are in some form of partnership with different states in the promotion of rice cultivation in Nigeria.

S/No.	State	Multilateral/NGO partners
1	Bauchi	Federal Government and Development Exchange Centre (DEC).
2	Benue	Church-based NGOs exist in the state independently promoting rice production.
3	Borno	Rice Farmers' Associations and <i>Fadama</i> Users' Associations all over the state.
4	Ebonyi	Sudan United Mission, St. Joseph Farm – Igbeagu, Cistercian Monastery – Sharon.
5	Ekiti	None.
6	Enugu	Federal Government, National Seed Service (NSS) and National Cereals Research Institute (NCRI).
7	Gombe	None.
8	Jigawa	Federal Government and Sassakawa Global 2000.
9	Kaduna	None.
10	Katsina	None.
11	Kebbi	Sassakawa Global 2000, <i>Fadama</i> Users' Association, Commodity Farmers Association, and NCRI Birnin Kebbi.
12	Kogi	WARDA.
13	Kwara	None.
14	Nasarawa	Federal Government, NCRI and National Seed Service (NSS).
15	Plateau	Federal Government, NSS, NCRI, NALDA and Church NGOs.
16	Yobe	Federal Government and EEC (which has suspended its programmes until democracy has become established).
17	Zamfara	Information not given.

Ebonyi State has very active NGO participation in rice production. Projects involving Sassakawa Global 2000 as in Jigawa and Kebbi are also active. However, projects in partnership with church-based NGOs, as in Ebonyi, Benue, Plateau and Kaduna (the Anglican Diocesan Agricultural Project, personal knowledge), stand a greater chance of sustainability than the others. For example, EEC participation in rice production in Yobe State collapsed completely during the military regime when the EC suspended their projects in Nigeria. DEC and the Women's Farmers Advancement Network (WOFAN) are promoting the processing and marketing of rice by women at Dass and Garko respectively. DEC is at Bauchi and WOFAN at Kano. The involvement of NALDA reported above has ceased because the institution became defunct in 2000.

2.5 State rice systems

Table 6 provides a summary of the dominant rice systems found in each state according to government officials. Rain-fed field rice, also known as the dry upland system, is very widespread. It is particularly important in the Savannah zones. The waterlogged shallow *fadama* field rice system is also widespread. It is an important system given the fact that it is practised along the major drainage system such as the Niger/Benue troughs as well as along minor watercourses and tributaries.

S/No.	State	Rice systems		
		Rain-fed dry upland	Shallow <i>fadama</i>	Valley bottoms
1	Bauchi	Yes	Yes	None
2	Benue	Yes	Yes	Yes
3	Borno	Yes	Yes	None
4	Ebonyi	Yes	Yes	Yes
5	Ekiti	Yes	Yes	None
6	Enugu	Yes	Yes	Yes
7	Gombe	Yes	Yes	None
8	Jigawa	Yes	Yes	Yes
9	Kaduna	Yes	Yes	None
10	Katsina	Yes	Yes	None
11	Kebbi	Yes	Yes	Yes
12	Kogi	Yes	Yes	None
13	Kwara	Yes	Yes	Yes
14	Nasarawa	Yes	Yes	Yes
15	Plateau	Yes	Yes	Yes
16	Yobe	Yes	Yes	Yes
17	Zamfara	Yes	Yes	Yes
	%	100	100	58.82

Table 7 shows minor rice systems in each state.

S/No.	State	Small pumps	Hill rice	Irrigated rice Scheme name (year established)
1	Bauchi	None	None	None.
2	Benue	Yes	Yes	Not “true” schemes but rain-fed farms being cultivated by farmers that belonged to government agencies such as the former NALDA and RBDA.
3	Borno	Yes	Yes	Yau irrigation scheme (1959), Jere Bowl (1948), Chad Basin (1973) and Abadam irrigation scheme (1957).
4	Ebonyi	Yes	None	Ezillo community farm, gravity irrigation.
5	Ekiti	None	Yes	None.
6	Enugu	Yes	None	Adani rice scheme (1978).
7	Gombe	Yes	None	None.
8	Jigawa	Yes	None	Hadejia Valley Project at various locations (1981) including Jekarade Irrigation Scheme and Dambo Irrigation Scheme.
9	Kaduna	None	None	None.
10	Katsina	None	None	None.
11	Kebbi	Yes	None	Sokoto Rima Basin (1975), and Zauro Polder Project.
12	Kogi	None	None	None
13	Kwara	Yes	None	Duku/ Lade irrigation scheme (1985).
14	Nasarawa	None	Yes	Only large-scale former NALDA farms, which are rain-fed.
15	Plateau	None	None	Only large-scale former NALDA farms that are rain-fed.
16	Yobe	None	None	Information not given.
17	Zamfara	Yes	Yes	Saba Irrigation Scheme and Talata Mafara Scheme.

Valley bottoms, or ‘deep *fadama*’, provide the ideal environment for rice production. However, due to lack of flood control technology and appropriate varieties, this system remains largely untapped. Table 7 shows that hill rice cultivation is more widespread than the well-known system of Ekiti State; Benue, Borno,

Nasarawa and Zamfara also use this system. Upland rice is grown in the hilly areas of those states. Terrace farming for crops like millet, fonio and beans is well known. However, with rice joining such a list, assumptions about the marginal productivity of soils of hill areas must change.

Irrigated rice schemes were started in most states of the Savannah zone, but they are now moribund due to underfunding and a complete breakdown in infrastructure facilities. The River Basins Development Authorities (RBDAs) that run such schemes are back on stream, but for the time being they are concentrating on potable water supply projects. Therefore, rice schemes will remain dead for some years to come unless the Special Presidential Committee on Rice is able to address the problem squarely.

2.6 Rice intercrop systems

Rice intercropping systems are becoming more widespread as more farmers are cultivating upland rice, as demonstrated in Table 8 and Table 9. Sorghum, maize, cowpea and even yam and other vegetables are common intercrops of upland rice. Cowpea appears principally as a relay crop as in Zamfara. The number of local government areas practising the system in the state is supplied in brackets. The intercrops of shallow *fadamas* of maize, okra and melon are found in Ekiti State and Nasarawa State. Cocoyam is an intercrop of shallow *fadama* in the unique Ganawuri flooded rice system. It is part of the Ganawuri Green Manuring system. Valley bottoms generally do not allow for intercropping. However, for Jigawa State, Kebbi State, Kwara State and Zamfara State intercropping of deep *fadama* is possible due to the use of small pumps in the dry season.

S/No.	State	Dry upland		Shallow <i>fadama</i>		Valley bottoms/small pumps	
		LGAs under system	Crops (LGAs)	LGAs under system	Crops (LGAs)	LGAs under system	Crops (LGAs)
1	Bauchi	9	Maize sorghum (2)	2	None	None.	None.
2	Benue	6	Maize sorghum (1)	7	None	3	None
3	Borno	8	Maize (8).	7	None	2	Small pumps (no intercrop)
4	Ebonyi	13	None.	13	None	6	None
5	Ekiti	All	Maize melon okra (all)	1	Maize, okra (1)	None	None
6	Enugu	8	Yam (3)	6	None	5	None
7	Gombe	11	Maize (2)	2	None	4	Small pumps (no intercrop)
8	Jigawa	12	Sorghum (11)	12	None	12	No deep valley system but 12 LGAs with pumps, all intercropping with maize and sorghum.
9	Kaduna	10	Maize, yam (10)	9	Cocoyam (3)	None	None
10	Katsina	16	Sorghum maize cowpea (16)	34	None.	None	None

S/No.	State	Dry upland		Shallow <i>fadama</i>		Valley bottoms/small pumps	
		LGAs under system	Crops (LGAs)	LGAs under system	Crops (LGAs)	LGAs under system	Crops (LGAs)
11	Kebbi	10	Maize, sorghum vegetables (10)	7	None	6	Sugarcane, okra, vegetables (6); all 21 LGAs have small pumps with vegetables, maize and cowpea intercrops.
12	Kogi	14	None	7	None	None	None.
13	Kwara	9	Maize (2).	2	None	9	Maize (2), small pumps in 1 LGA.
14	Nasarawa	13	Maize (13)	13	Maize (13)	None	None
15	Plateau	8	Maize cocoyam (1)	7	Cocoyam (1)	2	None
16	Yobe	3	Maize (2)	1	None	4	None
17	Zamfara	14	Sorghum, maize and cowpea as a relay crop (14)	4	None	3	Sorghum, maize (3)

Table 9. Intercrop for minor rice systems by state

S/No.	State	Hill rice		Large scheme	
		LGAs	Crops with rice (LGAs)	LGAs	Crops with rice
1	Bauchi	None	None	None	None
2	Benue	None	None	None	None
3	Borno	None	None	1	None
4	Ebonyi	None	None	1	None
5	Ekiti	3	Maize, okra, melon (3)	None	None
6	Enugu	None	None	1	None
7	Gombe	None	None	None	None
8	Jigawa	None	None	3	None
9	Kaduna	None	None	None	None
10	Katsina	None	None	None	None
11	Kebbi	None	None	None	None
12	Kogi	None	None	None	None
13	Kwara	None	None	None	None
14	Nasarawa	None	None	None	None
15	Plateau	None	None	None	None
16	Yobe	None	None	None	None
17	Zamfara	None	None	2	None

No intercropping is carried out under large-scale schemes.

2.7 Rice and by-product consumption patterns

Table 10 shows that all communities grow rice for both consumption and cash.

Table 10. Rice and by-product consumption pattern by state							
S/No	State	Rice grown for:			Rice straw / bran used for:		
		Food only	Cash only	Both	Eaten by livestock	Burnt for fertiliser	Chopped and mixed with mud for building
1	Bauchi	No	No	Yes	Yes	Yes	No
2	Benue	No	No	Yes	Yes	Yes (including bran)	No
3	Borno	No	No	Yes	Yes	No	Yes
4	Ebonyi	No	No	Yes	Yes	Yes but a greater percentage of both by-products is wasted.	No
5	Ekiti	No	No	Yes	No	Yes	No
6	Enugu	No	No	Yes	No	Yes	No
7	Gombe	No	No	Yes	Yes	Yes	Yes
8	Jigawa	No	No	Yes	Yes	No	No
9	Kaduna	No	No	Yes	Yes	Yes	Yes
10	Katsina	No	No	Yes	Yes	Yes	Yes
11	Kebbi	No	No	Yes	Yes	No	Yes
12	Kogi	No	No	Yes	Yes	Yes	Yes
13	Kwara	No	No	Yes	Yes	No	No
14	Nasarawa	No	No	Yes	Yes	No	Yes
15	Plateau	No	No	Yes	Yes	Yes	Yes
16	Yobe	No	No	Yes	Yes	No	Yes
17	Zamfara	No	No	Yes	Yes	Yes	Yes
	%	0	0	100	88.23	64.71	52.94

Livestock in 88.23% of the states surveyed eats rice straw. The straw and /or bran is also burnt as fertiliser in 64.71% of the states. The straw is used as a raw material to re-enforce local building mud. This is widespread as it is practised in 52.94% of the states. The use of these by-products should be promoted because they help to recycle natural products. Bran ash is known to correct soil pH and hence iron toxicity.

2.8 Patterns in input use

Table 11 and Table 12 contain information on the pattern in input use according to government officials. Fertilisers are absolute requirements for rice production in many states. However, the removal of subsidy on the commodity has led to complaints from both farmers and officials. Its scarcity and high cost may explain the rather widespread use of green and farmyard manures. Organic manures are needed in large quantities and this has always been considered a drawback to their usefulness. However, this could be partially solved if farmers used readily available green matter for direct incorporation into the soil as well as other kinds of composting. For instance, in most parts of the savannahs, the Mexican sunflower (*Tithonia diversifolia*) has become a widespread weed present throughout the year. It grows profusely and has tremendous re-growth ability. It is used primarily as fuel but could have an additional use as a green manure. The use of bunds could also improve the utilisation of organic manure in rice systems. Entries on herbicides and pesticides exist only on paper because these are now generally unavailable to farmers at affordable prices and quality.

S/No.	State	Fertiliser	F. Y.M.	Insecticides (types)	Herbicide (types)	Green manure (LGAs)
1	Bauchi	Yes	Yes	Yes (types not given)	Yes (types not given)	No
2	Benue	Yes	Yes	Yes (types not given)	Yes (types not given)	Yes (5)
3	Borno	Yes	Yes	Decis EC; Vetox 85; Quadatox	2,4 D; Ronstar; Basagram; Rilof	Yes (1)
4	Ebonyi	Yes	Yes	Sheper Plus	Basagram, Delmin, Framin	Yes (13)
5	Ekiti	Yes	No	Yes (types not given)	No	No
6	Enugu	Yes	Yes	Furadan, Miral, Marshal	Basagram, Ronstar 25 EC, Risane	Yes (8)
7	Gombe	Yes	No	No	Yes (types not given)	No
8	Jigawa	Yes	Yes	Yes (types not given)	Yes (types not given)	No
9	Kaduna	Yes	Yes	Cypermethrin, Karate	Ronstar, Stomp, Teer, Basagram, Rilof	No
10	Katsina	Yes	Yes	Yes (types not given)	Yes (types not given)	No
11	Kebbi	Yes	Yes	Yes (types not given)	Yes (types not given)	No
12	Kogi	Yes	Yes	Basudin, Furadan, Marshal,	Stam F34, Orozo, Delmin, Ronstar, Basagram,	Yes (21)
13	Kwara	Yes	Yes	Yes (types not given)	Yes (types not given)	Yes (2)
14	Nasarawa	Yes	Yes	Karate, Decis, Cymbush	Ronstar, Basagram, Teer, Grammaxone	Yes (13)
15	Plateau	Yes	No	Karate, Decis, Cymbush	Rifit, Rilof, Basagram, Teer, Ronstar	Yes (8)
16	Yobe	Yes	No.	No	Post emergence (types not given)	No
17	Zamfara	Yes	Yes	Yes (types not given)	Yes (types not given)	No

The use of tractor power is essential for increased rice production. According to government officials, farmers have stopped using tractors in 11 states and five other states have witnessed a decline in their use. This underestimates the problem since tractor carcasses litter the premises of ADPs and Ministries of Agriculture all over Nigeria. The decline in tractor use has been attributed to the fact that they cannot be serviced and to their high cost of maintenance. Table 12 reveals the widespread use of animal traction for rice production, especially for upland rice. This phenomenon illustrates the adaptability of farmers when faced with production constraints.

Table 12. Input use pattern by state (B)

S/No.	State	Animal Traction (LGAs)	Tractor (LGAs)	Termination in Use of Tractor	Reasons
1	Bauchi	Yes (1)	Yes (20)	No	
2	Benue	No	Yes (4)	No	
3	Borno	Yes (27)	Yes (27)	No	
4	Ebonyi	No	Yes (4)	Decline	Unable to service.
5	Ekiti	No	No	Information not given	Information not given.
6	Enugu	No	Yes (8)	Decline	Non-availability and high cost.
7	Gombe	Yes (3)	Yes (6)	No	
8	Jigawa	Yes	Yes	No	
9	Kaduna	Yes (6)	Yes (3)	Decline in most LGAs	High cost of hiring.

S/No.	State	Animal Traction (LGAs)	Tractor (LGAs)	Termination in Use of Tractor	Reasons
10	Katsina	Yes (34)	Yes (34)	Decline in most LGAs	High cost of maintenance.
11	Kebbi	Yes (21)	Yes (21)	No	
12	Kogi	No	Yes	Decline	Frequent breakdown, high cost of hiring, and no spare parts.
13	Kwara	Yes (1)	Yes (16)	No	
14	Nasarawa	No	Yes (13)	No	
15	Plateau	No	Yes (17)	No	
16	Yobe	No	Yes (4)	No	
17	Zamfara	Yes (14)	Yes (14)	No	

2.9 Widespread rice production problems

Table 13 provides field data on widespread rice production problems. Blast is the most widespread disease; stem borers are a major problem in all states. The economic importance of this problem for Nigeria has not been documented in the literature and it is beyond the scope of this survey to make any technical assessment. Weaverbirds are reported as a problem in many states. The distribution of avian pests generally follows a North-South dichotomy; quelea birds are a more serious problem in the North and weaverbirds in the South. The reporting of quelea in Kogi State is rather unexpected.

Table 13. Widespread rice production problems by state

S/No.	State	LGAs	Diseases	LGAs	Insects	LGAs	Birds
1	Bauchi	5	Blast	20	Stem borers, Army worms		None
2	Benue	3	Gall midge	3	Viridula spp.	6	Weaver birds
3	Borno	2	Rust	4	Stem borers	8	Quelea birds
4	Ebonyi	Not given	Leaf streak virus, aluminium and iron toxicity, gall midge	Not given	Stem borers	Not given	Weaver birds
5	Ekiti	3	Blast	Not given	Army worms, termites state-wide	Not given	Weaver birds – State wide
6	Enugu	4	Blast and gall midge	state-wide	Stem borers	3	Weaver birds
7	Gombe	State-wide	Blast and rust	state-wide	Stem borers	6	Quelea
8	Jigawa	Not given	Blast and iron toxicity	Not given	Stem borers	Not given	Quelea
9	Kaduna	state-wide	Blast and rust	state-wide	Army worms, stem borers, grasshoppers	state-wide	Weaver birds
10	Katsina	state-wide	Blast and leaf spot	state-wide	Grasshoppers, termites	state-wide	Quelea and Weaver birds
11	Kebbi	Not given	Blast	Not given	Grasshoppers, termites	5	Quelea
12	Kogi	state-wide	Blast and dead heart	state-wide	Stem borers, grasshoppers	state-wide	Quelea
13	Kwara	2	Blast	state-wide	Army worms in August.	state-wide	Weaver birds
14	Nasarawa	state-	Blast, but rust not	Not	Stem borers not severe	Not	Weaver birds

S/No.	State	LGAs	Diseases	LGAs	Insects	LGAs	Birds
		wide	severe	given		given	in early maturity varieties
15	Plateau	Not given	Blast and rust	Not given	Stem borers, grasshoppers	Not given	Weaver birds
16	Yobe	1	Blast		None	3	Quelea
17	Zamfara		None	Not given	Beetle <i>Trichiapa sp.</i> a new rice pest that can wipe out an entire field.	Not given	Quelea

Fulani cattle have been identified as a pest in Kebbi, Enugu and Ebonyi. The encroachment of livestock on farms has become a serious problem in the democratic era. Conflicts between pastoralists and farmers have increased and taken on fatal dimensions. These have to be addressed as more *fadama* lands are being developed throughout Nigeria.

Weeds put a big demand on manual labour. NERICA is weed resistant and its adoption by farmers will go a long way towards alleviating the problem. Bird resistant varieties are also available. However, farmers complain that they are difficult to thresh. That problem can be tackled through appropriate and cheap threshing technology.

Table 14 provides more information on the problems that farmers encounter in rice production.

Table 14. Other rice production problems by state

S/No.	State	LGAs	Mammals	LGAs	Weeds (local names)	Other problems cited
1	Bauchi	20	Squirrels and grass cutters	3	Striga and Cyperus spp.	None
2	Benue	7	Grass cutters	5	Witch weed (<i>beam</i>), which resembles rice except for the hairy ligule at its base.	High cost of inputs, flooding, untimely availability of inputs, lack of tractors, cheap foreign rice.
3	Borno	5	Rodents	12	Wild rice (<i>roba</i>)	Land preparation equipment, harvest equipment and lack of credit to farmers.
4	Ebonyi	Not given	Fulani cattle	Not given	Cyperus spp. (<i>etta</i>)	Shortage of inputs and credit.
5	Ekiti	state-wide	Grass cutter	state-wide	Panicum spp., Chromolaena odonatum, Aspillia spp.	Drying of rice and poor milling equipment.
6	Enugu	1	Fulani cattle	state-wide	Spear grass	None
7	Gombe	state-wide	Rodents	state-wide	Bahamas grass, (<i>damage, harkiya, jakur, kuda</i>)	Drought, high cost of fertilisers and labour.
8	Jigawa	Not given	Rodents	Not given	Oryza longistaminata (<i>roba</i>)	Scarcity of land preparation equipment.
9	Kaduna	state-wide	Squirrels and rats	state-wide	Cyperus spp. and Rhoboellia spp.	High cost of weeding and chemicals, processing equipment.
10	Katsina	state-wide	Grass cutters, rats and other	state-wide	Cyperus spp.	Drought, low yield high cost of production, cheap

S/No.	State	LGAs	Mammals	LGAs	Weeds (local names)	Other problems cited
			rodents			foreign rice.
11	Kebbi	Not given	Rodents and Fulani cattle.	6	<i>Stalozanthes spp.</i> (<i>bau, tukura</i>) which are similar to rice	Annual flooding since 1995, shortage of quality seeds, adulterated chemicals, high cost of inputs, low prices for rice.
12	Kogi	state-wide	Grass cutter and Rodents	state-wide	Sedges and <i>Cynodon spp.</i>	Marketing and poor milling quality.
13	Kwara	state-wide	Grass cutters and rats	state-wide	Sedges, Rottabellia and <i>Cynodon spp.</i>	Drought
14	Nasarawa	Not given	Rats	Not given	Serious problem of sedges and broad leaf weeds.	High cost of land preparation, weeding and harvesting.
15	Plateau	Not given	Rats and other rodents	Not given	<i>C. dactylon</i> ; <i>Ipomea spp.</i> and <i>Rottabellia sp.</i>	Non-availability of tractors, scarce pre-emergence herbicides, iron toxicity on the Plateau.
16	Yobe	Not given	Rats	Not given	False rice, (<i>roba sambai, dodowa, jakarasa</i>)	Shortage of tractors and high cost of land preparation, low yield and quality, flooding, lack of processing machines.
17	Zamfara		Not given	Not given	Spear grass	Not given

2.10 The formal research system

Table 15 shows the status of the relationship between the states and formal rice research systems. Research seems to be doing very well in the estimation of government officials.

Table 15. Assessment of the formal research system by state officials

S/No.	State	Which Institutions mandated by law to assist?	Problem(s) to be solved by mandated Institutions	Method of contact	Effectiveness of method of contact	Why is method of contact effective?	Has Institute(s) actually been responding?
1	Bauchi	NCRI/ WARD A	Agronomic, diseases and seeds	Direct	Effective	No response	Responsive
2	Benue	NCRI, UNIAGRI C Makurdi	Varieties, soil fertility and diseases	Letters, Monthly Technical Review Meetings (MTRM)	Effective	Scientists always attend MTRM.	Responsive
3	Borno	No response	No response	No response	No response	No response	No response
4	Ebonyi	NCRI, WARD A, IITA	Gall midge	Letters	Effective	No response	Responsive
5	Ekiti	IAR&T	Pests and	MTRM	Effective	No response	Responsive

S/No .	State	Which Institutions mandated by law to assist?	Problem(s) to be solved by mandated Institutions	Method of contact	Effectiveness of method of contact	Why is method of contact effective?	Has Institute(s) actually been responding ?
			diseases, varieties and low yields				
6	Enugu	NCRI	Gall midge	Letters	Not effective	Delays in postal system.	Responsive
7	Gombe	NCRI	No serious rice problem	No response	No response	No response	No response
8	Jigawa	NCRI, IAR	Blast and iron toxicity	Direct	Effective	Advantage of face-to-face communication	Responsive
9	Kaduna	NCRI	Improved seeds	Through FDA or direct contact	Effective	No response	Responsive
10	Katsina	IAR, NCRI and IITA	Seeds, pests and diseases	Direct	Effective	Face to face	Responsive
11	Kebbi	NCRI, IAR	Improvement in rice production	Personal, MTRM, workshops	Effective	If problems are properly identified	Responsive
12	Kogi	NCRI	Improved varieties	MTRM	Effective	Good technology transfer through on-farm trials	Responsive
13	Kwara	NCRI	Maturity and disease problems.	MTRM	Effective	Effective technology transfer	Responsive
14	Nasarawa	NCRI	High yielding and disease resistance varieties.	MTRM	Effective	Institute ever willing to help	Responsive
15	Plateau	NCRI	New varieties and advice on pest/disease problems.	MTRM, annual meetings, OFAR, workshops	Effective	Cordial working relationship	Responsive, but financial constraints make it difficult for NCRI to attend frequently.
16	Yobe	NCRI	New varieties	MTRM	Effective	Support provided for technology transfer.	Responsive
17	Zamfara	IAR	New varieties, pests and diseases	REFILS	Effective	Monthly, quarterly, and annual meetings.	Responsive

The data in the above table needs to be interpreted, and the effectiveness of the liaison between extension and research analysed, from the perspective of the farmer. Firstly, it should be noted that the Monthly Technical Review Meeting (MTRM) that takes place between the researcher and the extension agent does not include the farmer. Secondly, all Research Extension Farmer Input Linkage Systems (REFILS) are now defunct. The only times when a farmer would now have the opportunity to interact with scientists would be during Small Plot Adoption Techniques (SPATS) trials, during On Farm Adaptive Research (OFAR) and during Management Training Plot (MTP) technological sessions. However, as research funds dwindle, staff members of ADPs carry out most of these activities themselves. It is of great concern that technocrats at the Head Office determine topics to be discussed at MTRMs, which are not based on the problems reported by farmers to field workers. Therefore, the researcher is effectively remote from the farmer in the midst of myriad pre-planned as well as centrally controlled activities such as seminars, workshops and field days. The greatest value of Table 15 is to be found in the range of perceived needs that each state expected research to meet. The kind of formal research system discussed here comes under the collaborative programme between FoN and states called National Agricultural Technology Support Project (NATSP). Both this project and the National Accelerated Industrial Crop Production Programme are now defunct. Some low level research is also undertaken through the National *Fadama* Development Programme, which is still ongoing in most states of the Federation.

2.11 Status of rice processing technology

Table 16 shows some of the conditions of rice-processing technology in different states. Until 1998 there had not been a single rice de-stoner in Nigeria. The sudden appearance of de-stoners in many states points to the responsiveness of the sector to changes in technology.

Table 16. Status of rice processing technology by state

S/No.	State	Processing centres	Processors	Varieties best for eating	Reason for choice	Location for de-stoners
1	Bauchi	Rural and urban	Farmers and millers	FARO 44	Palatable	Dass
2	Benue	Rural and urban	Farmers and millers	MAS	Sweet, long grains	Makurdi, Gboko, Otukpo
3	Borno	Rural and urban	Farmers and millers, mostly male	De Gaulle	High yield	None
4	Èbonyi	Rural and urban	Farmers and millers	ITA 306, FARO 44 and 15, IR8	High yield, cooking quality	Abakaliki rice mill complex
5	Ekiti	Urban	Farmers and millers	ITA 150, 056	Taste, good appearance	None
6	Enugu	Rural and urban	Farmers and millers	IR 1416	Cooking quality	Adani
7	Gombe	Urban	Millers	SIPPI, ITA 306	High yield	None
8	Jigawa	Rural and urban	Millers with some government-owned mills	Not given	Not given	Hadejia, Auyo, Tashegwa, Sara

S/No.	State	Processing centres	Processors	Varieties best for eating	Reason for choice	Location for de-stoners
9	Kaduna	Rural and urban	Not given	FARO 15,44, ITA 315	Taste, long grains	None
10	Katsina	Rural and urban	Farmers	ITA lines	Palatable	None
11	Kebbi	Rural and urban	Farmers and millers	FARO 44 and Ex-China	Taste, stickiness	None
12	Kogi	Rural and urban	Farmers and millers	FARO 44 and ITA 150	High yield, grain quality	None
13	Kwara	Rural and urban	Farmers and millers, mostly female	FARO 29,43 and a variety called locally <i>mambechi</i>	Palatable	Gboyinde GRA Ilorin
14	Nasarawa	Both rural and urban	Farmers and millers	FARO 29, 15, 44	Taste	Lafia
15	Plateau	Rural and urban	Farmers and millers	FARO 44, 27	Taste, swelling	Langtang, Shendam, Wase
16	Yobe	Rural and urban	No response	ITA 150 and a variety called locally <i>yarkanshi</i>	Grain quality, shelf life	None
17	Zamfara	Rural and urban	Female and male millers	ITA 150, Ex-China	Not given	None

Table 16 indicates that SIPPI or FARO 44 are the varieties most desirable for processing. There is still a demand in states such Benue and Borno for MAS and De Gaulle, which are very old varieties. Long grains and palatability are characteristics sought after in rice processing. Government officials do not perceive high yield to be an important factor, although it is important to farmers. This implies that, for government officials, easy access to markets is a more crucial factor to be considered in boosting the rice enterprise than yield. However, local rice must be processed well to compete favourably with imported rice because of the changing tastes of urban consumers.

2.12 Rice pricing and marketing

Table 17 displays sources of price information on rice and related issues. Setting a pre-season price, which could be a potential incentive to rice production, is completely lacking in Nigeria. However, this year the Federal Government's announcement of the imposition of a 100% import tariff on rice should encourage farmers.

S/No.	State	Sources on prices	Problems in marketing rice
1	Bauchi	Traders	Middlemen
2	Benue	Other farmers and traders	Middlemen and rice imports
3	Borno	Other farmers and traders	Bad roads
4	Ebonyi	Other farmers and traders	Bad roads, low farm gate prices and lack of good storage facilities
5	Ekiti	Other farmers and traders	No standard measure and low farm gate prices

S/No.	State	Sources on prices	Problems in marketing rice
6	Enugu	Other farmers and traders	Bad roads
7	Gombe	Other farmers and traders	Low farm gate prices
8	Jigawa	Other farmers and traders	Not given
9	Kaduna	Other farmers, traders and radio	Middlemen, bad roads, poor product quality, low farm gate prices
10	Katsina	Other farmers and traders	Low farm gate prices
11	Kebbi	Other farmers and traders	Middlemen
12	Kogi	Other farmers and traders	Rice imports, bad roads and poor processing technology
13	Kwara	Traders	Rice imports
14	Nasarawa	Other farmers and traders	Low farm gate prices
15	Plateau	Other farmers, traders and radio	Low farm gate prices
16	Yobe	Traders	Available varieties attract low prices
17	Zamfara	Other farmers and traders	Not given

No government in Nigeria fixes a pre-season price for rice. Farmers' organisations and Co-operatives have neither a role in fixing rice prices nor serve as an information source on prices. Table 18 suggests that traders constitute the most important information source for rice prices (cited by 100% of respondents as one of their sources). Other farmers also constitute an important source (cited by 82.35% of respondents). Only 11.76% of respondents stated that they obtained information from the radio. This suggests that the radio has not been put to effective use in service delivery to farmers. Farmers should be empowered to fix the prices of their produce through institutional reforms, such as capacity building of Farmers' Organisations.

The activities of middlemen relate to low farm gate prices. 23.52% of respondents perceived the cut-throat activities of middlemen as a problem in rice marketing. These traders have ready cash and unite to fix the price of paddy rice. They buy rice directly from farmers and often resell it in the same market, thereby earning commission for doing absolutely nothing. Their union prevents farmers from selling directly to *bona fide* traders. This system keeps farm gate prices very low (35.29%); farmers usually need cash during festivals and therefore have to sell off their produce in order to meet social obligations. The importation of foreign rice is perceived by 17.65% of respondents as also creating a bottleneck in the marketing of rice. The call for a ban on rice imports has been so strong that a Presidential Special Committee on rice production has been constituted by the President of the FoN to advise on the governmental policy options that would make Nigeria a net exporter of rice. This high-powered committee comprises six Deputy Governors. However, it is clear from the response of the farmers themselves that rice imports are not perceived as a serious problem. More respondents (29.41%) cite bad roads as a mitigating factor against the profitable marketing of rice. Poor storage infrastructures, the lack of a standard measure, the poor quality of parboiled rice, the availability of varieties that attract only low prices and poor processing technology are also cited as problems (5.88% of respondents).

2.13 Evaluation of the extension systems according to state officials

Table 18 indicates that an overwhelming number of government officials prefer the formal extension system to the informal system. However, they also recognise the positive role that radio and television can play. A rejection of extension through associations and traditional rulers may be due to their belief that leaders in both categories appropriate things for themselves. Therefore, in their estimation, the rural poor would be better protected by a formal system.

Table 18. Evaluations of extension systems according to state officials		
S/No.	State	Preferred extension method
1	Bauchi	Government personnel, radio/TV
2	Benue	Government personnel, radio/TV
3	Borno	Radio/TV
4	Ebonyi	Government personnel

S/No.	State	Preferred extension method
5	Ekiti	Government personnel, radio/TV
6	Enugu	Government personnel, radio/TV
7	Gombe	Government personnel, radio/TV
8	Jigawa	Government personnel, radio/TV
9	Kaduna	Government personnel, radio/TV
10	Katsina	Government personnel
11	Kebbi	Government personnel, radio/TV, traditional rulers, mobile film shows
12	Kogi	Government personnel
13	Kwara	Government personnel
14	Nasarawa	Government personnel, research publications, radio/TV
15	Plateau	Government personnel, radio/TV, Farmers Association
16	Yobe	Government personnel, radio/TV
17	Zamfara	Government personnel

The preferred channels of extension are quite varied. The majority of state officials prefer to maintain the *status quo* (94.11%). Only Borno State has completely lost faith in this channel. Ebonyi State gave the qualified response that the government work force must be highly motivated to be able to deliver an effective extension service. 70.59% of respondents cite radio/TV as viable extension channels. However, its effectiveness in Nigeria needs to be properly assessed. Only those in Kebbi State (5.88%) see the use of peripatetic film shows as a desirable extension channel. This is rather unexpected because it was a major means of mass mobilization about 30-40 years ago. Given that precedent and the advent of home videos, television viewing centres and so on, that channel must still have something to offer. Kebbi is also the only State out of the 17 that sees traditional rulers (5.88%) as useful extension channels. This too is rather unexpected because traditional rulers seem to be too visible not to have a prominent role in rural extension. Nasarawa State (5.88%) sees the availability of accurate research publications to extension workers as a channel worthy of pursuit. For Plateau State, the Farmers' Association (5.88%) is considered a useful extension channel. However, it must be clarified that the formal extension system adopted by the ADPs has collapsed largely due to poor funding and a non-sustainable system. This system hinges on the "cost effective" Unified Extension Service through the principle of 'Training and Visit' (T&V). It is very ambitious and therefore cannot be easily sustained if there is no revenue allocation to the ADPs. It aims to increase the productivity and income of farmers by encouraging them to adopt new technologies through the establishment of Small Plot Adoption Techniques and to adopt improved technologies through the establishment of MTP (PADP: 9). For Plateau State and most others, rice featured prominently in the MTP, the Community Seed Programme and the Special Rice Programme. With the collapse of the system due to underfunding, the sustainability of rice technologies leaves much to be desired. The new research methodology of On Farm Adaptive Research using ADP personnel is beset by dishonesty on the part of field staff. The data fed into research logbooks are basically fictitious and recommendations based on them will be defective.

2.14 Status of farmers' associations

Table 19 appears to show a very rosy picture of the status of farmers' associations. However, in reality only the *Fadama Users' Associations* (FUAs) are functional. Any farmers' association that has government as its major sponsor is doomed because it cannot be sustained. FUAs are still functioning because they have World Bank loans or they expect to get one. The history of the formation of the organisations listed in the table explains their eventual failure.

Table 19. Status of farmers' associations by state

S/No	State	Name of association	Principal function	Co-ordination of activities by state
1.	Bauchi	Balasu Farmers' Association	Rice production and processing	None

S/No	State	Name of association	Principal function	Co-ordination of activities by state
		Dot Farmers' Association Alheri Farmers' Association	Rice production and processing Rice production and processing	None None
2	Benue	Beranda Traders' Association	Rice trade	None
3	Borno	Several Rice Farmers' Associations <i>Fadama</i> Users' Association	Organising rice farmers Rice/ vegetable production	None
4	Ebonyi	<i>Fadama</i> Users' Association Women's Farmers' Group Farmers' Co-operative Society	Organising farmers to harness surface water and underground water for dry season farming. Acquisition and dissemination of improved processing and farming technologies. Organising farmers for group farming, thrift and loan.	None None None
5	Ekiti	Rice Growers' Association Farmers' Congress	Not given Procure inputs and loans	Ministry of Agriculture, and Ministry of Commerce and Industry
6	Enugu	Rice Farmers' Association	Procure inputs and protect interest of farmers	None
7	Gombe	Dassa Co-operative Wadaci <i>Fadama</i> Farmers Dadin Kowa <i>Fadama</i> Farmers Hinna Women's Group	Trading in rice Fadama crop production Production of vegetables General trading in produce and livestock	Gombe State ADP
8	Jigawa	<i>Fadama</i> Users' Association (320 in total) Commodity Association (350 in total)	Development of <i>fadama</i> lands through tube wells/wash bores. Boosting of rice/ sugar cane production	None None
9	Kaduna	No response.		
10	Katsina	Rice Farmers' Association <i>Fadama</i> Users' Association Farmers' Cooperative Society	Unity to secure loan and seeds Secure Federal Govt. assistance Unity	Ministry of Agriculture, and Co-operative Finance Agency
11	Kebbi	Rice Farmers' Association Commodity Farmers' Association <i>Fadama</i> Users' Association	Unity, boosting of rice production An apex farmers organisation Promote use of <i>fadama</i> lands	Secretary Commodity Farmers' Association, Kebbi ADP. Or Secretary Commodity Farmers' Association c/o Hon. Commissioner for Agriculture, Birnin Kebbi
12	Kogi	Nigerian Farmers' Council Practising Farmers' Association <i>Fadama</i> Users' Association	No response	No response
13	Kwara	Egimayiwo Lade Group	Processing of rice	Kwara ADP

S/No	State	Name of association	Principal function	Co-ordination of activities by state
		Godewa Patigi Group	Processing of rice	Women's Unit; As above
14	Nasarawa	Fadama Users' Association	Dry season farming	Nasarawa ADP
15	Plateau	Fadama Users' Association Farmers' Club National Council of Nigerian Farmers Various Local Associations	Dry season farming Promote farming No response Self help and community development	Ministry of Women Affairs and Social Development
16	Yobe	Rice Farmers' Association Rice Marketing Association	To secure credit To secure inputs	Ministry of Agriculture and ADP
17	Zamfara	Fadama Users Association Rice Growers' Association Rice Millers' Association	Small holder irrigation Production and marketing of rice Securing soft loans for rice milling	State ADP State ADP Commerce and Industry

Most were initiated under government co-operative schemes or some other purported institutional arrangement. As long as government incentives, such as credits and inputs, are available for distribution, they become functional. This has some implication for M-APs whose major component should be a viable institution at that level. Only recently the FoN instructed the ADPs to establish Rural Institutional Development Units without providing funding to mobilise FOs in order to link them up with suppliers of inputs and services. This top-down approach will lead nowhere. Therefore, only the farmers themselves should be empowered to establish and run their own organisations.

2.15 Seed sources and variety preferences

Table 20 cites the reliable seed sources farmers have been using according to government officials. A majority of farmers (94.11%) source seeds from the ADPs and National Seed Service (NSS). A considerable number (52.94%) get rice seeds from "other sources", that is, private seed companies. Only 35.29% source seeds from government-run agricultural inputs supplies companies. These figures must be interpreted with caution since they contradict the fact that farmers always complain about adulteration of NSS seeds.

Table 20. Reliable seed sources for farmers according to state officials

S/No.	State	ADP/NSS	State Govt. Agric. Inputs Company	Others
1	Bauchi	No response	No response	No response
2	Benue	Yes	No response	No response
3	Borno	Yes	No response	No response
4	Ebonyi	Yes	Yes	Yes
5	Ekiti	Yes	No response	No response
6	Enugu	Yes	No response	Yes
7	Gombe	Yes	No response	Yes
8	Jigawa	Yes	Yes	Yes
9	Kaduna	Yes	Yes	Yes
10	Katsina	Yes	Yes	Yes
11	Kebbi	Yes	Yes	Yes
12	Kogi	Yes	No response	No response
13	Kwara	Yes	No response	No response
14	Nasarawa	Yes	No response	Yes

S/No.	State	ADP/NSS	State Govt. Agric. Inputs Company	Others
15	Plateau	Yes	Yes	Yes
16	Yobe	Yes	No response	No response
17	Zamfara	Yes	No response	No response

Table 21 and Table 22 further illustrate the perceptions of officials on the characteristics farmers in their respective states attribute to an ideal variety when they are given choice of four options. These are ranked in descending order in each column. Early maturity is the most desired characteristic in the survey sample and ranks 82.4%. This is followed by high yield at 64.7%, and resistance to pests and diseases and long grains, both at 52.9%. Therefore a method that focuses on getting farmers to adopt a technology just because it is high yielding may not meet the needs of farmers. Early maturity is an important factor because it ensures a quick release of new rice onto the market to cushion the effect of the lack of money during the growing season. It also guarantees a crop when the rains may be low. In Jigawa and Kebbi States, the additional traits of white colour and drought tolerance were listed. It is rather strange that it is only in Katsina State that government officials think a good rice price is worthy of consideration by farmers.

Table 21. Preferences of variety characteristics according to state officials

S/No.	State	Desired characteristics for new varieties
1	Bauchi	Maturity, high yield, resistance to pest/diseases, ease of threshing
2	Benue	Long grain, high tillering, non-lodging, medium duration
3	Borno	Maturity, good milling
4	Ebonyi	Maturity, high yield, resistance to pest/diseases, good cooking quality
5	Ekiti	Maturity, resistance to pest/diseases, non-lodging, sweet tasting
6	Enugu	High yield, ease of threshing, long grain, good cooking quality
7	Gombe	High yield, long grain, wweet tasting, non-shattering
8	Jigawa	Maturity, high yield, resistance to pest/diseases, long grain
9	Kaduna	Maturity, high yield, resistance to pest/diseases, long grain
10	Katsina	Maturity, high yield, resistance to pest/diseases, long grain
11	Kebbi	Maturity, high yield, resistance to pest/diseases, flood tolerance
12	Kogi	Maturity, long grain, medium duration, good milling
13	Kwara	Maturity, resistance to pest/diseases, long grain, high tillering
14	Nasarawa	Maturity, high yield, resistance to pest/diseases, long grain
15	Plateau	Maturity, high yield, long grain, good milling
16	Yobe	Maturity, high yield, good milling, drought resistance
17	Zamfara	Maturity, high yield, drought resistance

Table 22. Rating of characteristics according to state officials

S/No.	Characteristic desired	States desiring it	Percentage of surveyed states
1	Early maturity	14	82.4
2	High yield	11	64.7
3	Resistance to pests and diseases	9	52.9
4	Long grains	9	52.9
5	Sweet taste	4	23.5
6	Good milling quality	4	23.5
7	Non-lodging	3	17.6
8	Drought resistance	3	17.6
9	Ease of threshing	2	11.8
10	High tillering	2	11.8
11	Medium duration in maturity	2	11.8
12	Good cooking quality	2	11.8
13	Non-shattering	1	5.9
14	Good price	1	5.9
15	Flood tolerance	1	5.9

16	White colour	1	5.9
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2.16 Needs to be met for increased production

Table 23 and Table 24 give the perceptions of government officials regarding the needs of farmers' to be met in order to increase rice production. Table 24 may be used for a quick assessment of the responses. Subsidies for herbicides and insecticides rank highest. This is rather unexpected because land preparation is a more critical factor. Subsidies for fertilisers and the supply of good seeds were not included in the choices they were offered. However, we know that good soil fertility and good quality seeds are critical in giving the rice plant an advantage over weed competition and pest tolerance.

S/No.	States	Requirements for increased rice production
1	Bauchi	No response
2	Benue	No response
3	Borno	Tractors and equipment, credit, subsidize herbicides, subsidize insecticides
4	Ebonyi	Ban rice imports
5	Ekiti	No response
6	Enugu	No response
7	Gombe	Train farmers, subsidize herbicides, subsidize insecticides, pumps (Provide fertiliser subsidy)
8	Jigawa	No response
9	Kaduna	No response
10	Katsina	Ban rice imports
11	Kebbi	Train farmers, intensify research, provide flood controls, promote active extension services (provide good seeds)
12	Kogi	No response
13	Kwara	No response
14	Nasarawa	No response
15	Plateau	Establish de-stoner mills
16	Yobe	Promote NGO involvement
17	Zamfara	Set pre-season prices, establish de-stoner mills, intensify research

S/No	Requirement	States	% sample
1	Tractors and equipment	1	5.9
2	Credit	1	5.9
3	Subsidy herbicides	4	23.5
4	Subsidy insecticides	4	23.5
5	Ban rice imports	2	11.8
6	Training to farmers	2	11.8
7	Provision of pumps	1	5.9
8	Subsidy on fertiliser	(1)	(5.9)
9	Intensify research	2	11.8
10	Flood control	1	5.9
11	Promote active extension	1	5.9
12	Supply good seeds	(1)	(5.9)
13	Establish de-stoners mills	2	11.8
14	Promote NGO involvement	1	5.9
15	Set pre-season prices	1	5.9

In both Table 23 and Table 24, the information supplied in brackets indicates that the requirement is in addition to the four choices offered.

2.17 Distribution and assessment of released varieties

Table 25 provides data that may help researchers and policy makers to keep track of different varieties.

S/No.	Variety	State found	Local name	Date of release (If any)	Date of maturity (Days)
1	Ex-China	Benue	No response	Not known	90-105 days
		Borno	<i>Yar</i> - China	Not known	110
		Gombe	<i>Yar</i> - China	Not known	90
		Jigawa	<i>Yar</i> - China	1986	100
		Kaduna	<i>Yar</i> - China	1984	100
		Katsina	<i>Yar</i> - China	1980	120
		Kebbi	<i>Yar</i> - China	1979	60-70
		Zamfara	<i>Yar</i> - China	Not known	100-115
2	ITA 257/ FARO 45	Benue	Berly Gemyi	1992	90-110
		Enugu	None	1989	97
		Ebonyi	None	1991	Not known
		Jigawa	None	1984	100
		Katsina	None	1985	100
		Yobe	None	1993	100-105
3	FARO 26	Benue	Ton 3	1982	130-134
4.	BG 20 – 2 / FARO 29	Benue	Ton 1	1981	125-135
		Enugu	None	Not known	130-140
		Kwara	None	1984	125-135
		Yobe	None	1987	125-135
5	MAS 2401	Benue	MAS	Not known	155-160
6	ITA 150 / FARO 46	Benue	Ankurba	1992	100-150
		Borno	BOSADP	Not known	110
		Ebonyi	None	1991	Not known
		Ekiti	No response	No response	90
		Kaduna	No response	1985	110
		Katsina	No response	1987	100
		Plateau	No response	No response	90-100
		Yobe	No response	1993	100-105
		Zamfara	No response	No response	110-125

The local name *Berly Gemyi*, used in Benue State for ITA 257/FARO 45, is a corruption of the phrase “early germination”. Table 26 provides data that may help researchers and policy makers to plan breeding programmes based on field observations.

Table 26. Distribution and assessment of released rice varieties by state					
S/No.	Variety	State	Source of varieties	Distribution	Problems/Advantages
1	Ex-China	Benue	Unknown	Very common	No response
		Borno	Unknown	Common in upland	Low yield
		Gombe	Unknown	Very common	Short grain requires intensive management
		Jigawa	Unknown	No response	
		Kaduna	Unknown	Very common	Very short grains
		Katsina	Unknown	Common	Shatters
		Kebbi	Unknown	Very common	Pest tolerance is an advantage
		Zamfara	Unknown	Very common	Poor tillering
2	ITA 257/ FARO 45	Benue	IITA	Very common	Needs much water
		Enugu	IITA	Common	Hard to thresh
		Ebonyi	No response	Common	Off types
		Jigawa	IITA	No response	No response
		Katsina	IITA	Scarce	Difficult to thresh, attracts grasshoppers
		Yobe	NCRI	Very common	Difficult to thresh
3	FARO 26	Benue	IITA	Very common	No response
4.	BG 20-2/ FARO 29	Benue	IITA	No response	No response
		Enugu	IITA	Very common	No response
		Kwara	NCRI	Very common	Susceptible to drought, blast, and birds
		Yobe	NCRI	Not common	Susceptible to blast due to short height
5	MAS 2401	Benue	No response	Flood plain	Lodges during heading
6	ITA 150 / FARO 46	Benue	IITA	No response	No response
		Borno	NCRI	Upland	Average yield
		Ebonyi	NCRI	Common	No response
		Ekiti	NCRI	Very common	Susceptible to pest attack
		Kaduna	NCRI	Very common	Low yield
		Katsina	NCRI	Common	Low yield
		Plateau	IITA	Common	Low yield
		Yobe	NCRI	Very common	No response
		Zamfara	NCRI	Very common	No response

It is important that researchers note information on the problems associated with each variety.

3.0 Rice production variables: village survey

3.1 Introduction

A questionnaire similar to that used for the collection of data on rice production variables from state government officials (Section 2) was used for village surveys. (For a copy of the questionnaire, see App. 3.) It was administered in 27 villages cutting across all six geo-political zones of Nigeria. The data in this section express the actual field situation and may be used for comparative analysis with the former for a more accurate picture of the rice story in Nigeria.

3.2 Rice systems practised in some villages

Table 27 shows that the shallow *fadama* rice system constitutes 85.19% of the sample and is therefore dominant. The dissemination of alternative systems is as follows: the upland system (66.67%); deep *fadama* (25.95%); large irrigated rice schemes (14.81%); the small pump irrigated rice system (7.41%) and upland hill rice (3.70%). Small pumps for dry season rice cultivation are generally used because most farmers prefer to use such pumps for vegetable rather than rice production; horticultural production is a more lucrative.

S/No.	Village	State	System
1	Dass	Bauchi	Upland, shallow <i>fadama</i>
2	Dabardak	Bauchi	Upland, shallow <i>fadama</i>
3	Adaka	Benue	Upland, shallow <i>fadama</i>
4	Bar	Benue	Upland, shallow <i>fadama</i> , deep <i>fadama</i>
5	Okwaro - 2	Ekiti	Upland (hill rice)
6	Zabarmari	Borno	Upland, shallow <i>fadama</i>
7	Konduga	Borno	Shallow <i>fadama</i> , deep <i>fadama</i>
8	Ugboro	Cross River	Shallow <i>fadama</i> , deep <i>fadama</i> , gravity irrigation
9	Ijibor	Cross River	Shallow <i>fadama</i> , deep <i>fadama</i> , gravity irrigation
10	Izi Ugumego	Ebonyi	Upland, shallow <i>fadama</i>
11	Ndiechionuabonyi	Ebonyi	Upland, shallow <i>fadama</i>
12	Opanda	Enugu	Upland
13	Adani	Enugu	Shallow <i>fadama</i> , large scheme
14	Dasa Maibuzu	Gombe	Upland, shallow <i>fadama</i> , small pump (horticulture)
15	Hinna	Gombe	Upland, shallow <i>fadama</i> , deep <i>fadama</i>
16	Mashaya Dangado	Kebbi	Shallow <i>fadama</i> , deep <i>fadama</i> , small pump (horticulture), large scheme
17	Gwadon Gwaji	Kebbi	Shallow <i>fadama</i> , large scheme
18	Maigana	Kaduna	Upland
19	Idon	Kaduna	Upland, shallow <i>fadama</i>
20	Sabakri	Jigawa	Upland, shallow <i>fadama</i>
21	Kwadage	Jigawa	Upland, shallow <i>fadama</i>
22	Assakio	Nasarawa	Upland, shallow <i>fadama</i>
23	Sabon Gida	Nasarawa	Upland, shallow <i>fadama</i> , large scheme
24	Longvel	Plateau	Upland, shallow <i>fadama</i>
25	Ganawuri	Plateau	Upland, shallow <i>fadama</i> , deep <i>fadama</i>
26	Alagarno	Yobe	Upland, shallow <i>fadama</i> , deep <i>fadama</i>
27	Karage	Yobe	Shallow <i>fadama</i>

3.3 Rice production practices and intercropping

Data in this section show that the intercropping system described by farmers is similar to that described in Section 2. For example, in Ebonyi State, cassava, groundnut and yam are also intercrops. Cassava is also intercropped with rice in Ekiti State. Table 28 illustrates intercrops used with upland rice.

Table 28. Upland rice production practices and intercropping by village

S/No.	Village	State	Planting Method	Date of planting	Date of transplant	Intercrop	Rice harvest
1	Dass	Bauchi	Broadcasting, dibbling, transplanting	Not given	Not given	Not given	October
2	Dabardak	Bauchi	Broadcasting, dibbling, transplanting	Not given	Not given	Not given	October
3	Adaka	Benue	Not given	Not given	Not given	Not given	Not given
4	Bar	Benue	Broadcast	April	Not given	Maize, sorghum	July
5	Okwaro-2	Ekiti	Dibbling on hills	March	Not practised	Cassava	July
6	Zabarmari	Borno	Row planting, broadcasting	May	Not given	Maize, sorghum	October
7	Konduga	Borno	Not given	Not given	Not given	Not given	Not given
8	Ugboro	Cross River	Not given	Not given	Not given	Not given	Not given
9	Ijibor	Cross River	Not given	Not given	Not given	Not given	Not given
10	Izi Ugumego	Ebonyi	Row planting	March	April	Yam, potato, cassava	July
11	Ndiechionuabonyi	Ebonyi	Row planting	March	April	Groundnut, yam, cassava	September
12	Opanda	Enugu	Broadcast, planting	April	Not given	Maize, bean	August
13	Adani	Enugu	Broadcasting, planting	May	June	Not given	October
14	Dasa Maibuzu	Gombe	Dibbling	June	Not given	Not given	October
15	Hinna	Gombe	Broadcasting, transplanting	June	July	Not given	November/December
16	Mashaya Dangado	Kebbi	Not practised				
17	Gwadon Gwaji	Kebbi	Not practised				
18	Maigana	Kaduna	Row planting	June	July	Maize	November/December
19	Idon	Kaduna	Broadcasting, Drilling	June	July	Yam, maize hedge	October/November
20	Sabalari	Jigawa	Saving	June	July	Sorghum	October
21	Kwadage	Jigawa	Row Planting	June	Not given	Sorghum	October
22	Assakio	Nasarawa	Broadcasting	April	Not given	Maize	August
23	Sabon Gida	Nasarawa	Dibbling	April	Not given	Maize, yam, sorghum	July
24	Longvel	Plateau	Broadcasting	June	Not given	Maize	October/November

S/No.	Village	State	Planting Method	Date of planting	Date of transplant	Intercrop	Rice harvest
25	Ganawuri	Plateau	Not given	Not given	Not given	Not given	Not given
26	Alagarno	Yobe	Not given	Not given	Not given	Not given	Not given
27	Karage	Yobe	Not given	Not given	Not given	Not given	Not given

Table 29 gives the intercrops used in shallow *fadama* rice production practices.

Table 29. Shallow <i>fadama</i> rice production practices and intercropping by village							
S/No.	Village	State	Planting Method	Date of planting	Date of transplant	Intercrop	Harvest
1	Dass	Bauchi	Dibbling, transplanting, broadcasting	Not given	Not given	Not given	Not given
2	Dabardak	Bauchi	Dibbling, broadcasting, transplanting	Not given	Not given	Not given	October
3	Adaka	Benue	Broadcasting, transplanting	May	July	Not given	November
4	Bar	Benue	Broadcasting	May	June	Not given	November
5	Okwaro-2	Ekiti	Dibbling	August	Not given	Cocoyam	January
6	Zabarmari	Borno	Broadcasting	May	June	Not given	November
7	Konduga	Borno	Broadcasting	May	June	Maize	October/November
8	Ugboro	Cross River	Dibbling	June	July/September	Not practised	October/November
9	Ijibor	Cross River	Nursery, broadcasting	June	July	Not practised	November
10	Izi Ugumego	Ebonyi	Dibbling, transplanting	June	July	Not practised	October/November
11	Ndiechionuabonyi	Ebonyi	Dibbling, transplanting	June	July	Not practised	
12	Opanda	Enugu	Not practised				
13	Adani	Enugu	Not given	Not given	Not given	Not given	Not given
14	Dasa Maibuzu	Gombe	Dibbling	November	Not given	Not given	February/March
15	Hinna	Gombe	Broadcasting, transplanting	January/February	March	Not given	July
16	Mashaya Dangado	Kebbi	Not given	Not given	Not given	Not given	Not given
17	Gwadon Gwaji	Kebbi	Broadcasting	June	July	Not practised	October/December
18	Maigana	Kaduna	Not given	Not given	Not given	Not given	Not given
19	Idon	Kaduna	Broadcasting	July	August	Cocoyam	November/December
20	Sabalari	Jigawa	Sowing	June	July	Not practised	October
21	Kwadage	Jigawa	Row planting	June	Not given	Not practised	October
22	Assakio	Nasarawa	Nursery	December	January	Maize	May
23	Sabon Gida	Nasarawa	Broadcasting	June	Not given	Not practised	October
24	Longvel	Plateau	Dibbling	June	Not given	Sorghum	October/November
25	Ganawuri	Plateau	Nursery	April/May	June	Cocoyam	November

26	Alagarno	Yobe	Not given	Not given	Not given	Not given	Not given
27	Karage	Yobe	Not given	Not given	Not given	Not given	Not given

Table 30 displays the intercroops under the deep *fadama* fish/rice system by village.

Table 30. Deep *fadama* fish/rice production practices and intercropping by village

S/No	Village	State	Planting method	Date of planting	Date of transplant	Date of harvest	Fish caught
1	Dass	Bauchi					
2	Dabardak	Bauchi					
3	Adaka	Benue					
4	Bar	Benue					
5	Okwaro-2	Ekiti					
6	Zabarmari	Borno					
7	Konduga	Borno					
8	Ugboro	Cross River	Nursery (December–March)		April	July/August	Yes
9	Ijibor	Cross River					
10	Izi Ugumego	Ebonyi					
11	Ndiechionuabonyi	Ebonyi					
12	Opanda	Enugu					
13	Adani	Enugu					
14	Dasa Maibuzu	Gombe					
15	Hinna	Gombe	(Small pumps) broadcasting, transplanting	January/February	March	July	Yes
16	Mashaya Dangado	Kebbi	Broadcasting	June		October/November	Yes
17	Gwadon Gwaji	Kebbi	Broadcasting	June	July	October/December	Yes
18	Maigana	Kaduna					
19	Idon	Kaduna					
20	Sabalari	Jigawa					
21	Kwadage	Jigawa					
22	Assakio	Nasarawa					
23	Sabon Gida	Nasarawa					
24	Longvel	Plateau					
25	Ganawuri	Plateau					
26	Alagarno	Yobe	Broadcasting	April		November	Yes
27	Karage	Yobe	Broadcasting	April		November	Yes

Rice farmers deliberately catch fish in Cross River State, Gombe State, Kebbi State and Yobe State. The blank spaces in the above table indicate that the system is not practised in those villages.

3.4 Rice and by-product consumption patterns

Table 31 shows that rice production in Adani, Enugu State, is purely a commercial venture. Therefore, it is not possible for a new rice technology, such as seeds, to be introduced through the conventional extension system there. Only technologies that promote profit maximisation will appeal to them. They will have no interest in an on-farm adaptive research extension system, farmers' field days will appeal to them more. It is not surprising that IR 1416, which is not widely grown, is preferred by the Adani rice scheme; this variety is preferred in the market. This point needs to be heeded if NERICA, for example, is to be introduced to them.

S/No	Village	State	Both food/cash	Straw used for:		
				Eaten by livestock	Burnt for fertiliser	Chopped for building
1	Dass	Bauchi	Yes	Yes	Yes	No
2	Dabardak	Bauchi	Yes	Yes	Yes	No
3	Adaka	Benue	Yes	Yes	Yes	No
4	Bar	Benue	Yes	Yes	Yes	No
5	Okwaro-2	Ekiti	Yes	No	No	No
6	Zabarmari	Borno	Yes	Yes	No	Yes
7	Konduga	Borno	Yes	Yes	Yes	Yes
8	Ugboro	Cross River	Yes	Yes	Yes	Yes (but not widespread)
9	Ijibor	Cross river	Yes	No	Yes	No
10	Izi Ugumego	Ebonyi	Yes	Yes	Yes	No
11	Ndiechionuaonyi	Ebonyi	Yes	Yes	Yes	Yes
12	Opanda	Enugu	Yes	Yes	Yes	No
13	Adani	Enugu	(Cash only)	No	Yes	No
14	Dasa Maibuzu	Gombe	Yes	Yes	No	Yes
15	Hinna	Gombe	Yes	Yes	No	Yes
16	Mashaya Dangado	Kebbi	Yes	Yes	Yes	Yes
17	Gwadon Gwaji	Kebbi	Yes	Yes	Yes (iron toxicity)	Yes
18	Maigana	Kaduna	Yes			
19	Idon	Kaduna	Yes			
20	Sabalari	Jigawa	Yes	Yes	Yes	Yes
21	Kwadage	Jigawa	Yes	Yes	Yes	Yes
22	Assakio	Nasarawa	Yes	Yes	Yes	Yes
23	Sabon Gida	Nasarawa	Yes	Yes	Yes	Yes
24	Longvel	Plateau	Yes	Yes	Yes	Yes (and mulch)
25	Ganawuri	Plateau	Not given			
26	Alagarno	Yobe	Not given	Yes	Yes	Yes
27	Karage	Yobe	Not given	Yes	Yes	Yes
	Percentage		96.3%	77.8%	74.1%	55.6%

3.5 Gender and rice production

Table 32 shows that both men and women are actively involved in rice production. In many areas, men join women in processing and marketing rice.

Table 32. Gender and rice production											
S/No	Village	State	Production activities								
			Clearing	Land preparation	Planting	Transplanting	Weeding	Harvesting	Transporting	Threshing	Winnowing
1	Dass	Bauchi	0	4	2	0	2	2	4	2	3
2	Dabardak	Bauchi	0	2	2	0	2	1	2	1	3
3	Adaka	Benue	0	1	2	2	2	2	2	2	2
4	Bar	Benue	0	1	1	1	2	2	1	2	2
5	Okwaro-2	Ekiti	1	1	2	0	1	3	3	1	3
6	Zabarmiri	Borno	0	2	1	2	2	1	1	1	2
7	Konduga	Borno	0	1	1	0	1	1	1	1	1
8	Ugboro	Cross River	0	1	1	2	2	2	2	1	2
9	Ijibor	Cross River	0	2	1	1	2	2	2	1	3
10	Izi Ugumego	Ebonyi	0	1	1	2	3	3	3	1	3
11	Ndiechionuabonyi	Ebonyi	3	1	3	3	3	3	2	3	3
12	Opanda	Enugu	0	2	2	2	2	2	1	1	3
13	Adani	Enugu	0	1	3	3	3	2	1	1	3
14	Dasa Maibuzu	Gombe	0	2	1	0	1	1	1	3	3
15	Hinna	Gombe	0	1	1	1	1	1	1	3	3
16	Mashaya Dangado	Kebbi	1	1	1	1	1	1	1	1	1
17	Gwadon Gwaji	Kebbi	1	1	1	1	1	1	1	1	1
18	Maigana	Kaduna	0	1	3	0	2	1	1	3	3
19	Idon	Kaduna	0	1	3	3	3	2	3	2	3
20	Sabalari	Jigawa	1	1	1	1	1	1	1	1	1
21	Kwadage	Jigawa	1	1	1	1	1	1	1	1	3
22	Assakio	Nasarawa	1	2	2	2	2	2	2	2	2
23	Sabon Gida	Nasarawa	1	2	2	0	2	2	2	2	2
24	Longvel	Plateau	1	2	2	2	2	2	2	2	2
25	Ganawuri	Plateau	0	2	2	2	2	2	2	2	2
26	Alagarno	Yobe	0	2	2	0	2	2	2	2	2
27	Karage	Yobe	0	2	2	0	2	2	2	2	2

Codes:

0 = no information

1 = men

2 = both sexes

3 = women

4 = machinery

It is surprising that, in Ekiti State, it is women who undertake the hazardous task of land clearance. In Ebonyi State, only women undertake planting; the main task of men in Ndiechinuabonyi is land preparation. An interesting contrast may be drawn with Jigawa State where, in both locations, it is men who undertake land clearance, land preparation and planting. Therefore, it is not possible to conclude that gender, influenced by religion (especially female seclusion), is a major issue. Only in Kebbi State are women not involved in rice activities.

3.6 Pattern in input use

The tables in this section provide information on the pattern of input use. The use of fertiliser is not universal, for instance, it is not used in Plateau State, Ekiti State and Yobe State. The use of insecticides and herbicides is not widespread, whereas the green maturing method is. Workbulls are used on the sandy soils of Borno State, Gombe State, Kebbi State, Jigawa State and Yobe State for upland rice production.

Table 33 displays the pattern in the use of inorganic inputs.

S/No	Village	State	Input types		
			Fertiliser use	Insecticide use	Herbicide use
1	Dass	Bauchi	Yes	Yes	Yes
2	Dabardak	Bauchi	Yes	Yes	Yes
3	Adaka	Benue	Yes	Yes	Yes
4	Bar	Benue	Yes	Yes	Yes
5	Okwaro - 2	Ekiti	No	No	No
6	Zabarmari	Borno	Yes	Yes	Yes
7	Konduga	Borno	Yes	No	Yes
8	Ugboro	Cross River	Yes	No	No
9	Ijibor	Cross River	Yes	No	No
10	Izi Ugumego	Ebonyi	Yes	No	No
11	Ndiechionuabonyi	Ebonyi	Yes	Not available	Not available
12	Opanda	Enugu	Yes	No	No
13	Adani	Enugu	Yes	Yes	Yes
14	Dasa Maibuzu	Gombe	Yes	No	Yes
15	Hinna	Gombe	Yes	No	No
16	Mashaya Dangado	Kebbi	Not available	No	No
17	Gwadon Gwaji	Kebbi	Yes	Sometimes	Not available
18	Maigana	Kaduna	Yes	No	No
19	Idon	Kaduna	Yes	No	No
20	Sabalari	Jigawa	Yes	No	No
21	Kwadage	Jigawa	Yes	No	Yes
22	Assakio	Nasarawa	Yes	Yes	Yes
23	Sabon Gida	Nasarawa	Yes	Yes	Yes
24	Longvel	Plateau	Cannot afford	No	Yes
25	Ganawuri	Plateau	No	No	No
26	Alagarno	Yobe	No	No	Yes
27	Karage	Yobe	No	No	Yes

Table 34 gives patterns in the use of organic manure according to villages.

S/No	Village	State	FYM use	Green manure use
1	Dass	Bauchi	Yes	Yes
2	Dabardak	Bauchi	No	No
3	Adaka	Benue	No	No
4	Bar	Benue	No	No
5	Okwaro - 2	Ekiti	No	No
6	Zabarmari	Borno	Yes	Yes
7	Konduga	Borno	No	Yes
8	Ugboro	Cross River	Yes	Yes
9	Ijibor	Cross River	No	No
10	Izi Ugumego	Ebonyi		No

S/No	Village	State	FYM use	Green manure use
11	Ndiechionuabonyi	Ebonyi	Yes	No
12	Opanda	Enugu	No	No
13	Adani	Enugu	No	Yes
14	Dasa Maibuzu	Gombe	No	No
15	Hinna	Gombe	No	No
16	Mashaya Dangado	Kebbi	Yes	Yes
17	Gwadon Gwaji	Kebbi	Yes	Yes
18	Maigana	Kaduna	No	No
19	Idon	Kaduna	No	No
20	Sabalari	Jigawa	Yes	No
21	Kwadage	Jigawa	No	Yes
22	Assakio	Nasarawa	Yes	Yes
23	Sabon Gida	Nasarawa	Yes	Yes
24	Longvel	Plateau	No	Yes
25	Ganawuri	Plateau	No	No
26	Alagarno	Yobe	No	No
27	Karage	Yobe	No	No

Table 35 supplies information on the pattern in use of traction power according to villages.

Table 35. Pattern of traction power use by village						
S/No	Village	State	Work bulls use	Tractor (in past)	When tractor use stopped in years	Reason
1	Dass	Bauchi	No	Yes	Still in use	
2	Dabardak	Bauchi	No	Yes	Still in use	
3	Adaka	Benue	No	Yes	Still in use	
4	Bar	Benue	No	(Yes)	4	Not available
5	Okwaro - 2	Ekiti	No	No	Not applicable	
6	Zabarmari	Borno	Yes	Yes	Still in use	
7	Konduga	Borno	Yes	Yes	Still in use	
8	Ugboro	Cross River	No	No	Not applicable	
9	Ijibor	Cross River	No	(Yes)	5	Not available
10	Izi Ugumego	Ebonyi	No	(Yes)	3	Not affordable
11	Ndiechionuabonyi	Ebonyi	No	(Yes)	4	Not available
12	Opanda	Enugu	No	(Yes)	4	Not available
13	Adani	Enugu	No	Yes	Still in use	
14	Dasa Maibuzu	Gombe	Yes	No	Not applicable	
15	Hinna	Gombe	No	(Yes)	5	Not available and affordable
16	Mashaya Dangado	Kebbi	No	(Yes)	6	Not available
17	Gwadon Gwaji	Kebbi	Yes	(Yes)	6	Not available
18	Maigana	Kaduna	No	Yes	Still in use	
19	Idon	Kaduna	No	(Yes)	3	Not available and affordable
20	Sabalari	Jigawa	Yes	Yes	Still in use	
21	Kwadage	Jigawa	Yes	(Yes)	10	Not available

S/No	Village	State	Work bulls use	Tractor (in past)	When tractor use stopped in years	Reason
22	Assakio	Nasarawa	No	Yes	Still in use	
23	Sabon Gida	Nasarawa	No	Yes	Still in use	
24	Longvel	Plateau	No	Yes	Still in use	
25	Ganawuri	Plateau	No	No	Not applicable	
26	Alagarno	Yobe	Yes	(Yes)	4	Cost
27	Karage	Yobe	Yes	(Yes)	4	Cost

The tractor is still in use nation-wide but its non-availability, and prohibitive cost of purchase and hire, has made it beyond the reach of farmers.

3.7 Rice production problems

The information given in Table 36 corresponds with that given in Table 13 on widespread rice production problems (Section 2.9). The local names of the weeds are included for the purpose of identification of those weeds that the farmers see as problems. Fish is recorded as a pest for young rice seedlings in Borno State and Yobe State. Cattle damage to rice crops is a man-made problem that can be avoided.

Village	State	Disease (local name)	Insects	Birds	Mammals	Weeds (local names)
Dass	Bauchi	Blast	Stem borers	None	Squirrels	Striga sp., (shinka-shinka)
Dabardak	Bauchi	Blast	Stem borers	None	Squirrels, grass cutter	Not given
Adaka	Benue	None	Viridula spp.	Weaver birds	Grass cutter	(Been)
Bar	Benue	None	None	Weaver birds	Grass cutter	Barn yard millet
Okwaro - 2	Ekiti	None	None	Weaver birds, ergret	Grass cutter	(Ewolo)
Zabarmari	Borno	Rot (<i>sauki</i>)	Grass hopper (variegated)	Squirrel s	Cattle, rats	(<i>Roba</i>), wild rice
Konduga	Borno	Rust	Termites, stem borer	Squirrel s	Rat, fish (Tilapia)	(<i>Roba</i>), Cyperus sp.
Ugboro	Cross river	None	Stem borer	Weaver birds, (<i>ricice, eleve</i>)	Rats, grass cutter	(<i>Ikpen, iswaca</i>), wild rice; (Iron grass)
Ijibor	Cross River	Blast	Stem borer, dragonfly	Weaver birds, doves	Rats, grass cutters, leech	Echinochlon caugalli, Cyperus spp.
Izi Ugumego	Ebonyi	Rust	Termites, (<i>wiwi</i>)	Weaver birds	Rats, grass cutter, cattle	Wild rice (<i>ichita</i>)
Ndiechion uabonyi	Ebonyi	None	Stem borers, Termites	Weaver birds, wild Pigeons (<i>kareket e</i>)	Rats, grass cutters	(<i>Ntekuoda</i> "cuts leg") (Odagbwolerice)

Village	State	Disease (local name)	Insects	Birds	Mammals	Weeds (local names)
Opanda	Enugu	Iron toxicity (ayola)	None	Weaver birds	Rats, grass cutters	(Aba)
Adani	Enugu	ARYM virus	Gall midge, worms, stem borers	Weaver birds	None	(Aba/ governor/batiama)
Dasa Maibuzu	Gombe	Blast	Stem borers	Squirrels	None	(Harkiya, damarge)
Hinna	Gombe	Blast	Stem borers	Squirrels	None	Bahamas grass, (roba), cyperus spp..
Mashaya Dangado	Kebbi	None	Variegated grasshopper	(Yuru)	Rats	(Bou, dandamarge, babanchi)
Gwadon Gwaji	Kebbi	None	Locust	Wild ducks	Rats (<i>kusa</i>)	O. bata, O. longistaminatu
Maigana	Kaduna	None	None	None	Cattle	(Kirikiri)
Idon	Kaduna	Smut	Stem borers, nematodes	Squirrels	Grass cutter	Imperata cylindrica
Sabalari	Jigawa	Blast	None	(Magaran)	Rats	(Roba,ilsinsiya, makasha)
Kwadage	Jigawa	Blast	None	None	Rats	(Makasha, raban zabuwa)
Assakio	Nasarawa	None	Stem borers, sucking bugs	Weaver birds	Rats	Sedges
Sabon Gida	Nasarawa	Brown spots	Crickets, army worms	Weaver birds	Rodents	Sedges, broad leaves
Longvel	Plateau	Blast	Sucking bugs, termites	Weavers	Rats	Shiga
Ganawuri	Plateau	Blast	Grasshoppers, locusts	Weavers, Squirrels	Rodents, fish, frog, toads	Sedges
Alagarno	Yobe	None	None	Squirrels	Fish	(Jado)
Karage	Yobe	None	None	Squirrels	Fish	(Jado)

Source: EDO Village Survey (October, 2000)

3.8 Rice processing and preferred varieties

Table 37 gives the varieties preferred for processing by farmers and the reasons for their choice. Local names are provided for follow up research. The Bida variety in Ganawuri, Plateau State, is one whose source is clearly Badeggi. It is liked not only for its market value but also for reasons such as the fact that it is “easy to swallow.” MAS 2401 is thriving as a preferred variety in states such as Jigawa, Enugu and Ebonyi and not just Benue State as suggested by government officials. Researchers at NCRI headquarters were extremely surprised to learn that MAS is still thriving. IR 1416 is the chief variety at Adani; it is the variety that sells first when taken to the market.

Village	State	Processing method	Hand Processors	Preferred variety	Reasons for choice
Dass	Bauchi	Mill	Female	FARO 44	Palatable and sticks well
Dabardak	Bauchi	Mill/manual	Both	FARO 44	Palatable
Adaka	Benue	Mill/manual	Female	MAS	Sweet, long grain
Bar	Benue	Mill/manual	Female	FARO 26	Sweet long grain
Okwaro – 2	Ekiti	Mill/manual	Both	Short duration	Ripens at right time
Zabarmari	Borno	Mill/manual	Both	De Gaulle	Good milling quality, high and swells on cooking
Konduga	Borno	Mill/manual	Female	Dan maizidum	Milling quality, high yield, swells on cooking
Ugboro	Cross River	Mill/manual	Both	FARO 14,15, Jango	Sweetness
Ijibor	Cross River	Mill/manual	Both	FARO 14,15	High yield, expands when cooked, sweet
Izi Ugumego	Ebonyi	Mill/manual	Both	MAS, IR 8	Sweet, grains do not stick
Ndiechionuabonyi	Ebonyi	Mill/manual	Men	MAS	Good taste, good looking
Opanda	Enugu	Mill/manual	Both	IR 1416	Sweet, long shelf life
Adani	Enugu	Mill/manual	Male	IR 1416	Sweet, long shelf, sells better than foreign rice
Dasa Maibuzu	Gombe	Mill/manual	Female	FARO 44, Ev-China	High yield, grain quality
Hinna	Gombe	Mill/manual	Female	FARO 44	Taste and bright colours
Mashaya Dangado	Kebbi	Mill/manual	Both	Ba Yawuri	Taste
Gwadon Gwaji	Kebbi	Mill/manual	Female	Danboto, jari iri, biki iri	Taste

Village	State	Processing method	Hand Processors	Preferred variety	Reasons for choice
Maigana	Kaduna	Mill/manual	Female	Long grain varieties	Palatability
Idon	Kaduna	Mill/manual	Female	Small grain varieties	Swells well
Sabalari	Jigawa	Mill/manual	Female	Kilaki	Nice looking and tastes good
Kwadage	Jigawa	Not stated	Female	MAS, yar Barjitu, Ev-china	Taste, white colour and long grains
Assakio	Nasarawa	Mill/manual	Female	BG 90	Swells very well
Sabon Gida	Nasarawa	Mill/manual	Female	BG 90	Swells well
Longvel	Plateau	Mill/manual	Female	FARO 44	Bright, swells well and sweet taste
Ganawuri	Plateau	Mill/manual	Female	Bida	Easy to swallow
Alagarno	Yobe	Mill/manual	Female	Karamin iri	Very sweet
Karage	Yobe	Mill/manual	Female	Karamin iri	Very sweet

3.9 Rice pricing and marketing

High production costs are the bane of rice production in Nigeria. Four methods of pricing rice were encountered, as shown in Table 38.

Table 38. Rice pricing and marketing by village

Village	State	Price-setting	Source of price	Problems in marketing
Dass	Bauchi	Traders	Farmers/traders	Low prices especially at farm- gate.
Dabardak	Bauchi	Traders	Farmers/traders	Low prices especially at farm- gate.
Adaka	Benue	Traders	Farmers/traders	Middlemen cause low prices.
Bar	Benue	Traders	Farmers/traders	Farm-gate prices low due to middlemen.
Okwaro-2	Ekiti	Traders	Farmers/traders	Low price
Zabarmari	Borno	Farmers with community consent	Farmers/traders	Price lower than cost of production.
Konduga	Borno	Traders with community consent	Farmers/traders	Price lower than cost of production.
Ugboro	Cross River	Farmers/traders with community consent	Farmers/traders	Price too low, price control advocated
Ijibor	Cross River	Farmers/traders with community consent	Farmers/traders	Farmers are at a disadvantage in selling products.
Izi Ugumego	Ebonyi	Farmers/traders with community consent	Farmers/traders	Price not commensurate with cost of inputs. Imported rice threatens local rice.
Ndiechionuabonyi	Ebonyi	Traders with community consent	Farmers/traders	Foreign rice has reduced prices of local one.
Opanda	Enugu	Farmers/traders	Farmers/traders	Price not commensurate with cost of inputs
Adani	Enugu	Farmers/traders with community consent	Farmers/traders	Price not commensurate with cost of inputs
Dasa Maibuzu	Gombe	Farmers/traders	Traders	Price fluctuations

Village	State	Price-setting	Source of price	Problems in marketing
Hinna	Gombe	Farmers/traders	Traders	Price fluctuations
Mashaya Dangado	Kebbi	Farmers/traders with community consent	Farmers/traders	Cost of production very high leading to low profit.
Gwadon Gwaji	Kebbi	Farmers/traders with community consent	Farmers/traders	Cost of labour higher than selling price.
Maigana	Kaduna	Farmers/traders	Farmers/traders	Price not stable
Idon	Kaduna	Farmers/traders	Farmers/traders	Price not stable and farmers sell on time.
Sabalari	Jigawa	Farmers/traders with community consent	Traders	Costs of inputs very high.
Kwadage	Jigawa	Farmers/traders with community consent	Farmer/traders	Costs of inputs very high and profit low.
Assakio	Nasarawa	Farmers/traders	Farmers/traders	Low prices during harvest, but higher in June.
Sabon Gida	Nasarawa	Farmers/traders	Farmers/traders	Low prices at glut periods but high in June July.
Longvel	Plateau	Farmers/traders with community consent	Farmers	Poor processing quality lowers prices.
Ganawuri	Plateau	Farmers with community consent	Farmers	Low prices at harvest.
Alagarno	Yobe	Farmers/traders with community consent	Farmers/traders	Production cost too high so prices always low.
Karage	Yobe	Farmer/traders with community consent	Farmers/traders	Production cost too high and so low profits.

The data reveals that farmers and traders (22.2%), without the consent of the community, may fix the price of rice and that traders (18.5%) may also fix the price of the commodity whether milled or not milled. It shows that a greater percentage (37.0%) of farmers and traders fix the rice price together and with the consent of the community. It is only at Ganawuri in Plateau State and Zabarmari in Borno State that farmers decide the price with the consent of the community, and traders (7.4%) have no say in it. This is possible at Ganawuri because their rice is in great demand at the market. The government does not fix pre-season prices for rice, unlike the practice with a commodity such as cocoa. It may be deduced from Table 38 that there is a strong correlation between the role of the community in fixing prices and a revered traditional chieftaincy. Where the traditional ruler is strong, the community and farmers contribute to fixing rice prices.

The major sources of information on rice prices are farmers and traders. Radio and television do not broadcast prices. Problems associated with marketing rice are diverse. In some villages there is no problem (25.9%). Foreign rice is considered a problem in two villages (7.4%). This is not entirely unexpected because the farmers around Abakaliki are also traders. However, elsewhere this is not a problem. The cost of inputs, especially labour, is a major source of worry to farmers. In order to cope, they have to cultivate only small sized farms. The problem of low farm-gate prices and quick disposal of paddy rice by farmers at harvest time, rather than storing it to be sold 6-8 months later, is caused by a combination of market forces created by middlemen and the need for families to meet obligations during the festive periods of Christmas and Ids (Moslem holidays). This constitutes 33.3%. Those socio-economic factors also manifest themselves as big fluctuations in prices (11.1%) during the glut period and food shortages of May-July. Only 3.7% of the sample says that poor processing is a marketing problem. However, the sudden appearance of de-stoners in major milling centres is an indication that rice marketers perceive poor processing as a need that must be met.

3.10 Preferred extension channel

According to Table 39, an overwhelming number of farmers prefer an extension system that is at the village level (59.3%). An equally high number prefer a system using farmers themselves as agents of change

(51.9%). Radio and the formal extension system using government agents are less preferred. The table reveals further that traditional rulers should play a significant role in extension (44.4%). The findings are an indictment of the formal system and this calls for serious change on the part of government agents. The role of religious institutions, such as the church and mosque, was not elicited, but both could be strategic agents for change.

Village	State	Government agent	Traditional ruler	Village/h amlet forum	Radi o	Other farmers
Dass	Bauchi	No	No	Yes	No	Yes
Dabardak	Bauchi	No	No	Yes	No	Yes
Adaka	Benue	Yes	Yes	Yes	Yes	Yes
Bar	Benue	Yes	Yes	No	Yes	No
Okwaro - 2	Ekiti	No	Yes	No	No	Yes
Zabarmari	Borno	No	No	Yes	No	Yes
Konduga	Borno	No	Yes	Yes	No	No
Ugboro	Cross River	No	Yes	Churches	No	Yes
Ijibor	Cross River	No	Yes	Yes	Tow n crier	No
Izi Ugumego	Ebonyi	No	Yes	Yes	No	Yes
Ndiechionuabonyi	Ebonyi	No	No	Yes	No	No
Opanda	Enugu	No	No	No	No	Yes
Adani	Enugu	Yes	No	No	No	No
Dasa Maibuzu	Gombe	Yes	No	No	No	Yes
Hinna	Gombe	Yes	No	Yes	No	Yes
Mashaya Dangado	Kebbi	No	Yes	No	No	No
Gwadon Gwaji	Kebbi	No	No	Yes	No	Yes
Maigana	Kaduna	Yes	No	No	Yes	No
Idon	Kaduna	No	No	No	Yes	No
Sabalari	Jigawa	No	Yes	No	No	No
Kwadage	Jigawa	No	Yes	Mosques	No	No
Assakio	Nasaraw a	No	Yes	Yes	No	No
Sabon Gida	Nasaraw a	No	No	Yes	No	Yes
Longvel	Plateau	No	Yes	Yes	No	Yes
Ganawuri	Plateau	Yes	No	Yes	No	Yes
Alagarno	Yobe	Yes	No	No	No	No
Karage	Yobe	Yes	No	No	No	No
%		33.3	44.4	59.3	14.8	51.9

NGOs, farmers' organisations and the organised private sector are expected to play leading roles in extension and linkage between research and extension by the World Bank. The situation on the ground is not very encouraging because no viable alternative exists for pro-poor extension services. Commercial extension services will meet the needs of large-scale farmers only and even so will be in the area of inputs supplies and not the adoption of technology. The most sensible approach would be to seek for practicable and realistic means of reactivating the formal system through alternative funding arrangements. The World Bank, through its top-down method of policy design and implementation, was responsible for the creation of the non-sustainable ADP system. However, as a preliminary step, ADP trained personnel could be disengaged from the civil service and provided with adequate incentives to live and work in villages as professionals. The government has been encouraging other professionals (e.g. health workers) to work in rural areas and

the same approach could be followed. This would go a long way towards improving service delivery and the farmer-extension officer ration (Buntjer, 1976: 81).

3.11 Farmers' associations

Table 40 shows that most village-based farmers' associations are functional. However, in the South-South and South-East zones the associations are not functional. This reflects the social structure of the zones. Social cohesion, with regard to communal activities, is comparatively higher in the northern part of Nigeria than in the South-East and South-South. *Fadama* Users' Associations (FUAs) need further explanation. These are the only functional formal organisations that are in close liaison with the ADPs. They are funded under the World Bank facility. Phase 1 of the project started in 1992 for the core *fadama* northern States and was terminated in 2001. The 12 states that participated promoted only the cultivation of horticultural crops. Phase 2 envisages a new philosophy of agricultural extension and an expansion of its scope to cover crops such as rice, maize, cowpea and cassava. It will also include livestock, fisheries and agro-forestry. The approach to extension and research has hitherto has been top-down but now the World Bank is suggesting that it should be demand-driven and should be contracted to NGOs and FOs. The new approach will completely omit the ADPs. The capacity of many FUAs is being developed through training on technical, institutional and sustainability issues. This approach is in line with the concept of M-APs. However, Nigeria is not ready for such radical change and it is also disturbing that the partial bottom-up approach to be pursued had no input from farmers for whom the loans for *Fadama* Phase II will be secured.

There are two more types of farmers' organisations depicted in Table 40: formal co-operative societies and groups that are independent of government. Formal co-operative societies have a bias towards marketing, savings and loans. Generally such societies are fostered by governments and therefore are not very effective. Groups that have been established without the involvement of government are viable and sustainable and so are crucial in the implementation of M-APs. They include labour exchange (*gaya*) groups, revolving loan self-help groups (*adashe*) and age-grades. These have social capital that is available to fill the gap that the formal system is unable to provide. Therefore they have as great a potential as the engine for growth and provide an answer to poverty eradication.

Table 40. Farmers' associations by village

Village	State	Name of Association	Principal functions	Status
Dass	Bauchi	<i>Balari</i> Farmers' Association	Rice production	Functional
Dabardak	Bauchi	<i>Dot/Dabardak</i> Farmers' Association	Rice production	Functional
Adaka	Benue	<i>Adaka</i> Farmers' Association	Promotes production of cash crops	Functional
Bar	Benue	<i>Beranda</i> Farmers' Association	Promotes production of cash crops	Functional
Okwaro - 2	Ekiti	<i>Okwaro-2</i> Rice Millers' Association	Rice milling	Functional
Zabarmari	Borno	<i>Zabarmari</i> Rice Farmers	To increase income of members	Functional
		<i>Fadama</i> Users' Association	To promote <i>fadama</i> activities	Functional
Konduga	Borno	<i>Fadama</i> Users' Association	To promote production of <i>fadama</i> crops	Not functional
Ugboro	Cross River	<i>Bekwara</i> Farmers' Association	Distribution of inputs	Not functional
Ijibor	Cross River	Co-operative Farmers' Association	Distribution of inputs when available	Not functional
Izi Ugumego	Ebonyi	Co-operative Farmers' Association	Distribution of inputs	Not effective

Village	State	Name of Association	Principal functions	Status
Ndiechionuabonyi	Ebonyi	<i>Izzi</i> Farmers' Association	Encourage rice production	Not effective
Opanda	Enugu	<i>Opanda</i> Farmers' Association	Distribute inputs	No effective
Adani	Enugu	<i>Adarice</i> Farmers' Association <i>World Bank</i> Farmers' Association	Distribution of inputs Distribution of inputs	Not very functional Not very functional
Dasa Maibuzu	Gombe	<i>Dasa</i> Co-operative Society <i>Wadaci Dasa</i> Co-operative	Multipurpose – general trading Promotion of <i>fadama</i> crops	Functional Functional
Hinna	Gombe	<i>Dadin Kowa</i> Farmers' Association <i>Fadama</i> Users' Association <i>Hinna</i> Women Multipurpose Society	Farming for income improvement Promote dry season farming General trading and livestock rearing	1. Not functional 2. Functional 3. Functional
Mashaya Dangado	Kebbi	Young Farmers' Club	Not given	Not given
Gwadon Gwaji	Kebbi	General Farmers' Association	Promote modern farming	Functional
Maigana	Kaduna	Not given	Not given	Not given
Idon	Kaduna	<i>Fadama</i> Co-operative Society	Keeping accounts, loans and trading	Functional
Sabalari	Jigawa	Young Farmers' Club	Sharing of loans from government	Functional
Kwadage	Jigawa	Young Farmers' Club	Sharing of loans from government	Functional
Assakio	Nasarawa	Not given	Not given	Not given
Sabon Gida	Nasarawa	<i>Sabon Gida</i> Farmers' Association	To parcel out land to farmers.	Functional
Longvel	Plateau	Allah Na Nana Association <i>Mermwes</i> Farmers' Association <i>Kautaubri</i> Farmers' Association <i>Didi</i> Farmers' Association	Farm labour mobilisation Farm labour Self help Self help	Functional Functional Functional Functional
Ganawuri	Plateau	<i>Aten</i> Farmers' Association <i>Deer</i> Farmers' Group	Raise funds, for self help Community development	Functional Functional
Alagarno	Yobe	<i>Fadama</i> Users' Association	Promote <i>fadama</i> development	Functional
Karage	Yobe	<i>Fadama</i> Users' Association	Distribution of inputs	Functional

3.12 Choice of varieties and seed sources

Table 41 gives the results of group interviews with farmers on the characteristics they desire in a rice variety. They were required to choose a maximum of four “most desirable characteristics” in an ideal variety if it were to be developed to meet their needs. It reveals that high yield (81.5%) is the most desirable characteristic that farmers require. Early maturity (44.4%) and pest/disease resistance (40.7%) follow. Other characteristics in descending order are: good milling quality (25.9%); medium duration maturity period (18.5%); long grains (14.8%); easy threshing (14.8%); tall variety (11.1%); flood resistance (11.1%); non-lodging (7.1%); weed resistance (7.1%); and good cooking quality (3.7%). The table displays the distribution of the characteristics according to village.

Table 41. Characteristics of ideal rice type by village

Village	State	Desired characteristics in variety in order of preference
Dass	Bauchi	Early maturity, pest/disease resistance, high yield
Dabardak	Bauchi	Early maturity, pest/disease resistance, high yield, easy threshing
Adaka	Benue	Tall variety, medium duration
Bar	Benue	Easy threshing, medium duration, long grains, non-lodging
Okworo-2	Ekiti	Early maturity, pest/disease resistance, high yield, easy threshing
Zabarmari	Borno	Early maturity, high yield, good milling, good for cooking
Konduga	Borno	Early maturity, high yield, good milling
Ugboro	Cross River	Pest/disease resistance, high yield, good milling, weed resistance
Ijibor	Cross River	Early maturity, high yield, medium duration, non-lodging
Izi Ugumego	Ebonyi	Early maturity, high yield
Ndiechionuabonyi	Ebonyi	High yield
Opanda	Enugu	Not given
Adeni	Enugu	Pest/disease resistance
Dasa Maibuza	Gombe	Early maturity, high yield
Hinna	Gombe	Early maturity, pest/disease resistance, long grains
Mashaya dagado	Kebbi	Pest/disease resistance, medium duration, flood resistance
Gwadon Gwaji	Kebbi	Pest/disease resistance, tall variety, medium duration, flood resistance
Maigana	Kaduna	Early maturity, high yield, pest/disease resistance
Idon	Kaduna	Early maturity, high yield, long grains
Sabalari	Jigawa	Early maturity, pest/disease resistance, weed resistance
Kwadage	Jigawa	High yield, pest/disease resistance, easy threshing, good milling
Assakio	Nasarawa	Pest/disease resistance, long grains, good milling
Sabon Gida	Nasarawa	High yield, pest/disease resistance, tall variety
Longvel	Plateau	Pest/disease resistance, good milling
Ganawuri	Plateau	High yield, pest/disease resistance, good milling
Alagarno	Yobe	Pest/disease resistance
Karage	Yobe	Pest/disease resistance

Only 62.96% of the farmers were satisfied with the government seed source. An overwhelming 96.30% of farmers rely on other farmers for seeds.

3.13 Requirements for increased rice production

Table 42 gives the results of group interviews with farmers on their requirements from the government to enable them to increase rice production. They were offered a maximum of four “most urgent needs” for their village. Most farmers say that they need fertilisers, tractors and credits. Farmers in Ekiti State and Plateau States say that they need more land. A dismal 7.4% of farmers require effective extension services. This

shows that farmers are dissatisfied with the formal extension system. Only 3.7% of farmers want rice imports to be stopped.

Village	State	Needs
Dass	Bauchi	Fertilisers, tractors, credit facility, herbicides
Dabardak	Bauchi	Fertilisers, tractors, credit facility, herbicides
Adaka	Benue	Fertilisers, tractors, credit facility, herbicides
Bar	Benue	Fertilisers, tractors, credit facility, herbicides
Okwaro-2	Ekiti	Fertilisers, tractors, more land, credit facility
Zabarmari	Borno	Fertilisers, credit facility, control of birds
Konduga	Borno	Fertilisers, credit facility, good quality seeds, high yielding varieties
Ugboro	Cross River	Tractors, credit facility, herbicides
Ijibor	Cross River	Fertilisers, tractors, credit facility, good quality seeds
Izi Ugumego	Ebonyi	Fertilisers, tractors, credit facility, high yielding varieties
Ndiechionuabonyi	Ebonyi	Fertilisers, tractors, credit facility, herbicides
Opanda	Enugu	Fertilisers, tractors, herbicides, good price
Adani	Enugu	Fertilisers, tractors, irrigation infrastructures, flood control
Dasa Maibuzu	Gombe	Good price, mill technology, farmer training
Hinna	Gombe	Irrigation infrastructures
Mashaya Dangado	Kebbi	Fertilisers, tractors, herbicides, flood control structures
Gwadon Gwaji	Kebbi	Fertilisers, tractors, good price, flood control structures
Maigana	Kaduna	Fertilisers, tractors, credit facility, herbicides
Idon	Kaduna	Fertilisers, tractors, credit facility, herbicides
Sabalari	Jigawa	Fertilisers, tractors
Kwadage	Jigawa	Fertilisers, tractors, herbicides
Assakio	Nasarawa	Fertilisers, tractors, herbicides
Sabon Gida	Nasarawa	Fertilisers, tractors, herbicides
Longvel	Plateau	Fertilisers
Ganawuri	Plateau	More land, good quality seeds, high yielding varieties, good price
Alagarno	Yobe	Fertilisers, credit facility, control of birds
Karage	Yobe	Fertilisers, credit facility, control of birds

3.14 Rice varieties grown by farmers

Table 43 reveals that farmers are cultivating a large number of varieties known principally by their local names. Knowledge of these names is necessary for any research on the characteristics of varieties to ensure that varieties preferred by farmers are chosen.

Village	State	Varieties grown by farmers (local names)
Dass	Bauchi	Not given
Dabardak	Bauchi	Not given
Adaka	Benue	FARO 26: can withstand flooding; MAS: lodges easily
Bar	Benue	FARO 26: tillers well with good fertility; (<i>Dantella</i>): very tall and good for floods; FARO 44
Okwaro-2	Ekiti	Not known
Zabarmari	Borno	De Gaulle: high yielding, marketable, good milling but susceptible to rot, and has a high fertiliser requirement; Ex-China: early maturing, good milling quality

Village	State	Varieties grown by farmers (local names)
Konduga	Borno	Jato: reliable yield, desirable red colour but shatters at harvest; Dan Maibuzu
Ugboro	Cross River	Jango: big seeds, weed resistant, a new variety; FARO 14,15; Ex-China: early maturity; <i>Okprikpri</i> and <i>Ibali</i> grown on Obudu Hill but found in market
Izibor	Cross River	FARO 14, 15; (90 days); <i>Jango</i> ; <i>Dantara</i> ; Iron rice
Izi Ugumego	Ebonyi	IR 8, IR 5; ITA 306; MAS; Ex-China (90 days)
Ndiechionuabonyi	Ebonyi	IR 8, IR 5; ITA 306; MAS; Ex-China (90days)
Opanda	Enugu	IR 1416: early maturing, excellent tillering and yield; <i>Danpate</i> ; similar to IR 1416; FARO 16
Adani	Enugu	IR 1416: sweet, can be eaten without sweetening; MAS: very sweet; IR 8: resistant to diseases but does not store well; IR 5; SMA: sweet and pure white seeds.
Dasa Maibuzu	Gombe	ITA 306;Ex-China: susceptible to blast; FARO 44: slow growing so can be overtaken by weeds; <i>Babigila</i>
Hinna	Gombe	BG 92: low yielding. ITA 306 late maturing; Ex-China; FARO 44: is replacing Ex-China
Mashaya Dangado	Kebbi	
Gwadon Gwaji	Kebbi	BKN DA; FARO 7, 44, 35, 37; IR 54; Danboto; Babban Fari; Jan irin, Yar liman; Yar kalgawa; Bikin iri; Yar zaburwa; Raura; Farin iri, Ex-China
Maizana	Kaduna	Not given
Idon	Kaduna	Not given
Sabalari	Jigawa	Jaka, kilaki, yar ruwa; mai ada; yar diriya “from diriya Bauchi”
Kwadage	Jigawa	Not given
Assakio	Nasarawa	BG 90; FARO 15
Subon Gida	Nasarawa	BG 90; IR 8
Longvel	Plateau	FARO 44, 27, 43, 15, <i>Mai allura</i> : scares away birds due to long awns
Ganawuri	Plateau	BIDA; Bartholomew: not common, difficult to thresh
Alagarno	Yobe	Not given
Karage	Yobe	Not given
Source: EDO village survey (October 2000)		

4.0 Individual farmers' survey

4.1 Introduction

A farmer's questionnaire (see App. 1) was administered to 1000 individual rice farmers. This section discusses the responses of these farmers. The findings that are presented in the tables of this section, when considered together with those of Section 3 provide us with a fuller picture of the rice enterprise in Nigeria.

4.2 Family size and classification of respondents by sex

The mode of family size for the national survey is 4 while the mean is 9.4. This large family size is necessary for sustainable rice production by smallholder farmers because the family is the main source of labour for the enterprise. Table 44 displays gender characteristics in rice production. 91.5% of the respondents are male of whom 45.9% are aged between 36 and 45 years. 8.5% of the respondents are female of whom 4.1% are aged between 26 and 35 years. These women come mostly from the North-Central geo-political zone. However, the survey did cover the female groups in Bauchi State and Kano State, who are in the forefront of rice processing and marketing.

Age bracket (years)	Male		Female	
	No.	%	No.	%
15-25	30	3.0	3.0	0.3
26-35	177	17.7	41	4.1
36-45	459	45.9	37	3.7
46-55	233	23.3	4	0.4
56-65	13	1.3	0	0
66-75	3	0.3	0	0
75 and above	0	0	0	0

An observation in a report on a national *fadama* project by the Projects Coordinating Unit of the Federal Ministry of Agriculture and Rural Development is pertinent here:

The selection of respondents was stratified (sic) by gender, but the proportion of males and females varied across the three zones. In the northern zone, women were proportionately far less than men in terms of their activities in *fadama* farming, while the resulting sample from the southern states did not conform to the pre-study assumption that males would predominate in *fadama* farming. In some areas women were the major producers of crops on *fadama* lands. For the resulting total sample, therefore, the proportion of females to males in the southern states was significantly higher than originally planned. (PCU, 2002:46)

4.3 Farming systems

Table 45 depicts the different farming systems used by individual rice farmers. The mangrove rice system was not covered by the survey due to the security situation prevailing at the time in areas where the system might have been found. 82.3% of respondents use the shallow *fadama* rice system. This is followed by upland rice (21.90%) and deep *fadama* (10.90%) respectively. These percentages are not national averages. They are nevertheless worthy of note because they provide a representative picture of all geo-political zones in Nigeria. It seems that the upland rice system is not the most important nationally and its sole promotion would be contrary to farmers' perceptions. Moreover, the risk of drought is higher in the upland rice system than in the others. The large irrigation schemes for rice cultivation (10.90%) have all broken down, but farmers were still using the fields for rainfed cultivation or cultivation of horticultural crops under the National *Fadama* Development Programme - Phase 1. The terms of reference of the Presidential Special Committee on Rice Production, referred to in Section 2, has large-scale farmers in mind and so there is hope that this rice system might become important again. Table 45 shows the numbers of farmers practising different rice systems. About one-third of farmers use more than one system, hence the sample size is greater than 1000 (1265).

Table 45. Distribution of farmers practising rice systems

System	No. of responses
Water-logged (Shallow <i>Fadama</i>)	823
Rainfed Field Rice (Dry Upland)	219
Large Scheme	109
Valley-Bottoms	108
Small Pump Assisted	6

Table 46 shows that farmers practise a combination of systems and that the majority of those that do so prefer to combine upland and shallow *fadama* rice systems. However, most farmers practise only one system. The dominant system is the shallow *fadama*.

Table 46. Distribution of farmers growing rice in combinations of systems

System	No.
Upland and shallow swamp	192
Upland and deep swamp	49
Upland and large scheme	24

4.4 Rice-fish culture in deep *fadama* systems

Where water control is good, as in Badeggi area of Niger State, wild fish are deliberately left to grow and are harvested just before the fields dry up. Farmers indicate that this system is a source of additional income for them. Elsewhere, the farmers simply catch any available fish in their rice fields. Table 47 provides information on states and numbers of farmers involved in rice-fish culture. It shows that only 8.4% of them use this system. Given the advantages of this system it should be studied more and promoted. 84 farmers were surveyed.

Table 47. Rice-fish culture by state and number of farmers who catch fish on rice fields

State	No.
Yobe	7
Niger	19
Kebbi	20
Jigawa	2
Ebonyi	16
Cross River	19
Benue	1

Table 48 gives the names of fish species caught by rice farmers according to their English or local names. Due to constraints of time during the reconnaissance survey, it was not possible for the local species to be identified. However, the local names will be a good starting point for more in-depth research on rice-fish cultures. Rice-fish culture practices are likely to be more widespread the survey indicates. In Borno State, fish is considered a major pest for young rice seedlings.

Table 48. Fish species caught by rice farmers		
State	Village	Fish type (local names)
Kebbi	Mashaya	(Zawan, tanbuwa, gari, karage, kulumi, wuri, giwan ruwa) Tilapia, Clarias
Yobe	Karage	Catfish, Tilapia
Jigawa	Sabalari	(Tarwada, karfasa, kawara, burdo)
Cross River	Ugboro	<i>Offia</i> , <i>okparoko</i> , electric fish

4.5 Frequency of flooding

Flooding is a menace to rice production in some states, such as Kebbi, Benue, Kwara, Kogi, Nasarawa and Taraba. Table 49 shows the number of farmers who experienced the problem and its frequency.

Frequency in last 10 years	Farmers	%
1-2	9	0.9
3-4	54	5.4
5-6	12	1.2
7-8	1	0.1

Out of a total of 76 farmers affected by flooding, 54 of them state that they experience flooding 3-4 times every 10 years on average. Some experience it up to 7 or 8 times in 10 years. The majority of farmers interviewed (92.4%) did not experience flooding. A detailed study is necessary for areas where the problem is not politically motivated, so that appropriate plans for solving it can be worked out. In the course of this study we witnessed how flooding in the Sokoto basin was amicably resolved through good inter-state co-operation in the management and release of excess water from man-made dams upstream, so that downstream farming activities would no longer be devastated. Farmers along the course of the River Benue attribute devastation by flooding to careless release of water from dams located in the Republic of Cameroon. This international angle to this problem is significant, though only a low number of farmers reported it.

4.6 Small pump assisted rice system

Only 154 farmers out of our sample of 1000 are using small pumps to grow rice in the dry season. They were encountered in Kaduna State (18), Kebbi State (39) and Gombe State (97). This low number of farmers using pumps for the purpose of dry season rice farming can be explained in part by the emphasis of the National *Fadama* Development Programmes on using pumps for vegetable production. For example in Kebbi State, a net profit of N37000 per dry season per farmer per hectare has been recorded (PCU, 2002). A farmer under dry season rice cultivation cannot attain this. However, many farmers in the border areas of Cross River State and Benue States grow rice in the dry season using water under natural gravity.

4.7 Hill rice cultivation

Hill rice cultivation is no different from other upland rice systems. Farmers are forced to grow rice on hills because of scarcity of flat arable land. This is the case in Ekiti State where interviews took place with individual farmers. The presence of this system in that location, on the Obudu hills of Cross River State and on other hill enclaves shows the importance of rice cultivation as an agricultural enterprise.

4.8 Large rice schemes

River Basin Development Authorities (RBDAs) were established in the 1970s to boost wheat production but they were converted to rice schemes. Table 50 shows the number of farmers who were growing rice on land owned by government schemes in different states. Schemes as originally designed do not exist in any state. Tenancy arrangements have been made between farmers and government officials so that farmers can still have access to land belonging to moribund schemes. Only 116 farmers indicated they were growing rice under that kind of large scheme arrangement.

Table 50. Large scheme farmers by state

State	No. of farmers
Plateau	85
Kebbi	11
Borno	10
Gombe	4
Enugu	3
Nasarawa	3

All the irrigation facilities on the sites where the farmers were interviewed had broken down. Other problems confronting the farmers included: blocked irrigation channels and canals, broken pumping machines, the availability of only functional tractor power for land preparation, lack of extension services, inadequate supplies of inputs, low yields due to soil infertility and weeds, high costs of inputs and labour, and inadequate water in the dry season. Apart from those in Borno State, the farmers are growing rice on these moribund schemes using rainfed methods. In Borno State, the situation is very bad because of the untimely release of water and other problems. Farmers would not give interviews in the presence of state officials because they considered them to be part of the problem; their complaints are corroborated in part by a PCU report (2002):

Before the construction of the Alau Dam in 1980, at the Jere Bowl in Borno, the utilisation of *fadama* resources depended on the quantity and timing of the rainfall and the flooding of the Ngadda river. A typical year was characterised by a succession of agricultural activities beginning with rice and vegetable production in the rainy season, followed by legume and grain production and livestock grazing in the dry season. The area was considered to be an economic 'island' in the midst of mass poverty of the surrounding areas. Most of the families were able to save money and indebtedness was rare among the Jere Bowl farmers. Two events, however, have changed the fortunes of the local residents. First, the damming of the river Ngadda 24 km. upstream, and second, the gradual decline and inconsistent amounts of rainfall received in the area over the last 15-20 years. Aridity now characterises the Jere Bowl, which can no longer produce rice and vegetables (PCU, 2002:56). Given the low appeal of these capital-intensive irrigation schemes to smallholder farmers, the most sensible option left is to privatise them to small-scale farmers to manage as traditional *fadama* lands.

Large schemes were established with the aim of enabling farmers to grow more one crop per year. However, only three out of 116 farmers grow two rice crops each year and even then the second crop is a re-growth of the harvested first crop. Not a single farmer sells his rice to officials administering the scheme land. In fact, there is no government participation in the scheme. The farmers use their own sources for seeds and no longer get them from the scheme's sources. Only one farmer in Gombe State said that he got his seeds from ADP. Table 51 shows the farm sizes of rice farmers using scheme land. It indicates that large scale irrigated rice farmers no longer exist. No large-scale rainfed rice farmers were encountered.

Size (acres)	No. of farmers
1-5	33
6-10	34
11-15	24
16-20	20
21-25	4
26-30	1

4.9 Input use

Table 52 indicates that fertiliser is the input most farmers (46.4%) use, followed by the use of green manure. This suggests that green manure technology is familiar to farmers and should be encouraged. Many farmers (36.2%) use no input at all, but depend on natural soil fertility to produce rice.

Input	No.	%
Fertiliser	464	46.40
No input used	362	36.20
Green manure	66	6.60
Herbicide	59	5.90
Insecticide	29	2.90
Farm yard manure	20	2.00

Farmyard manure is not very popular for rice production because of problems of quantity, loading, transportation and application.

Practically no farmers receive subsidies on inputs. The World Bank will see this as a welcome development, but farmers and government officials will not. Every country subsidises agriculture. In Nigeria, however, the subsidies do not reach the farmers. Unless the distribution network for agricultural inputs can be re-organised to ensure that farmers have direct access to them, without depending on middlemen, it is pointless for government to subsidise inputs. Only Kebbi State government subsidises insecticides and rice seeds.

Table 53 illustrates the use of fertilisers. Almost a third of the farmers interviewed (30.60%) do not use chemical fertilisers at all. 22.9% used them in the past, 21.6% said that they had been using them; and only 24.9% stated that they were currently using them. Availability and high costs are the two factors that influence fertiliser use. 64% of the farmers who had stopped using fertilisers attributed it to the high cost of the commodity and 36% identified non-availability as the factor that made them to stop. 30.6% do not use fertilisers for rice production. If plant residues were to be returned to the soils through controlled bush burning, the fertility of most soils would sustain rice production without needing inorganic fertilisers.

Table 53. Fertiliser use

Pattern of use	No. of farmers
Never	306
Start use only in present	249
Use in past only	229
Use in past and present	216

Farm animal power is being used in areas with soft soil. Table 54 shows only 17 farmers own work bulls and 8 hire from others.

Table 54. Animal traction use pattern

Use pattern	No. of farmers
No animal traction	975
Animal traction	25
Own animals	17
Hire animals	8

A few farmers (23.8%) are still using tractors, as Table 55 demonstrates (see also, Figure 1). However, tractors were used more in the past (40.6%). Cessation in tractor use is attributed to non-availability (57.4%) and the high cost of hiring (33.3%); 6.13% gave no reason. In the last eight years or so, it has become increasingly difficult to buy and maintain tractors. The cost of hiring a tractor is far beyond the reach of smallholder farmers even when a tractor is available. In order to plough and harrow one hectare of *fadama* land a farmer needs between N3000 – N5000. Farmers quoted these rates in Plateau State and Ebonyi State respectively. The figures are representative of the whole country.

Table 55. Pattern in tractor use

Pattern of use	No.	%
Had to stop use	406	40.6
Use currently	238	23.8
Never used	356	35.6

Figure 1. Pattern of tractor use

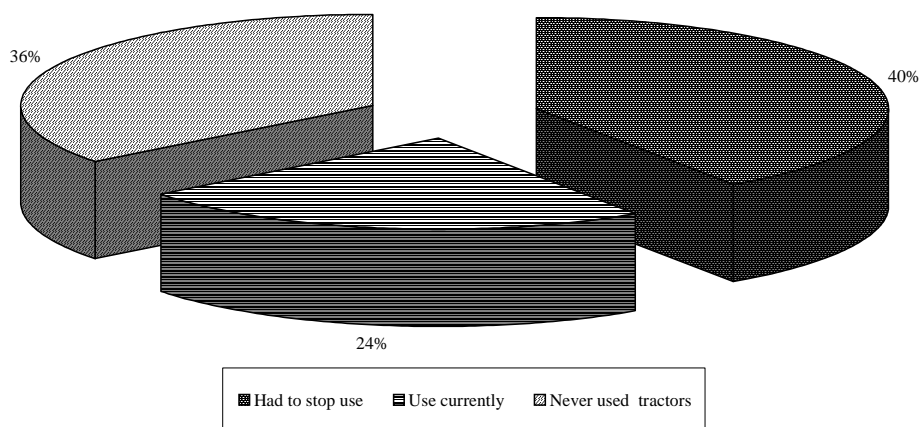


Table 56 shows the increasing decline in tractor use by farmers (483).

Table 56. Discontinuation in use of tractors by year		
Year	No of farmers.	%
1	126	12.6
2	153	15.3
3	99	9.9
4	77	7.7
5	10	1.0
6	9	0.9
7	0	0
8	3	0.3
9	0	0
10	6	0.6

4.10 Labour use

Most rice farmers (57.1%) hire labour. Extra labour is usually needed for activities as such weeding, harvesting and threshing. Weeding is a major agronomic activity in rice cultivation. For most farmers it is the deciding factor in whether or not they can break even. Table 57, based on 1000 respondents, gives the rates for hiring labour *per man- day* i.e. about 8 hours. Farmers in the northern states pay the lowest rates and farmers in the southern states, the highest. Farmers in the middle-belt states pay mid-range pieces.

Naira per day	No. of farmers	%
0	429	42.9
100	162	16.2
120	9	0.9
150	65	6.5
200	234	23.4
250	25	2.5
300	64	6.4
>300	12	1.2

For rates higher than ₦300, the work is done on a contractual basis. This is the case in the South-South, South-East and parts of Plateau State. Twelve respondents had to pay contract rates based on the size of the plot: half the size of a football field, between ₦400 –₦500; four football fields, ₦3000 –₦5000; and for 10 football fields, ₦15000. Farmers find contract weeding much cheaper because the operation is completed efficiently.

4.11 Agricultural extension

Government extension agents have never visited the majority of farmers (89.5%). This confirms the total collapse of the system and was the result of a reduced level of activity at ADPs. A complete overhaul of the formal extension system is therefore necessary. A number of questions need to be asked. For instance, is there a demand from farmers for formal extension services? (If there is no demand then the services need not be provided). If awareness of need is created, will poor and smallholder farmers be able to demand such services? How has the poor fared in using a healthcare delivery system that charges for services? Will people who cannot afford to pay for a service be able to demand it? These are pertinent questions that must be answered if M-APs is to be implemented. It has been suggested that a new participatory approach may create the desired awareness. However, it is doubtful that such a simplistic approach will achieve the desired results because, as results of research in the Gambia on the participatory model are showing (Brown et al. 2002: 10), institutional reforms must take place first. All stakeholders in rice production need to look closely at the issue and have a complete re-think. The collapse of the ADP system, as clearly demonstrated here, shows that its Training and Visit (T&V) methodology is not sustainable (as corroborated in PCU, 2002: 16). The linkage system between extension and research which Agbamu (2000:4-5) spent much energy describing exists only in the minds of government officials. Table 58 summarises the types of institutions that provide extension services. The ADP was the principal provider of extension services when World Bank loans were available.

Table 58. Extension services by institution

Institution providing extension advice	No. of farmers	%
Respondents not visited	933	93.30
ADP	44	4.40
NGO	11	1.10
Research institute	6	0.60
Master farmer	4	0.40
RBDA	2	0.20

The survey of 1000 farmers shows that only 37% of respondents have heard anything useful about rice in the mass media (radio, television and press). This is unexpected given the tremendous growth in radio broadcasting on short wave, medium wave and other frequency modulations. Rice specific programmes may be lacking even if agricultural broadcasting is popular. Radio has a greater potential as an effective extension tool than television.

94% of respondents have never participated in a farmers' field day. Such an occasion is suppose to afford a group of farmers from a particular location the opportunity to interact with agricultural experts, scientists, extension workers and farmers from several other villages. They see crops on the field and questions can be raised and answers given on the spot by experts or other farmers. This data further confirms the total collapse of the formal extension system. No institution, apart from the ADPs, have organised farmers' field days in Nigeria.

99.5% of respondents have never received a useful leaflet on rice production. Illiteracy cannot be said to be responsible; at least 37.7% of respondents are literate. The National Agricultural Research and Liaison Service (NAERLS) at Zaria has the national mandate to print and distribute such leaflets. The 1980s marks the end of the era in which such materials were in circulation.

79.3% of respondents do not belong to any formal farmers' association. The implication of this is that any approach to extension delivery through co-operatives, farmers' associations and other groups will have to be preceded by strong mobilisation to make such organisations relevant. Out of the 20.7% farmers who belong to a formal association, only 12.3% of the associations are still functional. That is not a healthy picture for effective partnership for technology transfer.

4.12 Seed sources and varieties

The major sources of rice seeds are farmers. According to Table 59, 43.2% of respondents use seeds that have been passed down through the generations. NGOs and traders play a minor role in seed distribution. It is not wise for farmers to depend upon seeds from the local open market. About two-thirds of farmers get seeds from more than one source and there were therefore 1703 responses.

Table 59. Seed sources

Source	No. of farmers	%
Other farmers	818	81.8
Ancestors	432	43.2
ADP	325	32.5
Traders	93	9.3
NGOs	35	3.5

97.3% of farmers indicated that they have no problems in getting seeds. The few who have problems encountered them in the process of buying them from ADP sources. However, common complaints on seeds from ADP are usually that they are admixtures and have low germination rates. These problems were heard from farmers in every state.

98.5% of respondents have never heard of WARDA. This is not unexpected since WARDA provides services to farmers indirectly through government organisations such as the National Cereals Research Institute (NCRI) and the National Seed Service (NSS), and sometimes through ADPs. The implication of this for M-APs is grave. ADPs (hence NCRI and NSS) have been shown to be unable to effectively discharge their statutory responsibilities mainly due to lack of funds, poor management and instability in government policies on agriculture. Unless M-APs or some other institutional arrangements are put in place, WARDA's great technological break-throughs, such as the development of New Rice for Africa (NERICA), will remain unavailable to farmers in a co-ordinated manner. This is the reality on the ground, the detailed description by Agbamou (2000: 4-5) of the existence in Nigeria of a vibrant linkage system between research and extension notwithstanding.

With regional integration in West Africa being promoted under the auspices of ECOWAS (Economic Community of West African States), WARDA must review its protocol on how its projects are to be implemented in member states. If ADPs are honest, their reports should have reflected a weakness in their ability to supervise on-farm adoptive researches (OFARS). Most of the personnel lack the integrity to record field data accurately. More often than not the data are generated at the desks of field staff. Such critical

bottlenecks can be minimised if WARDA and national research institutes (and Nigeria has 19 government-owned agricultural research institutes) take a more active role in reaching the grassroots themselves using real participatory methods. New thinking in government circles in Nigeria points to a better prospect for participatory research and extension. The National *Fadama* Development Programme provides a good example. The first phase of the programme was executed in 12 states between 1992 and 2001 under a World Bank loan. This programme has been evaluated and a new loan is being negotiated for a second phase that will cover 18 states (PCU, n.d. and PCU, 2001). The economic and social impact assessment document for that programme makes this sombre comment about a shift in the government's approach to doing business:

The main objective of this project is to remove the production, organisational and marketing constraints which hamper small-scale farmers from fully utilizing their resources and capabilities for *fadama* expansion in order to obtain sustainable increase in agricultural production as well as contribute to enhanced food security and reduction of rural poverty. The project approach is based on two concepts (that involve) a gradual devolution of decision-making process to the local level, particularly the ultimate rural beneficiaries; and a private sector driven partnership with government. The approach is a shift in paradigm where the public sector is playing only the role of a facilitator/catalyst to provide an environment that is conducive, regarding policy, information and other support systems, while the private beneficiary is in the driver's seat. (PCU, 2002: 17)

However, the above is more or less a statement of intention. A true bottom-up approach for project planning and implementation in Nigeria is far from becoming a reality, the promptings from the World Bank notwithstanding.

Table 60 displays the responses by farmers on their chosen characteristics for an ideal rice variety. The responses were not elicited from a checklist, rather each farmer was asked to state any four characteristics he would like if such a variety could be developed for farmers in his area. Farmers identified more than one characteristic; therefore there were 3039 responses.

Table 60. Variety preferences		
Variety characteristics	No.	%
High yield	736	73.6
Early maturity	585	58.5
Good for milling	463	46.3
Weed resistance	252	25.2
Good taste and shelf life	236	23.6
Good price	173	17.3
White colour	172	17.2
Pest and disease resistance	85	8.5
Flood resistance	64	6.4
Upland	53	5.3
Drought resistance	46	4.6
Good tillering	45	4.5
Non-shattering	36	3.6
Easy threshing	35	3.5
Non-lodging	24	2.4
Swamp	13	1.3
Red colour	12	1.2
Floating	9	0.9

High yield (73.6%) is the most chosen characteristic, followed by early maturity (58.5%), good milling quality (46.3%) and weed resistance (25.2%). The results show that the ideal variety should combine all four characteristics. If a variety could combine good taste, a long shelf life, and white grain colouration and therefore attract a good market price, then there would be a rice revolution in that a super-variety would have been created. However, the best seed that is being offered to farmers is NERICA. This is superior to

most varieties being grown by farmers because of its excellent agronomic quality of weed resistance and high yield. The testing of this variety with farmers is still very limited and whether it will be accepted widely by farmers is still unknown. If NERICA, which is becoming popular in the Nigerian press, is not the ideal Nigerian variety, we will continue to search for it.

Each respondent was also given the opportunity to state any four requirements to be met by government that he considered critical to increased rice production. Table 61 gives the results; every farmer gave more than one requirement, therefore there is a total of 1902.

Table 61. Farmers' requirements

Needs requested	No requested	%
Fertilisers	549	54.9
Tractors	548	54.8
Seeds	265	26.5
Herbicides	227	22.7
Credit	121	12.1
Rodent control	84	8.4
Farmer training	37	3.7
Flood control	23	2.3
Pumps	18	1.8
Good communication between research and extension	16	1.6
Deep water rice seeds	7	0.7
Ban rice imports	6	0.6
Implementation of the tenure laws so that government truly owns land	1	0.1

According to the farmers, their most urgent needs are for fertilisers, tractors, seeds, herbicides and credit in that order, followed by control of rodents, farmer training, flood control, irrigation pumps and good communication between research and extension. However, a rice revolution will elude Nigeria unless smallholder rice farmers get a good price for the commodity as well as improved rice-processing technologies to enable local rice compete favourably with imported rice. Traders at Adani, Abakaliki, Lafia, Ganawuri and elsewhere are unanimous in their assessment that good quality local rice is preferred by consumers because of its taste, freshness, the ability to swell on cooking and even smell. Imported rice, by contrast, is said to be tasteless, to require more cooking ingredients than local rice, and to have been stored for more than nine months before reaching the consumer. In their choice of varieties above, farmers alluded to these marketing and processing factors.

A distinction should be drawn between policies designed to help the poor and those aimed at commercial farmers. Appropriate research and extension services targeted at smallholder farmers have to be evolved and implemented. Some problems could be tackled through the breeding of weed- and pest-resistant cultivars. NERICA is known to be weed resistant and is a candidate for active promotion among smallholder farmers. A commercialised extension model would be appropriate for large-scale farmers but would make poor farmers even more impoverished. (See section 4.13 for fuller discussion). Although birds were mentioned as serious pests of rice during group interviews, no individual farmer raised it. However, it is a biological constraint that must be addressed within the context of the promotion of bio-diversity in agriculture and tourism. This conflict of values will have to be tackled. For instance, during the survey trip, farmers in Borno State requested that we plead on their behalf with the Pest Control Department of the Federal Ministry of Agriculture and Rural Development to undertake aerial control of *quelea* birds. However, that is not an acceptable method of control because it would not maintain bio-diversity, even if the money could be found for the repair of helicopters and fuel supply. M-APs need to evolve a better pest management strategy through joint planning.

There is an aspect of the fertiliser debate of which farmers are unaware. Research on savannah soils by Jones (1974) showed that they are chemically fragile and that regular application of fertilisers may raise unexpected problems. Calcium and magnesium deficiency arose after only three years of heavy fertiliser application. Under less intensive but continuous cropping with fertilisers, the time-scale would be longer, perhaps ten years or more, but the same problem would eventually arise. The practice of adding fertilisers on an *ad hoc* basis to increase yields of the current crop is undoubtedly hazardous. Mokwunye (1978: 15) advocated new complete (i.e. compound) fertiliser formulations if productivity is to be maintained. Appropriate residue management practice is one way to arrest the decline in fertility.

However, residue incorporation either as green manure or mere residue requires traction power from oxen or tractor; digging in by hand is prohibitively laborious under normal farm conditions. According to Jones (1976: 123), it requires that the soil be soft enough to plough after harvest. Therefore farmers must be told clearly that chemical fertilisers can be harmful in the long-term. Fortunately, the Federal Government hopes to come up with a fertiliser policy before the end of the year 2002.

5. Conclusions and recommendations

The case study has shown the following results:

- ❖ The absence of a clear government policy on rice production and imports in Nigeria despite increasing internal demand.
- ❖ Very low levels of use of inputs traditionally supplied by government e.g. fertilisers, herbicides, seeds, insecticides, credits and tractors.
- ❖ Almost complete failure of the private sector to meet this 'market gap', except in the case of fertilisers.
- ❖ Near-total collapse of large- and medium-scale rice schemes.
- ❖ Institutional failure of the formal extension system.
- ❖ Only poorly developed farmers' associations, NGOs/ CBOs serving small-scale producers.
- ❖ Increased demand for labour for crucial activities like weeding, harvesting and threshing that cannot be fully met due to high levels of urban migration.
- ❖ Failure of government to assist in processing technology with consequent quality problems in comparison to imported rice.
- ❖ Bodies charged with breeding and disseminating varieties appropriate to farmers, notably the NCRI (national cereals research institute) and WARDA have no effective impact on the ground. Despite a clear awareness of desirable characteristics by farmers this is not effectively communicated to plant-breeders.
- ❖ An absence of action-research on rice–fish culture and other innovative technologies that could add value to rice production.
- ❖ An absence of descriptions of the diverse low-input rice production techniques found in Nigeria that could be disseminated more widely.

The above factors are ideal for making a start on the design of an appropriate M-APs model for Nigeria. Participatory development requires a forum where problems can be articulated and solutions offered through a rapid response mechanism. A M-APs approach offers that prospect. Consideration must be given to extension and input supplies as a package. The Research Extension Farm Inputs Linkage System (REFILS), under the defunct National Agricultural Research Project, attempted to do this, albeit briefly. It needs to be implemented within the larger context of rural, peri-urban and even urban livelihoods (Farrington et al., 2002: 10-13). M-APs is a model that can be tried.

An emergency situation, such as prevails in Nigeria, is the ideal circumstance for instigating such a rapid response system. The case of taro production in Samoa will illustrate the point. According to Hunter (2002: 10), taro is the most important staple and export crop in Samoa. It was devastated following the arrival in 1993 of taro leaf blight disease. The relevant government organisations quickly responded by bringing in resistant cultivars from the Philippines and Pohnpei. These were widely distributed to farmers for testing. In the course of this collaborative enterprise between government, farmers and researchers, each component

was able to articulate its concerns. A participatory approach to plant breeding involving researchers, farmers and extension staff, was used, then, as a means of achieving well-defined objectives. In Samoa, the participatory approach provided an opportunity for farmer-researcher-extension interaction and exchange of information, allowing researchers to obtain rapid feedback on the evaluation of improved germplasm and gave them confidence in the quality of selections that were made. It strengthened the capacity of farmers to innovate and experiment and equipped extension staff with up-to-date knowledge of taro that they could disseminate to other farmers. The Somoan case details illustrate how M-APs may work. The kind of emergency described above now exists in Nigeria in relation to rice production. The government has begun to discuss seriously how the problems of rice production and marketing may be addressed. However, the decision to set up a Special Presidential Committee, whose members know nothing about farming, will not help. A quick fix will not solve the rice crisis in Nigeria. It may only further alienate poor farmers. A typical example of this, encountered during the survey, was the replacement of rice field by industrial sugarcane plantations in Jigawa State in 2000. Now, in 2002, the farmers are crying because no processing plants have been established and they do not know what to do with the produce. This scenario underscores the need for participatory planning and adoption of technology. The NCRI claimed to have developed a plant that would process industrial sugar and promoted cultivation of the crop in the state. At the most crucial stage, the farmers were left with produce that is perishable within 12 hours if not processed. This is a situation M-APs could have resolved through joint planning with sugar processing plants in Bacita or Lagos or other pre-production arrangements. Researchers, farmers and extension workers can all benefit from open dialogue (Safo et al. 1990: 31). There is demand for sugar because only recently in one seizure at the seaport, the Nigeria Custom Service impounded five ships carrying poor quality imported sugar worth N1.5 billion.

The three arms of M-APs are research, extension and NGOs/Farmers Organisations (FOs). The reality on the ground is that all three institutions in Nigeria are very weak. NGOs/FOs are in dire need of capacity building. The structures for formal FOs exist, but their actual operations in the absence of strict supervision by a credit-giving institution leave very much room for improvement. NGOs, on the other hand, are donor-driven and lack the ability to be sustainable. Extension and research exist only as fund-starved institutions.

Therefore a starting point for the implementation of M-APs in Nigeria will be mobilisation and capacity building for NGOs and FOs. Funds will have to be found for an initial takeoff as grants and not loans. When the benefits of M-APs becomes obvious, NGOs, private companies and even community-based organisations, such as the myriad informal but functional FOs that abound in Nigeria, may be prepared to fund extension as outlined in Van den Ban (2000: 8–19). Strategies must be developed to mobilise the organised private sector because they are very reluctant to participate in government programmes that do not bring immediate and huge profits. The psyche of immediate return on investments must change through education so that the sector, especially private companies, can vindicate itself of the accusation that it is lukewarm towards activities of the ADPs when invited to participate. Will they now be ready to fill part of the gap that the ADPs have left? Or will it be more cost effective for the formal extension system, with the ADPs in charge, to be modified as a transitional interim measure, using empowerment and re-orientation, before the private sector is ready to take on the role of extension? Can M-APs be integrated into the activities of the newly established (but non-functional) Rural Institutional Development units of the ADPs? These and similar questions are issues to which a M-APs model can offer answers. These recommendations are summarised below:

Much consultation and communication between GOs, FOs, CBOs, NGOs and MLAs must take place as a prelude to a successful M-APs.

GOs/NGO/CBOs/seed companies and other stakeholders should use traditional institutions, such as festivals, to create avenues for informal interaction. New Rice Variety Festivals and other similar social occasions would have great potential for disseminating technological information and ultimately bring about rapid change in West African agriculture. Festivals are potential engines of change that Western research models have neglected. The festival concept is very different from that of the agricultural show or fair. Festivals symbolise the core values of the people and they can therefore relate to them. For example, New Yam Festivals are not only well known, but they attract crowds from communities of organisers and well-wishers. A New Rice Variety Festival, organised by a M-APs body on behalf of WARDA, IVC or DFID would be a realistic possibility. Fishing festivals, similar to the annual Argungu Fishing Festival in Kebbi State of

North-West Nigeria, are already spreading to other states. The harvesting of rice from canoes in Sokoto can be developed into a festival as a means of breaking ground and launching M-APs'.

Capacity building and much training in resource management for GOs, FOs, CBOs, and NGOs are *sine qua non* for workable M-APs in Nigeria. The country has been under military rule for such a long time that a culture of undertaking projects without wide consultation has been the norm. That way of thinking must be changed across the entire country in order for M-APs to become a possibility. DFID has considerable expertise and could help the smallholder farmer, who is always neglected in government programmes, by sponsoring more participatory research into their needs and holding workshops and seminars. NGOs, Fos, some GOs such as NCRI, and select ADPs may require training overseas.

A national rice stakeholder workshop to discuss the way forward for small, medium and large-scale rice producers and marketers is needed. DFID and other donor agencies, such as USAID, EZE and ICCO, could sponsor the workshop, at the end of which a rice network rather than a professional rice society should be set up. This will rectify any fire brigade approach that the Special Presidential Committee on Rice, Special Food Security Programme of the FAO and Rural Institutional Development Units of the ADPs and other government agencies may undertake without the participation of real stakeholders.

Some form of direct funding to NGOs would go a long way towards restructuring the dissemination of rice technologies to a wide spectrum of Nigerian society. These NGOs should include: the Catholic Centre at Abwa, SUM Abakaliki; the Women's Farmers Advancement Network (WOFAN), Kano; the Country Women's Association of Nigeria (COWAN); the Catholic Mission Abakaliki; the Oyo/Oshogbo Dioscean Agricultural Programme; the Leventis Agricultural Training Centre, Ife; and the Development Exchange Centre (DEC), Bauchi.

The advances in WARDA's hybrid releases have set the stage for GOs and NGOs to be resource persons in the wide testing of varieties. The ADP system has collapsed almost entirely. NGOs could fill the gap in the short-term. Straight participatory models cannot handle the degree of documentation needed.

Given the promises these hybrid lines hold, the private sector should classify them as "true" technologies. M-APs could therefore provide a model of the 'Technology Triangle' adopted by developed countries for consolidating the links between researchers and industry. GOs/ NGOs/ Extension/ FOs form one side of the triangle, WARDA/NCRI form the second, and private seed companies/marketers/processors form the third. The objective is to get technology out of the scientists' laboratories and into the hands of industry and farmers, where it will be used to create new products, generate new companies and opportunities and provide unlimited new jobs in the process (Adegoke, 1989). In order for this three-pronged approach to work, private seed companies need to sponsor farmer-based technological research. The research results should then be taken up by a GOs/NGO/FOs/Extension component within the context of some form of partnership using private sector principles. That sector would provide the impetus and resources for growth in both research and extension. The underlying philosophy of the three-pronged approach must be that the interactions of each side of the triangle are designed to meet needs identified by the farmer.

M-APs as an organ could be established for each of the six geo-political zones under the co-ordination of an expatriate DFID project officer in close collaboration with a local NGO. In each ADP, a M-APs unit could be established within the extension/research department to work in close collaboration with the Rural Institutional Development Unit. The focus of extension would be farmers, but M-APs would focus on networking with all the stakeholders e.g. government institutions, rice marketers, rice producers, FOs, input distributors, NGOs, and the press. For M-APs to be sustainable, a painstaking bottom-up methodology using a participatory paradigm must be implemented with external grants to jump-start the process.

In conclusion, it is worth reiterating that the basic ingredients for the successful inauguration of M-APs in Nigeria are available (provided there is some initial funding by a donor agency). These include: low government participation in agricultural extension and research; availability of many rice varieties, some of which should be celebrated through annual cultural festivals; high participation in rice production by smallholder farmers in the face of intimidating constraints; a responsive milling and packaging sector willing to invest in procurement of processing technology without intervention by the government; and the green

manuring technology, which was discovered by farmers themselves, is already in use and should be encouraged. There is also willingness on the part of government officials and researchers to participate in M-APs. The installation of democratic governance after several years of military dictatorship and a growing NGO sector with a focus on rice is a starting point for sustainable policy planning and implementation.

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Annex. Questionnaires



MULTI-AGENCY PARTNERSHIPS FOR RICE PRODUCTION IN NIGERIA

Village Questionnaire number

Enumerator

Date /00

1 = YES | 0 = NO

Village Grid reference / N/ / E

Local Government State

Chief _____ or
other _____

Main language Other
languages / /

Rice systems

Do the following exist in the community?

- A. Rainfed field rice (dry upland)
- B. Waterlogged field rice (shallow fadama)
- C. Valley-bottoms/riverine (gravity fed) (deep fadama)
- D. Small pump assisted
- E. Mangrove
- F. Rainfed hill rice
- G. Large scheme

A. Rainfed field rice (dry upland)

Planting _____ method?

Is rice intercropped? Which crop? _____
/ /

Month seedlings begun _____ Month seedlings transplanted _____
Month of harvest _____

B. Waterlogged field rice (shallow fadama)

Planting _____ method?

Is rice intercropped? Which crop? _____
/ /

Month seedlings begun _____ Month seedlings transplanted _____
Month of harvest _____

C. Valley-bottoms/riverine (gravity fed)

Planting method? _____

Is rice intercropped? Which crop? _____
/_____
/_____

Month seedlings begun _____ Month seedlings transplanted _____

Month of harvest _____

Do you intentionally trap fish in the rice paddies? What species?

D. Small pump assisted individual plots

Planting _____ method?

Is rice intercropped? Which crop? _____
/_____
/_____

Month seedlings begun _____ Month seedlings transplanted _____

Month of harvest _____

E. Mangrove F. Rainfed hill rice

G. Large scheme

Name of scheme _____ Date of scheme foundation

Extant?

Gravity Irrigated

General questions

Do you grow rice for consumption, cash or both?

Who does Land preparation?
 Planting,
 Transplanting,
 Weeding,
 Harvesting,
 Transporting
 Threshing?
 Winnowing?

0 = Men
1 = Women
2 = Both

Do you grow rice with any other crop in one field?

1. _____ 2. _____ 3. _____

What happens to rice-straw? Eaten by livestock Burnt for fertiliser Chopped up for building

Inputs

Do you use fertiliser? manure? insecticide? herbicide? Do you use grass as green manure?
 Did you use any in the past and why have you stopped?

Do you use animals to prepare ricefields? Hire or own traction animals? _____
 Did you formerly use tractors? Do you now? When did you stop? Why?

Problems

	Local name	Other name	Description	C
Diseases				
Insects				
Birds				
Mammals				
Weeds				

What other problems do you face with rice production?

Processing:

How do you process the rice?

1.

2.

Who processes the rice? _____

Which variety is best for eating _____ and why?
 _____ /

Marketing:

Who sets market prices? _____

Is this by community consent? _____

How do you get information about prices? Other farmers Traders Radio

What _____ problems _____ are _____ there?
 _____ /

Extension:

How should information be spread effectively to the community?

What Farmers' Associations exist locally?

Name	Function	Extant?	What does it actually do?

New seeds

Where do seeds come from? Ancestors Other farmers Traders Agric NGO

If the someone were to bring a new variety, what characteristics would you hope it would have?

_____ _____

_____ _____

Any other comments

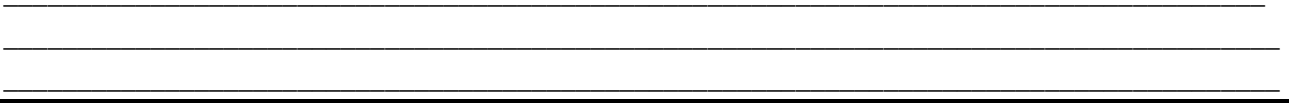


Table showing farmers' selection criteria for rice varieties.

Language_____										
No.	Term	Meaning	Variety	Days to maturity	Why do you grow this variety?	How common?	What are the problems with this variety.	U	L	I
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										