

# **Farming Systems in the Nigerian Savanna**

Research and Strategies  
for Development

**David W. Norman, Emmy B.  
Simmons, and Henry M. Hays**



# Farming Systems in the Nigerian Savanna

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## About the Book and Authors

### *Farming Systems in the Nigerian Savanna: Research and Strategies for Development*

David W. Norman, Emmy B. Simmons, and Henry M. Hays

Presenting the case for a farming systems approach to research in developing countries, this book considers the role of new technology and appropriate development strategies in improving agricultural production and the welfare of farming families in the semi-arid tropical region of West Africa. The authors draw extensively on comprehensive studies they and their associates conducted over an eleven-year period in northern Nigeria. Their discussion of these studies, which focused on production, consumption, and marketing systems and included the testing of improved technology packages, is supplemented by results from research undertaken in other parts of semi-arid West Africa. Emphasizing the importance of a proper understanding of the technical and human environment in which farming families operate, they describe the essential characteristics of a farming systems approach and consider problems of methodology and implementation that must be solved if it is to become a widely accepted development strategy in the 1980s.

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the farmers of the  
Nigerian savanna





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D.W.N.  
E.B.S.  
H.M.H.

# Acronyms

AAAS	American Association for the Advancement of Science
ABU	Ahmadu Bello University (Nigeria)
AID	Agency for International Development (USA)
AMIRA	Groupe de Recherche sur l'Amélioration des Methodes d'Investigation en Milieu Africain (France)
ASA	American Society of Agronomy (USA)
AVV	Autorité des Aménagements des Vallées des Volta (Upper Volta)
CATIE	Centro Agronomico Tropical de Investigacion y Ensenanza (Costa Rica)
CFDT	Compagnie Francaise pour le Développement des Fibres Textiles (France)
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (Mexico)
CMDT	Compagnie Malienne de Développement des Textiles (Mali)
CNRA	Centre National de Recherches Agronomiques (Senegal)
CSNRD	Consortium for the Study of Nigerian Rural Development (USA)
DALST	Division for Agricultural and Livestock Services Training (Nigeria)
ECA	Economic Commission for Africa (Ethiopia)
EUCARPIA	Congress of the European Association for Research on Plant Breeding
FAO	Food and Agricultural Organization of the United Nations
FDA	Federal Department of Agriculture (Nigeria)
FMT	Farmer Managed Test
FSAR	Farming Systems Approach to Research
FSP	Farming Systems Perspective
FSR	Farming Systems Research
GCP	Guided Change Project (Nigeria)
HMSO	Her Majesty's Stationery Office (UK)
IAAE	International Association of Agricultural Economists
IADS	International Agricultural Development Service (USA)
IAR	Institute for Agricultural Research, Ahmadu Bello University (Nigeria)
IBRD	International Bank for Reconstruction and Development
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (India)
ICTA	Instituto de Ciencia y Tecnologia Agricolas (Guatemala)



IDS	Institute of Development Studies (UK)
IEDES	Institut d'Etude Economique et Social (France)
IFAN	Institut Fondamental d'Afrique Noire (France)
IFPRI	International Food Policy Research Institute (USA)
IITA	International Institute of Tropical Agriculture (Nigeria)
INRA	Institut National de la Recherche Agronomique (France)
INSEE	Institut National de Statistiques et d'Etudes Economiques (France)
IRRI	International Rice Research Institute (Philippines)
ISRA	Institut Sénégalais de Recherches Agricoles (Senegal)
NAFPP	National Accelerated Food Production Program (Nigeria)
NISER	Nigerian Institute for Social and Economic Research (Nigeria)
OACV	L'Operation Arachide et Cultures Vivrières (Mali)
OLC	Overseas Liaison Committee, American Council of Education (USA)
ORD	Organisme Regional de Développement (Upper Volta)
ORSTOM	Office de la Recherche Scientifique et Technique Outre-Mer (France)
PANS	Pests, Articles, and News Summaries
RERU	Rural Economy Research Unit (Nigeria)
RMT	Researcher Managed Trial
SAED	Societe d'Aménagement et d'Equipement du Delta (Senegal)
USAID	United States Agency for International Development

# 1

## Introduction: Farming Systems, Agricultural Research and Development Objectives

"The 'reason' why governments tend to introduce distortions that discriminate against agriculture is that internal policies generally favor the urban population at the expense of rural people in spite of the much greater size of the rural population," and because of "a shrinking from the complexity and difficulty of the task of developing agriculture ."

Schultz (1980) and Wilde (1967)

In the past two decades, Nigeria--with about eighty million people--has acquired the means to effect its transformation from a struggling Third World agricultural nation to an oil-rich exporting power searching for its place in history and in the ranks of more developed countries. It has had problems during the transition. Since gaining independence in 1960, the country has survived a civil war and moved from a loose federation of states to a federal entity of nineteen states (Map 1.1). It has also recently managed the transition from military to civilian rule.

Reliance on oil revenues with the government's directed emphasis on infrastructure, education, and industrialization has promoted significant growth in all sectors but agriculture. As shown in Table 1.1, Nigeria's Gross Domestic Product (GDP) has grown more than sixfold since independence--to a total value of ₦16,755 million in 1976.<sup>1</sup> The GDP growth rate improved slowly between 1960 and 1966. In 1960, the agriculture sector accounted for 64 percent of GDP and approximately 80 percent of the labor force employment. From 1966 through 1976, the period of rising oil exploration, GDP is estimated to have increased at a real annual rate of 8.5 percent, and GDP per capita at an annual rate of 6 percent. Per capita income rose to an estimated ₦252 in 1976 (Central Bank of Nigeria 1978). By 1974-75, agriculture accounted for only 21 percent of the GDP, a decline of 43 percentage points. The proportion of the labor force employed in agriculture had dropped to 64 percent (Federal Republic of Nigeria 1975). This dramatic decline in agriculture's share of GDP and the labor force stems in part from the increase in oil's importance and the labor force transformation. However, there is some evidence that total farm output has fallen in absolute terms.

MAP 1.1  
Nigeria's Nineteen States



While these statistics probably reflect the adverse agricultural conditions of the early 1970's--the impact of the Sahelian drought on Nigerian agriculture--and somewhat overstate the decline, the impression of an agricultural sector lagging behind the rest of the economy is reinforced by both food import and agricultural export data for later years in the decade. Between 1973 and 1977, the food import bill rose sharply, from N126 million in 1973 to nearly N800 million just five years later. At the same time, agricultural exports fell to new lows. The value of the agricultural export index in 1960 was 100. Since 1970, the index has not exceeded 85 and in 1976, it plummeted to 68.

TABLE 1.1  
Selected Performance Indicators of the Nigerian Economy

Item	1960	1966	1970	1976
The economy (million naira): <sup>a</sup>				
Gross domestic product	2493	3045	4178	16755
Agricultural output	1598	1582	1824	3491
Mining output	30	210	503	6886
Percent employed in the agriculture sector <sup>b</sup>	80	n.a.	n.a.	64
Indices:				
Production of major food crops	100	102	90	82
Consumer prices:				
All items	100	125	150	348
Food	100	133	164	465
Trade:				
Food imports	100	129	144	1102
Agricultural exports	100	115	101	68

Sources: Federal Office of Statistics (various issues); Federal Republic of Nigeria (1975); Central Bank of Nigeria (1977 and various other issues).

- a. Figures for 1960, 1966, and 1970 were based on constant factor cost for 1962-63 while 1976 was based on constant factor cost for 1974-75.
- b. n.a. means not available.

To talk of Nigeria's agricultural development thus involves something of a misnomer. Production has declined, resulting in greater disparities between rural and urban sectors and lack of balanced development in the country. A more accurate description of the past twenty years' experience might be agricultural undevelopment.<sup>2</sup> But there is considerable concern about reversing the trend (Essang 1978). Attention is being refocused on the agricultural sector and investments in various production activities are beginning to support the rhetoric. Assuming that a realignment of priorities for development will lead to further increases in investment in Nigeria's agricultural sector, the question to be answered is "what is the best way to increase productivity and production with broad-based participation of all farmers and wide impact in the rural sector?"

Nigeria is more fortunate than many developing countries in having a substantial base of agricultural research infrastructure and knowledge (Idachaba 1980) as well as financial and human resources to use the knowledge. Still, Nigeria's leaders will likely have to make some hard choices--which research gaps to fill, which programs to support, which personnel to hire, which policies to modify.

In this book, rather than offering definitive answers, we

suggest that starting with the farmers themselves is a useful way to begin. By adopting a farm-level- or micro-orientation, research problems relevant to changing the behavior of producers can be formulated and the research results, when achieved, can be more quickly fed back to stimulate production increases. By adopting a micro-orientation, extension programs can be adjusted to improve delivery of information and services relevant to client farmers. By adopting a micro-orientation, agricultural strategies and policies can be more closely geared to the incentive structures and resources of the producers themselves--with possible conflicts between societal goals and farmers' goals anticipated and ameliorated before bottlenecks become apparent and tensions arise.

More than eleven years of work at the Institute for Agricultural Research (IAR) in Zaria, Kaduna State, in the northern part of Nigeria, led us to this orientation. More recent work in other parts of Africa, Latin America, and Asia has persuaded us and others of the potential utility of such an approach in Nigeria and elsewhere. Assembling the factual base of empirical data needed to implement a micro-orientation is part of what already has come to be widely known as "farming systems research." Although a concise definition of what constitutes such research probably is not possible, the interdisciplinary approach and farmer involvement in research implied by the term are, we feel, critical to the development and application of a micro-orientation towards the problems of agricultural change.

Since our work in the Rural Economy Research Unit at the Institute for Agricultural Research helped support the emergence of farming systems research and our village-level research provides an early case study of its application, we present here both the theory and practice of farming systems research work. We attempt to place it in the context of agricultural research in general and agricultural development in the Nigerian savanna in particular.

In the remainder of this introductory chapter, we discuss in some depth the rationale for a micro-orientation to research and agricultural development activities and then briefly review the setting in Nigeria, where the micro-oriented research with which we were associated, evolved.

## RATIONALE FOR A MICRO-ORIENTATION

In Nigeria, as elsewhere in the developing world, there has been an evolution in thinking about the problems of agricultural development. There has also been an evolution in thinking about how agricultural research might best be carried out to address development problems and goals. As would be expected, there are parallels between broad definitions of agricultural development approaches and delineation of agricultural research priorities and policies. Economic crises are increasing the pressures on developing countries to take a hard look at the dissemination of and return to government investments. Funds for agricultural research are not immune to such pressures. Where the returns from research do not seem commensurate with anticipated development impacts, governments often take steps to change the orientation of research to effect an improvement in the situation.

In the first section here, we trace the path which has led to the current concern with increasing the productivity of small farmers. In the second section, we discuss what this concern means in agricultural research terms: going back to basics and understanding the farmers.

### Evolution of Agricultural Research Priorities

We believe that three or four decades ago, a dominant feature of agricultural research in developing countries involved satisfying the needs of the organization providing the research resources. These needs were not necessarily synonymous with the interests of farmers responsible for applying the technology.<sup>3</sup> In more recent periods, the thinking has shifted gradually to the view that the success of agricultural research must be measured in terms of its contribution to the welfare of the farmers themselves. The task of the agricultural research institution has thus become more complex. Not only is the research establishment responsible for executing a program consistent with national goals and scientific principles; it is also responsible for visibly improving the lives (and incomes) of farmers. The evolution in thinking can be broken into four stages.

In the first stage, the extractive philosophy of colonial times led to an agricultural development pattern concerned only with increased production of marketable surpluses for export (Lele 1975). The agricultural research emphasis was narrowly restricted to boosting the output of the export cash crops--in northern Nigeria's case, groundnuts and cotton. The colonial government ensured that research contributions were used by producers, but although some producers profited, benefits to producers were not a central concern.

In the second stage, the idea of selectively transferring technology to developing countries from developed countries supplanted the extractive approach. But the new approach was predicated on the notion that someone knew what was best for agriculture in a developing country. That resulted in attempts to import technology wholesale--sometimes with success but often with disastrous results. Heavy tractors became mired in mud, factories were installed to process ten times the volume of commodities available, dairy cows died of trypanosomiasis and other diseases. Where the wholesale transfer worked, dual agricultural economies often evolved, as, for example, in the case of Zambia. One, frequently nurtured and protected, became the modern sector of agricultural production; the other remained primitive and traditional (Norman 1981).

Then a third concept of developing agricultural technology within the low-income countries evolved. The unsuitability of directly-transferred technology contributed to this shift. The idea was that, by using as building blocks the elements that made technological change successful in high-income countries, researchers could develop unique and locally relevant technologies with a high degree of potential success.

In the fourth stage, those three essentially "top-down" approaches have been supplemented, but not entirely replaced, by a "grass-roots" or "bottom-up" strategy.<sup>4</sup> It is this latest stage of