

# TENURE AND ALLEY FARMING IN THE HUMID ZONE OF WEST AFRICA

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TENURE AND ALLEY FARMING IN THE HUMID ZONE OF WEST AFRICA:  
FINAL REPORT OF RESEARCH IN CAMEROON, NIGERIA, AND TOGO

by

Steven W. Lawry and Douglas M. Stienbarger

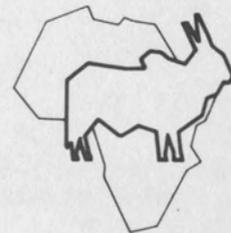
A Collaborative Research Program Between

**LAND TENURE CENTER**  
University of Wisconsin-Madison  
and

**INTERNATIONAL LIVESTOCK CENTRE FOR AFRICA**  
Ibadan, Nigeria



**LTC**



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All views, interpretations, recommendations, and conclusions expressed in this publication are those of the authors and not necessarily those of the supporting or cooperating organizations.

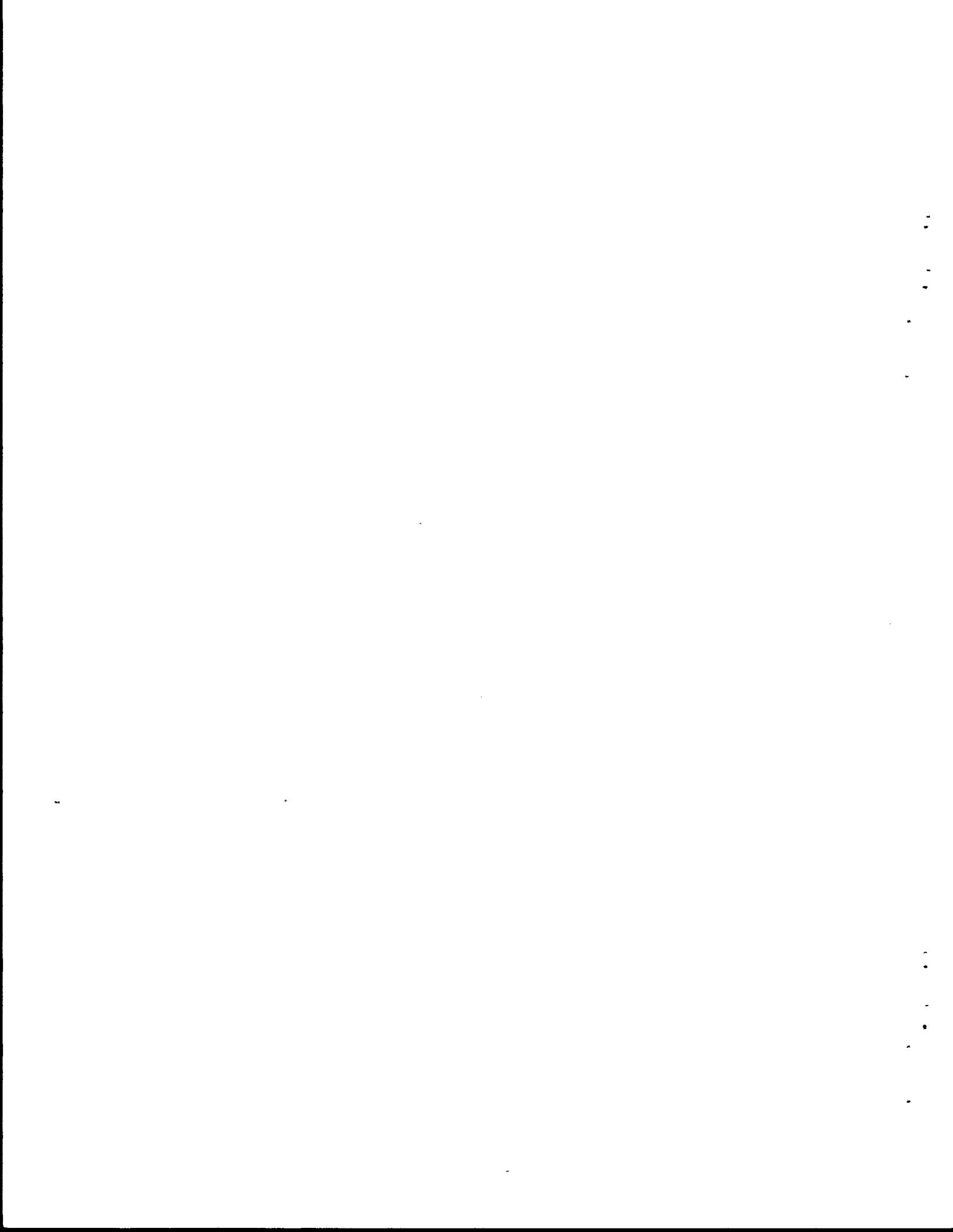
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## Preface

This report provides a summary and synthesis of research in Cameroon, Nigeria, and Togo on the role of tenure in the adoption of alley farming. Alley farming is an agroforestry technology in which rows of leguminous trees and shrubs are intercropped with cereal and tuber crops. Cuttings from the trees are used as a mulch and a supplementary livestock forage. Alley farming is designed to improve fallow management in areas of declining soil fertility and increasing population pressure.

Tenure, or the nature and distribution of rights to land, trees, and other resources, can be an important factor in farmer decisions concerning adoption of any agricultural technology. Alley farming is a technology which yields returns over a long-term period. Farmers will plant alley trees on land over which they have secure long-term tenure and where they have exclusive rights to the products of alley trees. Farmer security of tenure to land and trees varies considerably in West Africa, depending upon such factors as the distribution of various rights over farm parcels among the state, lineage authorities, and farmers; the prevalence of short-term tenancy arrangements; the gender of the farmer; and the intensity of land use of the farming system.

The origins of this project lie in previous on-farm research in southern Nigeria carried out by scientists at the International Livestock Centre for Africa (ILCA). Paul Francis and A.N. Atta-Krah found that farmers participating in ILCA-sponsored on-farm trials were less likely to plant alley trees on parcels subject to control and periodic reallocation by lineage authorities than on parcels over which farmers themselves had more or less permanent control. The apparent significance of tenure as a factor in alley farming adoption led ILCA scientists to conclude that more in-depth research on this subject was needed both in Nigeria and elsewhere in the region. Thus, in 1989, ILCA and the Land Tenure Center (LTC) entered into an agreement by which LTC would carry out research on the role of tenure in alley farming adoption in the West African humid zone. The agreement stipulated that the research be undertaken in collaboration with national researchers in three countries in the zone. This report is the final publication of the research program, which began in June 1989.

The research program has been a complex undertaking, and the contributions of many people merit mention and thanks. The project was developed at the initiative and under the guidance of Stephen Sandford, formerly head of the Livestock Economics Division at ILCA headquarters in Addis Ababa, and Len Reynolds, formerly team leader of the ILCA Humid Zone Programme in Ibadan, Nigeria. Mohammed Jabbar, currently ILCA team leader in Ibadan, assumed overall responsibility for the project upon Mr. Reynold's transfer to Kenya in 1989. We appreciate the assistance, interest, and encouragement extended by all of these gentlemen. We wish also to thank ILCA Director-General John Walsh and Deputy Director-General Hank Fitzhugh for their continuing interest in the project.

We are especially grateful for the efforts of our affiliates who implemented the country research programs in Cameroon, Nigeria, and Togo. In Cameroon, our research affiliate was the Institute de la Recherche Agronomique (IRA) in Yaoundé. Dr. Jean Tonye, IRA Deputy Director for Agroforestry

Programs, led the research team, which also included Dr. Christine Meke-Meze, Professor of Private Law, and Dr. Pierre Titi-Nwell, Professor of Sociology, both of the University of Yaoundé. Our affiliate in Nigeria was Dr. Yakub L. Fabiyi, Professor of Agricultural Economics at Obofemi Awolowo University in Ile-Ife. He was assisted by Dr. Ezekiel Idowu. Dr. Messanvi Foli, Professor of Law at the Université du Benin in Lomé, led the Togo research team, which also included Dr. Kwami G. Kpakote, forage agronomist, Dr. Garni Kenkou, rural sociologist, and Dr. Kounouho Agbemelo-Tsomafo, animal scientist.

At the Land Tenure Center, LTC Director John Bruce participated in the project's design. Patty Grubb, Don Esser, and Teresa Barry provided administrative support and solved truly complex and sometimes unusual administrative and logistical problems. Jane Dennis, LTC editor, prepared this report for publication.

I am especially grateful to Douglas Stienbarger, LTC field manager and co-author of this report, who over the last two years spent several months away from his home in Mali assisting the research affiliates with a great variety of research tasks. The literature review and preliminary data analysis, prepared by Mr. Stienbarger, have made important contributions to the project.

The research project was carried out under the auspices of LTC's research program on tenure and natural resource management in sub-Saharan Africa. Funding for this project was provided by the International Livestock Centre for Africa through a grant from the Bureau of Science and Technology of the U.S. Agency for International Development.

**Steven W. Lawry**

**August 1991**

## Executive Summary

This report presents the findings of research carried out in Cameroon, Nigeria, and Togo on the role of land and tree tenure in the adoption of alley farming. The International Livestock Centre for Africa (ILCA) commissioned the Land Tenure Center, University of Wisconsin-Madison, to implement the research program in collaboration with national researchers in each country. Earlier research by ILCA in Nigeria had identified tenure as a potential constraint to alley adoption, particularly where village authorities retained the right to regulate fallow cycles and reallocate farm parcels among village households. Alley farming is a technology which yields benefits to farmers over a long-term period. Under circumstances of uncertain long-term tenure security, farmers would be unlikely to adopt alley farming.

The research program was divided into six phases: literature review and project preparation (including identification of research affiliates in Cameroon, Nigeria, and Togo); research design; pilot studies; household-level field surveys; analyses of country data, and country report preparation and preparation of this synthesis report by the Land Tenure Center. The research program began in June 1989, and ended in August 1991.

Based on an extensive review of the literature and reconnaissance field surveys, the Preliminary Research Report (December 1989) identified five major research issues: (1) the effects of land tenure security and (2) tree tenure security on farmer adoption of alley farming; (3) the effects of overlying community use rights to farmland; (4) the nature and implications of gender-based differences in land and tree rights for adoption of alley farming by men and women farmers; and (5) the effects of state regulation of tree use on adoption of alley farming.

In the most general terms, the research is concerned with how tenure, or the nature and distribution of rights to land, trees, and other resources, affects the ability of land users to adopt alley farming.

Chapter 2 describes farmer rights under customary tenure systems in the West African humid zone. Distinctions are drawn between community or group rights, primary access rights, and secondary access rights. Normally community or group rights over farmland are restricted to allocative, administrative, and judicial rights exercised by village chiefs, lineage heads, or heads of household, acting as land trustees.

Primary rights are rights of usufruct held by community members over discrete parcels of farmland. These rights are secured through allocation by land trustees but principally by inheritance. Historically customary tenure systems prohibit sale of land. Increasingly, customary tenures sanction land sales, especially in land-short areas and where sellers secure the permission of all family members with interests in the holdings. Primary land rights are usually inheritable. Generally speaking, landholders are free to manage their land as they wish, subject to constraints imposed by the ecology or technological and other constraints associated with the prevailing farming system. Rights of individual landholders become stronger as land becomes scarce and agricultural management becomes more intensive. Primary right holders normally enjoy a high degree of tenure security. Primary rights are broadly analogous to rights of "ownership" under Western property systems.

Secondary access rights are rights to land held by tenants. Tenancy terms are usually specified in agreements between tenants and primary right holders (the "owners") but may also be defined by rules and conventions associated with various forms of tenancy. "Stranger farmer" agreements are a common form of the latter. Here, emigrant farmers are permitted to farm land on a year-to-year basis, with the landholders entitled to a share of the crop or to payment of annual tribute in recognition of their ownership rights. Tree planting is a right normally associated with landownership or primary tenure. Thus, tenants are usually prohibited from planting trees, since successful tree planting may be used by tenants as evidence in support of subsequent attempts to assert ownership. About one-third of all parcels surveyed in Togo were farmed under tenancy arrangements compared to 12 percent in Nigeria and a negligible percentage in Cameroon.

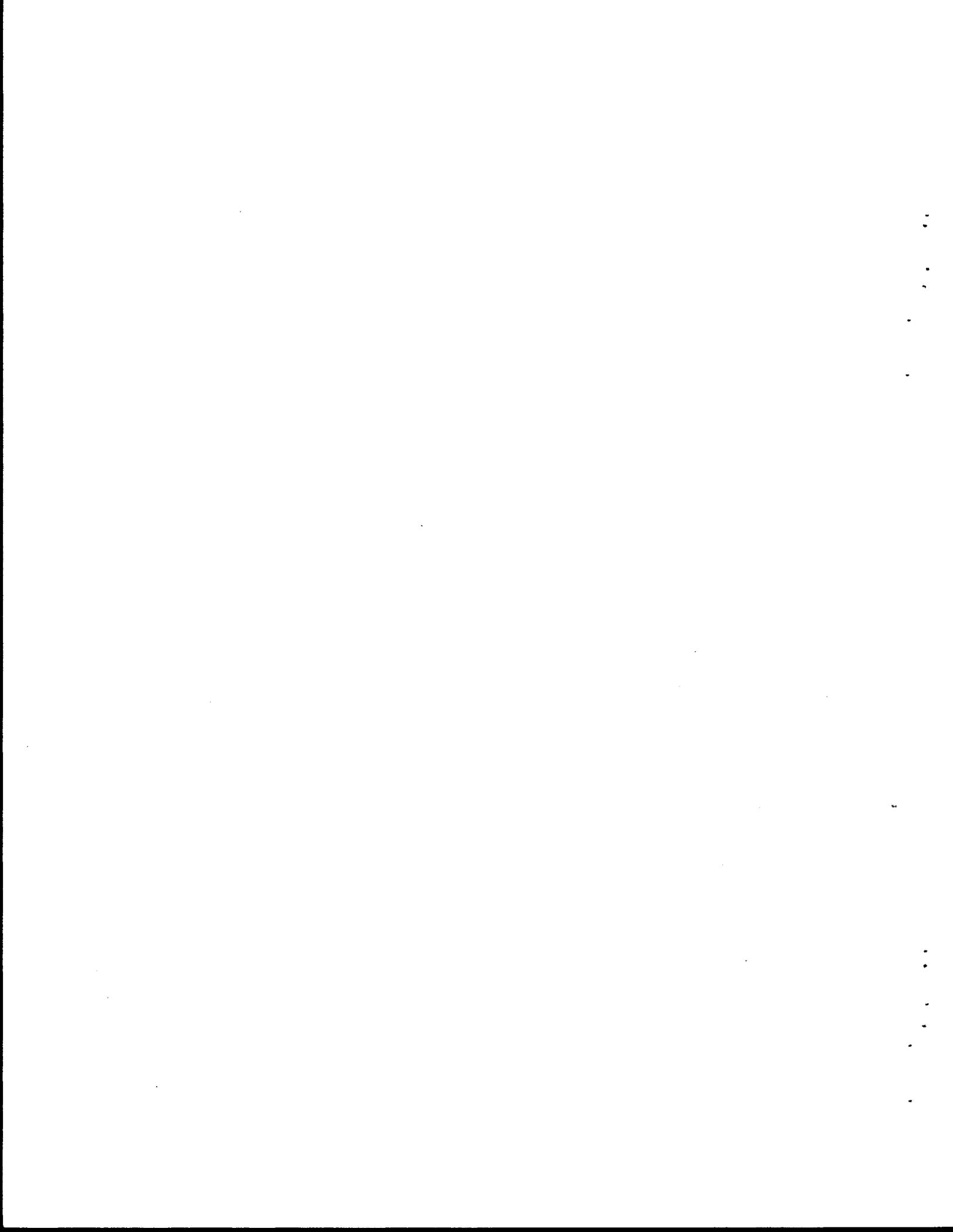
In all three countries, national governments have promulgated land and forestry legislation reducing the role of customary tenure systems. However, states have generally been unable to put in place administrative and legal structures necessary to replace customary tenures, which continue to be recognized as legitimate tenure institutions in most areas.

Chapter 3 analyzes field survey data for relationships between land tenure and adoption of alley farming or for practices analogous to alley farming such as tree planting and use of mulch and other inputs. The analyses confirmed hypotheses that farmers most likely to adopt alley farming were those holding land under primary forms of tenure. Farmers who secured land through inheritance, purchase, or gift were more likely to engage in alley farming or analogous practices than those holding land under tenancies, including long-term borrowing arrangements. However, the research identified significant differences in the management of inherited parcels which had been divided among heirs and land that remained undivided. Levels of tree planting and use of inputs were significantly higher on divided inherited land. A significant proportion of parcels in all three research areas is held under undivided inheritance tenure: one-third of parcels in Cameroon and Nigeria and nearly one-half in Togo. Inherited land may remain undivided for a variety of reasons. Families may be avoiding disputes likely to arise over final division. Division may await the permanent return to farming of adult heirs working in cities.

Chapter 4 presents research findings on tree tenure and alley farming adoption. Research found that farmers possessing primary landownership rights normally have secure rights to self-sown and planted trees on their parcels. Informants in Togo and Nigeria were skeptical about the ability of tenants to use alley tree plantings to support a claim for primary rights because alley trees are pruned frequently, are used primarily for noncommercial objectives, and can be easily removed. Project research affiliates in Togo and Nigeria thus concluded that landowners may not object to tenants planting alley trees, particularly where farmers and tenants agree at the commencement of tenancies that planting of alley trees does not extend primary rights to tenants. Predominately male questionnaire respondents accorded women few or no independent rights to plant or manage trees in Cameroon and Nigeria. Most respondents in Togo stated that husband and wives share rights to trees planted on family parcels. All women alley farmers in the Nigeria survey were widowed or divorced. The Cameroon forest code grants farmers full rights to trees they plant on their parcels. The Togo code requires farmers to secure permits before cutting down trees on their farms, including planted trees. However, farmers have free rights to prune trees and collect firewood. Most Togo survey respondents believed that forestry legislation would not constrain farmer adoption of alley farming. Finally, landholders in all three countries have the right to prohibit access by livestock belonging to others to their parcels, at all times.

Chapter 5 examines relationships between land use intensification and individualization of tenure rights on farms. Generally speaking, customary tenure systems extend stronger individual rights to landholders as land becomes more scarce. This accommodates more intensive management of parcels and adoption of technologies such as alley farming. However, land tenure systems also serve economic and social purposes not related to agricultural management. An example identified in this study is social factors which delay the division of inherited land among family members. This may constrain tree planting on at least some parcels held by members of a family or lineage. Chapter 5 presents descriptive data on land use and agricultural management from the three research countries, including data on fallow management, use of inputs, division of labor and decision-making responsibilities within farming households, and livestock ownership and feeding and management practices.

Chapter 6 summarizes the main findings of the research program. Customary tenure is not a general constraint to alley farming adoption. Farmers in the research areas in Cameroon, Togo, and Nigeria are least likely to face tenure-related constraints to adoption of alley farming where they have primary access rights over land which they farm in the form of inherited land which has been divided or land secured through purchase or gift.



## CHAPTER 1:

### Research Issues in the Study of Tenure and Alley Farming Adoption in the West African Humid Zone

Alley farming is an agroforestry technology in which rows of leguminous trees and shrubs are intercropped with cereal and tuber crops. The biomass from regular tree prunings is used as mulch and as supplementary livestock feed. Alley farming's emphasis on utilizing tree biomass to fertilize the soil and feed livestock binds trees to the land by requiring long-term access to land for agricultural purposes and long-term access to the products of any trees planted.

However, under the customary tenure systems which still predominate in West Africa, certain land tenure arrangements and tree tenure rules and conventions may impose restrictions on the planting and management of trees by certain groups of farmers and land users. Tenant farmers, even those who possess long-term tenancy rights, may be restricted from planting trees, as tree planting is a right usually associated with land ownership. Women farmers may lack sufficient control over the products of alley or other trees to merit investment of their labor in alley farming. Community land authorities may retain the right to reallocate certain categories of cropland among families on a periodic basis to take account of changes in family food production needs and to enforce fallow patterns.

Rights to trees often operate independently from rights to land. For instance, a farmer's neighbors may have rights to gather firewood or wild fruits from self-sown trees occurring on his land. Neighbors' rights may vary with a number of factors, including the species of tree, the intended use, and the social status of the neighbors. In some countries, national land laws have vested ultimate landownership rights in states or given state agencies broad powers to regulate land use, including use of trees on farms. Restrictions owing to both state and customary tenure may reduce the confidence of farmers that they will reap the benefits, over the long-term, of current investments in alley farming.

The systematic implementation of alley farming in West Africa has only recently been attempted, and the primary focus has been on experimentation on production characteristics of the tree-crop interaction. Initial work performed by Paul Francis and K. Atta-Krah of the International Livestock Center for Africa (ILCA) indicated that tenure appeared to be a critical factor in farmers' willingness to participate in alley farming (Francis, 1987; Atta-Krah and Francis, 1989).

In order better to understand the constraints to alley farming imposed by land tenure systems and better to identify the tenure conditions most favorable to alley farming, ILCA entered into an agreement with the Land Tenure Center (LTC), in 1989, to undertake research on the implications of land and tree tenure in the humid zone of West Africa. LTC carried out the research in collaboration with national researchers in Cameroon, Nigeria, and Togo. This report provides a summary of country-level research findings and a synthesis and analysis of those findings for their implications to the role of tenure in alley farming adoption in the region.

## **Research Issues**

The linkage between land access and rights to trees and their products makes delineation of land and tree tenure systems and of existing land use patterns a primary goal in the research program. The major research issues addressed in examining these relationships are: land tenure security, tree tenure security, state rights to land and trees, land management strategies, and animal production patterns. Subsumed within each of these issues is the determination of how the rights of women may diverge from those of men and what subsequent restrictions this may place on women's participation in alley farming.

### **Land Tenure Security**

The right to occupy and farm a given parcel of land for a long-term period is a key attribute of land tenure security. Farmers who possess only short-term rights, or whose rights are subject to revocation, are unlikely to invest in alley farming. Another important attribute of land tenure security is the farmers' control over the use of their farmland. Farmers may possess secure rights of occupation, but their use rights may be constrained in important ways, or members of their family, lineage, or community may possess use rights which affect the ability of landholders to engage in certain land use practices or adopt certain technologies. Community controls may be exercised at various levels, or not at all, and different parcels of a farmer's holdings may be controlled differently. When land management decisions are taken by persons or authorities outside of the land users' immediate families, farmers may not feel they have sufficient autonomy over land management to engage in alley farming.

Use rights exercised on individual parcels by community members at-large may include seasonal grazing rights and the right to gather certain tree products. Where such overlying community use rights interfere with the individual user's ability to control the production and use of alley trees, farmers will be unlikely to invest in alley farming.

Women present a special concern since they most often obtain land use rights through their husbands. It is necessary to determine to what extent these derivative use rights might restrict women from engaging in alley farming.

### **Tree Tenure Security**

In considering tree tenure security, we are concerned that those who plant alley trees have the ability to control their management and use. Under customary tenure, rights of ownership and use of trees may vary by whether the trees are self-sown or planted, whether they are used for commercial or subsistence purposes, and by the tenure of the land on which they occur. While rights to some commercial tree crops are highly individualized and may be owned separately from the land, self-sown trees used for subsistence purposes are sometimes considered to be a communal good. It is important to determine into which categories alley trees will fall and under what conditions.

### **State Rights to Land and Trees**

The rights over land and trees reserved by states play an important role in influencing farmers' decisions on tree planting. Frequently, state agencies regulate directly the uses made by farmers of trees occurring on their individual farms. The research assesses the extent to which national

forest codes and laws affect the willingness of farmers to adopt intensive management strategies such as alley farming.

#### **Land Management Strategies**

Land management strategies used by farmers serve as an important indicator of potential land tenure security. Land tenure security usually increases as a function of intensifying land use. As a farmer begins to use and invest in land more intensely, the farmer's rights to the land and its production tend to become more exclusive. Indices of intensified land use include decreased fallow and increasingly continuous cropping as well as the increased use of labor and soil fertility-enhancing inputs. Alley farming is more likely to be adopted where land use is intensifying and specifically on parcels receiving the highest levels of labor and input use.

#### **Livestock Management Patterns**

The management of livestock is linked to the rights of farmers to certain resources. Free roaming livestock imply a general right to use browse (for example, crop residue and leaves) regardless of who owns the land. This could reduce the exclusive control of alley tree fodder and discourage farmers from investing in alley farming. Where animals are confined or their movement is restricted, farmers will be able to assert greater control at less cost over their alley trees.

#### **Organization of the Research**

The program of research was carried out in collaboration with national research affiliates in Cameroon, Nigeria, and Togo. The national affiliates were responsible for assembling the necessary local personnel and material support, implementing field research activities, and analyzing the data collected. From these analyses, each country team prepared interim and final country reports. The LTC provided assistance in designing country research programs, formulating questionnaires, conducting data analysis, and editing reports.

The research program was not conceived in terms of holding the national affiliates to one tightly structured research plan. Country research designs gave affiliates sufficient flexibility to pursue tenure and resource management issues as they arose in the field. LTC staff members, Steven Lawry (Principal Investigator) and Douglas Stienbarger (Project Field Manager), worked to ensure that the country programs addressed a broadly shared set of issues related to tenure and alley farming. This report, co-authored by the LTC team, provides a summary of country research findings and a general synthesis of those findings for the implications of tenure to alley farming adoption.

Despite the varying professional schedules of national affiliates and the differences between agricultural calendars among the countries, the national research programs proceeded more or less at the same pace. The overall research program was implemented in six distinct phases: the preparation of a literature review and the identification of research affiliates; the formulation of research programs for each country; the implementation of pilot studies; the implementation of a sample survey instrument; the analysis of data and preparation of country final reports; and the preparation of a synthesis final report by the LTC.

### 1. Literature Review and Project Preparation (June to December 1989)

During the first half of this phase of the research, the LTC field manager conducted a literature review on tenure and agroforestry in West Africa. Table 1 provides a list of reports prepared under the research program. The review delineated key research issues that would be examined in each country research program. In the second half of this phase, national research affiliates were identified. Contractual agreements were drafted and signed during a trip to the region by the LTC team in November and December 1989.

**Cameroon.** LTC's research affiliate in Cameroon was the Institute de la Recherche Agronomique (IRA), the government agency responsible for agricultural research in Cameroon. Heading the team was Dr. Jean Tonye, IRA deputy Director for Agroforestry Research and Vice-Chairman of the Alley Farming Network for Africa (AFNETA). Other team members were Dr. Christine Meke-Meze, Professor of Private Law, and Dr. Pierre Titi-Nwell, Professor of Sociology, both at the University of Yaoundé.

**Nigeria.** Dr. Yakub L. Fabiyi, Professor of Agricultural Economics and Dean of the Faculty of Environmental Design and Management, Obofemi Awolowo University, in Ile-Ife, was selected to be the research affiliate in Nigeria. The second principal team member was Dr. Ezekiel Idowu, Agricultural Economist. Research was carried out in areas in southeast and southwest Nigeria, where ILCA, the International Institute for Tropical Agriculture (IITA), and the National Livestock Project Development (NLPD) had promoted farm trials of alley farming.

**Togo.** In Togo, LTC entered into agreement with Dr. Messanvi Foli, Professor of Law at the Université du Benin in Lomé, to carry out the Togo research program. Professor Foli enlisted the participation of three faculty members from the College of Agronomy at the university: Dr. Kwami G. Kpakote, Director and Forage Agronomist; Dr. Gnanri K. Kenkou, Rural Sociologist; and Dr. Kounouho Agbemelo-Tsomafa, Animal Scientist.

### 2. Research Design (February to March 1990)

The LTC team traveled to each study country to assist the national affiliates in preparing research plans. (These plans appear as annexes to the interim report submitted by LTC in July 1990.) The plans provide a review of information on land and tree tenure issues as they apply to the potential adoption of alley farming in each country. They describe existing alley farming or related agroforestry practices or interventions. Each country team drafted tentative research hypotheses and outlined the research methodologies to be utilized in the different research phases. The research plans also furnish timetables of research activities for the duration of the research programs.

### 3. Pilot Studies (March to June 1990)

During this phase, each country team carried out preliminary field research designed to provide a typology of land and tree tenure systems and knowledge of how these systems function. Additionally, each team examined how tenure influenced the management strategies employed by farmers on their fields.

TABLE 1

## Reports Issued During Research Program

ACTIVITY	REPORTS PUBLISHED
Literature Review and Project Preparation (6/89-12/89)	<ul style="list-style-type: none"> <li>- Tenure and Alley Farming: A Literature Review with Particular Reference to the West African Humid Zone. (LTC, 10/89)</li> <li>- Preliminary Research Report, The Implications of Land and Tree Tenure for the Introduction of Alley Farming in Tropical West Africa. (LTC, 12/89)</li> </ul>
Research Design (2/90-3/90)	
Pilot Studies (3/90-6/90)	<ul style="list-style-type: none"> <li>- Implications du Régime Foncier et du Droit sur les Arbres sur l'Introduction de l'Agriculture en Couloir dans la Zone Forestière du Cameroun. (Affiliate, 6/90)</li> <li>- Interim Research Report, The Implications of Land and Tree Tenure for the Introduction of Alley Farming in Nigeria. (Affiliate, 6/90)</li> <li>- Rapport Préliminaire, Étude des Implications du Régime Foncier et de la Propriété des Arbres sur l'Introduction de l'Agriculture en Couloir dans la Zone Humide du Togo. (Affiliate, 6/90)</li> <li>- Interim Research Report, The Implications of Land and Tree Tenure for the Introduction of Alley Farming in Tropical West Africa. (LTC, 7/90)</li> </ul>
Sample Survey (7/90-10/90)	
Data Analysis and Country Final Report Preparation (11/90-5/91)	<ul style="list-style-type: none"> <li>- Alley Farming and Land Tenure in Cameroon, Togo, and Nigeria: Report on Preliminary Field Data Analysis. (LTC, 4/91)</li> <li>- Influence du Régime Foncier et du Droit sur les Arbres sur l'Introduction de l'Agriculture en Couloir dans la Zone Forestière du Cameroun. (Affiliate, 8/91)</li> <li>- The Implications of Land and Tree Tenure for the Introduction of Alley Farming in Nigeria. (Affiliate, 8/91)</li> <li>- Implications du Régime Foncier et de la Propriété des Arbres sur l'Introduction des Techniques de l'Agriculture en Couloirs dans la Zone Humide du Togo. (Affiliate, 8/91)</li> </ul>
LTC Final Report Preparation (6/91-7/91)	<ul style="list-style-type: none"> <li>- Tenure and Alley Farming in the Humid Zone of West Africa: Final Report. (LTC, 8/91)</li> </ul>

Activities carried out in the pilot study phase included a review of customary land and tree tenure rules and conventions in the research areas and an assessment of the significance of statutory law and administrative codes for adoption of alley farming. Key informant interviews were conducted, using a checklist of open-ended questions covering the major research issues.

The analyses and write-ups of the pilot studies were submitted by each team as an interim research report. Knowledge gained in the pilot study phase was applied to designing a sample survey questionnaire. The survey was implemented in the next research phase. A tentative sample frame was also drawn up. The LTC field manager visited each country at the end of the pilot study phase to assist with interim report preparation and drafting the questionnaire.

#### **4. Household Sample Survey (July to October 1990)**

During this research activity, each country team administered a close-ended, partially precoded questionnaire to heads of randomly selected households in the field research areas. The questionnaires collected data on land tenure by parcel and on land, tree, and animal management practices. (The country final reports provide copies of questionnaires.)

#### **5. Survey Data Analysis and Country Final Report Preparation (November 1990 to May 1991)**

Each country team sought technical assistance in data entry and analysis from local specialists. During visits to each country in November 1990, the LTC field manager assisted in cleaning data sets and initiating statistical analyses. Interpretation and presentation of research results were the responsibility of the country teams. The field manager again visited country teams in January and February 1991 to assist with data analyses and organization of final country reports. The LTC field manager prepared a preliminary, comparative analysis of country research findings in April 1991.

Country final reports provide reviews of land and forest legislation, analyses of the sample survey, and conclusions regarding the implications of land and tree tenure arrangements to the adoption of alley farming in the research areas.

#### **6. LTC Synthesis Report Preparation (June to July 1991)**

ILCA sponsored a workshop in Ibadan on 3-5 June 1991, which provided the LTC team and the three country teams an opportunity both to review country research findings and to discuss their implications for alley farming extension and adoption in the humid zone. On the basis of workshop discussions, country reports, and field data, LTC staff, Lawry and Stienbarger, drafted this final report in Sevaré, Mali, and Madison, Wisconsin, in June and July 1991.

#### **Organization of This Report**

Following is a summary of the contents of the five remaining chapters of this report.

Chapter 2, "Land and Tree Tenure in the Humid Zone: Major Concepts and Issues," describes the key attributes of African customary tenure systems. Particular attention is given to characterizing the nature of tenure security under customary systems. The chapter draws distinctions between primary forms

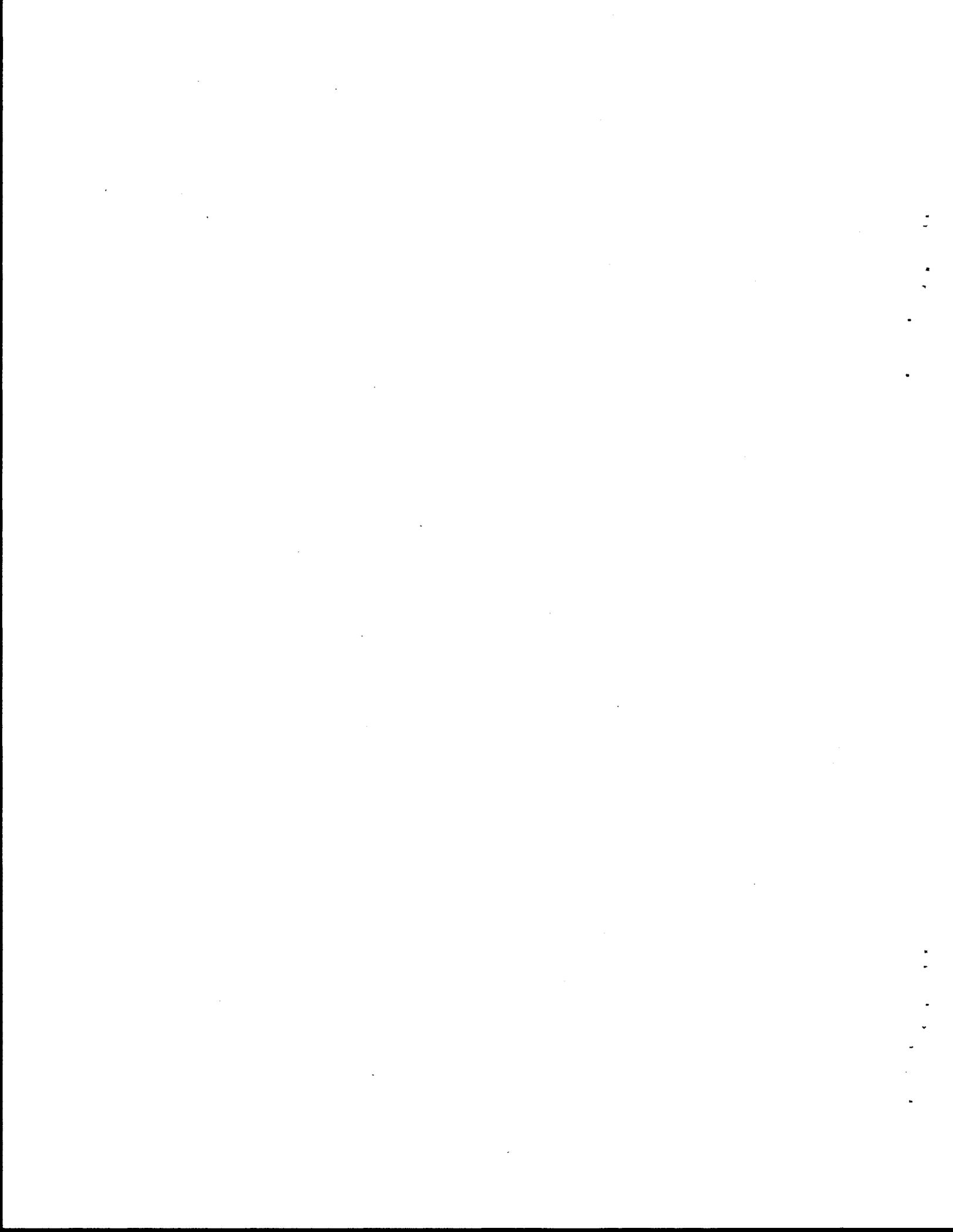
of land tenure, where landholders possess virtual ownership rights and enjoy high levels of tenure security, and secondary tenures (including various tenancy arrangements), where farmer rights are attenuated and may discourage adoption of tree crops. Customary systems are compared to systems of modern tenure, which normally entail formal registration and titling of land rights by the state. The impacts of postindependence land legislation on customary systems are discussed. The chapter provides a survey of customary tenure rules in the research areas in the three study countries. Land and forestry legislation promulgated since independence is described, and the implications of legislation to customary systems is assessed.

Chapter 3, "Land Tenure Security," presents research findings on relationships between tenure of holdings and adoption of alley farming or, where alley farming is not practiced, management practices analogous to intensive land use such as tree planting, mulching, and use of other inputs. The data evaluate three key research hypotheses, which postulate relationships between tenure categories and tenure security and adoption of alley farming, and relationships between land scarcity, tenure change, and agricultural intensification.

Chapter 4, "Tree Tenure Security," analyzes survey data for their implications to four tree-tenure research issues: restrictions to on-farm tree planting or use, particularly on tenancies; women's rights to own and manage trees; effects of state forestry legislation on farmer rights to trees on-farm; and the effects of overlying community use rights on tree use and management on-farm.

Chapter 5, "Tenure Change, Land Use, and Agricultural Management," presents a theoretical framework describing the process by which customary tenure systems accord landholders stronger individual rights over farmland as land use and agricultural management intensifies. The framework also describes how tenure may impede agricultural intensification, especially where tenure rules serve social and economic purposes not directly related to agricultural management. The chapter presents general data on land use and agricultural management from the three survey areas.

Chapter 6, "Conclusions: Tenure as a Factor in Adoption of Alley Farming," summarizes the major findings of the research program.



## CHAPTER 2:

### Land and Tree Tenure in the Humid Zone: Major Concepts and Issues

In studying tenure and its relationships to an agricultural technology such as alley farming, we are concerned with how the nature and distribution of rights to land, trees, and other resources affect the ability of land users to adopt the technology. As noted in chapter 1, alley farming has a fairly long-term production horizon. Farmers, if they are to adopt alley farming, will plant trees only if they are confident that they will reap the benefits of the investment of their labor and other resources in the undertaking. In other words, farmers must expect to be occupying the land five, ten, or fifteen years hence. They also need assurance that the right to plant trees and control their use is concomitant with their long-term land right.

This chapter consists of two sections. In the first section, a conceptual framework describing the key features of African customary tenure systems is presented. Such a framework is needed for two reasons. First, most land in the humid zone, and in the specific research areas, is held under customary tenures of one form or another. In subsequent chapters, frequent reference will be made to tenure concepts and terms with which readers must be familiar if they are fully to understand the analyses and conclusions presented. Second, discourse in the agricultural development community on the nature of rights held by land users under customary tenures has long been plagued by misunderstandings, borne usually of misinterpretation of key features of these systems in relation to Western concepts of property and land tenure. It is hoped that the discussion presented here can rectify some of these misconceptions.

In the second section, specific features of the customary tenure systems existing in the research areas of the three countries under study will be summarized. Attention will be drawn to similarities and important differences among the systems which may have particular implications for alley farming adoption. Also, customary systems are not static systems; they are adjusting to accommodate changing circumstances in the societies and economies in which they operate. The nature and implications of changes for alley farming adoption will vary from place to place. Since independence, all three countries have promulgated land and forestry laws which have various ramifications on customary tenure systems. Where appropriate, attention will be drawn to the impacts of modern law on customary tenure.

#### Major Principles of Customary Tenures

In the most basic terms, tenure is concerned with who has ownership of land or other resources. But "ownership" is not a simple concept. In Western systems of property rights (whose current statutory forms evolved from customary tenures existing in Europe), ownership ascribes to the deed holder a wide range of rights to use and develop land and to transfer those rights to others with minimum interference from third parties, such as neighbors, community authorities, or the state. Transfers of rights are usually made through the market. Rights to land are titled and registered by the state.

Title provides a basis by which right holders can call on the state to protect their rights when challenged by others. Title, then, provides security of tenure in Western property systems. The ability to provide security of tenure to legitimate landholders is an important attribute of any effective land tenure system. It is a precondition to investments in land which yield benefits to the farmer, particularly over the long term. It should be noted that ownership in terms of Western concepts of property is not an unlimited right. Owners are required to use their land in ways consistent with the public's health and safety. Land use and zoning regulations limit use rights in important ways. Private ownership rights can be extinguished and land claimed for public purposes, with just compensation.

"Ownership" is a useful starting point for studying Western systems of property rights. However, ownership is a much more complex concept under customary tenure systems and the source of unending mischief when analogy is drawn directly from the Western meaning of the term. To avoid the pitfalls of false analogy, salient features of customary tenures will be described below without drawing immediate reference to the notion of ownership. A meaningful analogy to Western concepts of ownership, based upon modes of access, individual control over use, and security of tenure associated with customary tenures, will be drawn at the conclusion of this section.

Customary tenure systems differ from Western systems in important ways, particularly in how land users gain access to land, in how transfers of land rights are carried out, and in how tenure rights are secured. Below we consider general principles of customary tenure for agricultural land.

1. Under customary tenures, individuals gain access to land by virtue of their membership in the kinship group that controls a given territory. The right to control is typically based upon a claim of first settlement in the area. Lineage authorities act as land trustees and allocate land to bona fide members of the lineage. Lineage membership is normally based upon descent; an individual's right to land is a birthright.

It is a common error to ascribe to lineage authorities or to the lineage itself ownership of land, in the Western meaning of the term ownership. This notion of either elite or collective ownership implies that the practical rights of individual group members to discreet areas of farmland are very limited and susceptible to capricious revocation by lineage leaders acting in their own interests or on behalf of the collectivity. (Collective ownership or communal tenure are also terms suggestive of collective production, which of course is not typical of African farming systems, where production is normally organized on an individual or family basis.)

Lineage authorities are more accurately characterized as land trustees who exercise certain administrative rights over land, including the right to allocate and revoke land rights and adjudicate land disputes consistent with generally recognized rules and procedures. Trustees themselves are often accountable for their actions to lineage or village councils. Individual lineage members, on the other hand, possess use or "usufruct" rights to land. The use rights of qualified members are usually very secure. Rights to specific areas of land which are continually farmed (allowing for fallow) are normally inheritable. Trustees, by virtue of their administrative rights, do not normally possess any special usufruct rights. Lineage "chiefs" may directly allocate land, or allocation rights may be exercised directly by lower level authorities such as clan leaders or senior family members (see Stienbarger, 1990, p. 7, for a discussion of land allocation systems in West Africa). Customary tenures, by basing land rights upon group membership, act to ensure reasonably equitable access to land by all members of community.

Customary rights to land are formally vested in married men as heads of household. Women normally are not able to assert independent rights. They gain use rights to land through their husbands. Unmarried women may have a right to inherit land from their fathers but would not normally be able to transfer that land to their husbands at marriage. Rather, the wife would farm land inherited through patrilineal descent from her husband in his village.

2. Under customary tenures, the role of a "land market" as a mechanism by which people can gain access to land is limited by conventions and rules prohibiting land sales. To sell land, and particularly to nongroup members, would alienate a basic resource from the patrimony of the community and reduce future opportunities of access by qualified group members. This, of course, would defeat one of the main purposes of customary tenures: providing equitable access to members of the lineage.

However, sale of land rights among group members has in many areas been accepted practice for some time and is becoming more frequent as undeveloped land becomes less available. Normally, persons contemplating sale of land must secure the consent of relatives who stand to lose their future interest in the land due to the transfer of rights to another family. Such permission is not often easily secured, for inheritance in areas experiencing land shortage will be the only effective means by which many family members gain access to land in the future. This will constrain the emergence of vigorous land markets, particularly in regions lacking employment opportunities outside of agriculture.

3. Although sales are uncommon and often not sanctioned, transfers of land rights take place through a variety of other mechanisms. Here we can distinguish between transfer of primary rights and assignment of secondary rights.

A primary right is a right secured through original settlement of unused land or through direct allocation of land from the founding lineage to the qualified group member. This is the strongest right under customary tenures, in that the right holder enjoys more or less permanent occupation rights, has a strong degree of discretion over how the land used, and can pass along his rights to the land through inheritance. With the exception of the right to alienate through sale, which is allowed under certain circumstances noted above, primary tenure is very similar to the Western concept of ownership.

The most frequent method of transfer of primary rights is through inheritance, where all of the primary rights of a deceased member of the community are distributed among heirs according to accepted principles. A second method of transfer of primary rights is land gifts, where a landholder makes an *inter vivos* transfer of his rights, normally to a relative. This is often used to forestall family inheritance disputes by allowing a landholder to make his wishes with respect to inheritance known in advance of his death. A third means of access to primary land rights is purchase, subject to the limitations noted above.

A secondary right is a right held by a person who has secured agreement from a primary right holder to utilize his land according to mutually agreed terms and conditions. These types of tenure are usually referred to as tenancies. Generally, secondary rights entail short-term use rights for specific purposes and do not in any way transfer primary rights to the secondary right holder. Common forms of tenancy are rental and sharecropping agreements, in which a farmer crops a landholder's land in exchange for a cash payment or a share of the crop, respectively. Nonlineage members and typically persons from outside the community can gain access to land for farming through stranger farmer arrangements, a common phenomenon in West Africa. Here, land is loaned to a farmer, often on a year-to-year basis, with

the terms of the loan agreed upon each year. Strangers can have access to particular parcels for several years but with important restrictions, including restrictions on tree planting.

A form of land borrowing common in West Africa that is not strictly considered to be a tenancy is the pledge, in which a landholder accepts a cash payment from a farmer wishing to farm his land, with the understanding that the land will be returned to the holder upon repayment of the pledge price to the farmer. (Pledge is similar in concept to pawning.)

4. The literature review underscored the complexity of tenure rules governing rights to trees, including trees on farmland held under primary forms of tenure. An important conclusion is that though land tenure is usually an important factor governing tree tenure, there often exist overlying rights to trees or limitations on their use which have important implications to adoption of agroforestry technologies. Fortmann (1988) groups tree rights into four main categories: the right to own or inherit, the right to plant, the right to use trees and tree products, and the right to dispose of trees (through destroying, lending, leasing or mortgaging, and selling or giving away). She notes a landholder may enjoy only some of these rights to trees occurring on his or her farm and that other rights may be shared with or held by the community or the state. The nature and distribution of these rights will also vary with the type of tree planted. For instance, transhumant herders may have rights to the foliage produced by self-sown trees on individual farms. In many African countries, state forest codes require landholders to secure the authorization of forestry agents before cutting or debranching many types of trees. Alternatively, in southwestern Nigeria cocoa trees may be planted, inherited, and sold by persons who have at best secondary rights to the land on which they are planted.

Generally speaking, however, the ability to plant trees is a measure of strong security of tenure in the land on which they are planted. Persons with primary customary rights possess long-term rights to their land. They plant trees in the knowledge that they or their heirs will benefit from them. However, persons who have been assigned secondary access rights through rental, sharecropping or borrowing arrangements will often encounter impediments to tree planting. Many tenancy arrangements are for short periods, often no longer than a year. Tenant farmers clearly lack the incentive to invest in trees where their sojourn on the land is so brief or the duration of their occupation so uncertain.

There are, however, forms of tenancy which are long-term in nature which expressly prohibit tree planting by tenants. This is the case because tree planting is considered a prerogative of primary right holders and thus a measure of primary as opposed to secondary tenure. Thus, attempts by tenants to plant trees will properly be seen as assertions of primary rights to land. Long-term tenancies are fairly common in West Africa. Lineages which settled in an area after the arrival of the founding lineage often gained formal access to land through long-term borrowing arrangements. Here, entire villages may be farmed under what are technically tenancy agreements. These secondary rights are inheritable and for most purposes provide a high degree of tenure security to the farmer. However, because tree planting is a right associated with primary tenure, it is forbidden for borrowers to plant trees. As noted above, a stranger farmer may continuously farm an area of land for many years but, because he is not a member of the lineage, will be prohibited from planting trees. (A stranger's ability to secure primary land rights will usually improve if he marries into the community.)

5. Customary tenure is sensitive to agro-ecological conditions. Farmers will not necessarily require strong individual rights to discrete areas of land in areas where land is plentiful. For instance, in sparsely

populated forest regions where the principal farming system is swidden agriculture based on long-term forest fallow, a specific area may be farmed for three years and abandoned for twenty years to forest. The farmer who first cleared the parcel may never farm it again. Under such circumstances farmers will possess a general right to farm within the forest region claimed by the lineage or group but will not possess, or require, a right to a specific parcel. Customary tenure systems generally ascribe stronger individual rights to land as population densities increase, fallows shorten, and farmers come to farm specific fields on a more or less continuous basis (Ault and Rutman, 1979). Stronger individual tenure accommodates and protects long-term investments in soil fertility and land, including tree planting.

In forest and transitional derived-forest savanna zones, it is not uncommon for individual families to farm in a variety of agro-ecological niches, with different fields held under different forms of tenure. For instance, Francis (1987) described farming systems in southwestern Nigeria based on portfolios of landholdings consisting of: intensively managed home gardens, located near the homestead and held under very secure tenure; near parcels producing cassava and maize, cropped for three to four years, fallowed for up to five years, and in some cases subject to reallocation by lineage authorities; and far fields, located in forest zones subject to long-term fallow and over which farmers claimed no long-term rights. The fact that individual families farm land held under a variety of tenures will have implications to the choices they make about adoption of alley farming. Certain fields, because of the tenure security they provide, will more easily accommodate tree planting than others.

#### **The Impacts of National Land Laws on Customary Tenures**

Since independence, most African states, including Cameroon, Togo, and Nigeria, have declared all or most of their land to be state or national land (Riddell and Dickerman, 1986). Thus, most of the land administered under customary tenure is statutorily state land. States have attempted to replace customary tenures with various forms of state tenure. Rights to land under national law are usually established through a process of registration with state land authorities. Only rarely, however, have states been able to put in place the administrative structures needed to register land titles and record transfers of land rights. More rarely still do farmers who hold land under secure customary tenures undertake to have their land surveyed and registered in terms of national land law. A large proportion of survey and registration costs must be borne by the applicant, and in terms of enhanced security of tenure, most farmers see little benefit in registering their holdings.

Similarly, forestry legislation has in many African countries created direct state interests in trees, including trees occurring on individual farms. Forestry law in former French colonies, including Cameroon and Togo, has drawn heavily upon colonial laws which supported forestry policies oriented toward aggressive policing of tree and forest use. Farmers are often required to secure the authorization of forestry agents before cutting down or debranching trees, especially trees of economic value and including trees which they have planted on their farms. Although regulations are applied unevenly and inconsistently, attenuated use rights proscribed by forest codes may act as a disincentive to planting of trees on farms (Lawry, 1989).

Despite the assertion of national interests in land and other resources, customary tenures continue to provide the principal sociolegal structures through which people gain access to land and by which they secure their land rights. As will be seen in the discussion of individual country cases below,

national laws, though failing to replace customary tenures as intended, have had significant effects on customary tenure. A potentially important impact arises where national law prohibits customary landholders from assigning secondary rights to tenants. Such prohibitions are based on the rationale that since all land belongs to the state, all land users are tenants under the state. Tenancies, apart from those entered into with the state or approved by the state, are accorded no legal standing. In some countries, including Nigeria, this has led some tenants to attempt to abrogate their longstanding obligations to customary landholders and has in turn caused landholders to be reluctant to allow landless farmers access to their surplus holdings.

The national land laws of Francophone countries, including Cameroon and Togo, generally accord little standing to customary tenures. Land rights under national law may be established and maintained where land users demonstrate that they have developed or improved the land: the legal concept is *mise en valeur*. Insofar as tree planting is considered an improvement, long-term tenants who have planted trees may be in a position to assert primary rights under national land law. Landholders may thus be inclined to underscore prohibitions against tree planting by tenants for fear that such activity may be used as a basis by which tenants claim ownership.

#### **A Framework for Analyzing Customary Tenure and Agricultural Innovation in the West African Humid Zone**

Above we have provided a summary of the key features of customary tenure in the humid zone. We noted that while states have been unsuccessful in replacing customary tenures with tenure rules based on national legislation, the legislation has had some effect on customary tenure. Generally speaking, customary tenure systems have proved adaptive to changing needs and circumstances. They are by no means static systems. They accommodate new forms of transactions, such as sales, where general social and economic conditions merit and sanction such changes.

Based on the above discussion of customary tenure and national land law, we summarize below some key tenure terms which will be used in analyzing tenure and land use relationships in this report.

##### **Community or Group Rights**

As noted above, persons gain access to land by virtue of their qualified membership in the kinship group occupying a geographical territory. As kinship groups grew in population, groups broke off to form separate kinship groups, each a little further removed from the original settlement area. Eventually this process of segmentation resulted in groups that were isolated from one another by distance, with each having its own "pool" of land. Control of the land thus passed from the original representative of the lineage to representatives of the sublineages, usually the senior male.

Normally community or group rights are limited to allocative, administrative, and judicial rights. The level at which these rights are exercised will vary from group to group. In principle, the lineage group could include all recognized members and would roughly correspond to a village or town. Or allocation and management rights over land could reside with a sublineage which would correspond to a subvillage, section, or neighborhood. As land becomes more scarce, control over land usually devolves to a lower-level of lineage authority. [In all of our study areas, it is the heads of extended families (equivalent to compounds or households) who generally allocate land to their family members and clients.]

In looking at the level at which land decisions are made, we find that decision levels may vary according to the particular land use intended. At a minimum, the head of the family allocates land use rights to those members of his immediate family who work the land. However, decisions on when, where, and how long parcels should be fallowed may rest with higher-level lineage authorities, as is the case in parts of southeast Nigeria.

#### **Primary Access Rights**

These are rights held by qualified community or group members. They are normally vested in the male head of household. In areas of relatively dense settlement where land is continuously occupied, rights to specific areas of land are for all intents and purposes permanent. Land can be inherited by family members without interference from the larger group. Customary tenures often prohibit sale of land or require that market transactions in land rights take place only among qualified group members. Primary access holders enjoy a high degree of tenure security. Their tenure is roughly analogous to the concept of "ownership" as used in Western property rights systems. Subsequent references in this report to "landowners" will refer to holders of primary access rights, usually under customary tenure.

#### **Secondary Access Rights**

These are rights held by tenants as specified in the agreements made between tenants and primary right holders (the "owners"). They take a variety of forms in West Africa, including renting, sharecropping, and long-term borrowing arrangements. In the absence of generally sanctioned land markets, secondary tenures are important modes of access in West Africa and will be increasingly important as undeveloped land declines in extent. Secondary access rights are limited in duration and in many cases expressly forbid tree planting, since tree planting is often considered a prerogative of landownership.

### **Land Tenure in the Research Areas**

#### **Cameroon**

**Customary Tenure in Cameroon.** There is one ethnic group in each of the research areas in Cameroon. The forest zone around Matomb is composed of the Basa, while the transition forest/savanna zone around Obala is composed of the Eton. Both groups exhibit decentralized lineage authority whereby the head of the extended family allocates the land under his control and makes certain land management decisions. Within both groups, land passes along the patrilineal line of descent.

Before independence, Western concepts of landownership were superimposed first by the Germans and then by the French, but these had little practical effect on the vast majority of agriculturalists in rural areas. After independence and until 1974, when the current national land law came into force, land law essentially followed preindependence French law, again with little impact on customary tenures.

Under customary rules, primary access rights to land are obtained through inheritance or *inter vivos* gift from one's father. Land is allocated among wives and unmarried sons by the family head, and community authorities in the research areas have no control over how farmers manage these lands.

Secondary rights may be obtained in several ways. A common method is pledge, but the duration of a pledge is normally not specified and therefore

can be reclaimed on fairly short notice. Land rentals also occur, but these contracts are generally short term.

Women ordinarily have no ownership rights to land. They are granted use rights by their husbands. Upon death of the husband, land is inherited by adult sons, though widows would normally continue to farm their usual plots. If the deceased husband is survived only by adolescent sons, the widow will hold the land in trust until such time as the son(s) reach adulthood. Frequently if a widow has no sons, her deceased husband's family will attempt to reclaim the land. In such cases, most courts have ruled that the land be divided among the two disputing parties.

Customary tree tenure accords rights over virgin forest to the clan (lineage) that controls access to the land and restricts tree rights to clan members. Self-sown trees customarily belong to the primary holder of the land they grow on. Tenants may use the trees with permission of the landholder. Trees planted by someone other than the landholder may be used by the planter but without according land rights to the planter. Use of trees planted by tenants is normally restricted to less than five years, and unless other agreement has been reached, the trees become the property of the landholder. Exceptions to this rule are made where the planters are family members, in which cases they obtain perpetual use rights to the trees.

**National Land Law of 1974.** The Cameroon legislation governing land tenure, passed into law as the National Domain Law of 1974, classifies land into three major categories: public state land, private state land, and national lands. Public State Land consists of those lands that prior to independence were held by foreigners ("colons") as well as those lands now used for public purposes such as schools, hospitals, roads, and so forth. National Domain Land basically comprises all land that has not been registered or is not in the process of being registered. This land is divided into two types: land considered vacant, and land occupied and worked by indigenous populations. Domainial Rights of Private Individuals and Customary Collectivities recognizes and regulates the rights of land registered by individuals and customary collectivities. The latter's rights are only recognized if they have gone through the registration process. Few collectivities have done so.

The key to establishing land rights in terms of national law is registration. The registration process is expensive and arduous, and most farmers can neither afford nor see any obvious benefits to land registration. There are two categories of registration: direct and indirect. Direct registration covers land occupied and worked before the 1974 Law took effect, while indirect registration encompasses registration of any land considered unused (national domain land) when the 1974 Law was enacted. Both require application that proceeds through ever higher administrative levels, though the administrative offices that handle each of the two types of registration are different. Public notice is also required, and a land commission rules on any objections. For indirect registration, land over 50 hectares in size requires a presidential decree. Although the minimum time for completion of the registration process is theoretically ninety days, some applications may take years before title is granted.

**Forest Legislation.** Current forestry legislation, which became law in November 1981, divides forests into three categories: those within the private domain of the state, those within the national domain, and those that form part of public collectivities or belong to individuals. Private domain forests include natural forest reserves, national parks, wildlife and plant sanctuaries, and the like. Collective forests are those planted by collectivities on land they own, while individual forests are those planted by individuals on land they own. Lastly, national domain forests include anything that does not fall within the first two categories; exploitation here

is regulated by the state. Although local populations in all these cases retain use rights to gathered tree products, felling of trees is limited by applicable regulations that require administrative consent. All self-sown trees are considered state property and require authorization to cut down. Planted trees are the property of the planter if the planter owns the land. If the land is owned by another, the planter enjoys use rights of the trees for a limited time, but they become the property of the landowner afterwards.

**The Effects of National Land and Forest Legislation on Agroforestry.** Permanent and temporary transfers of land, including tenancy arrangements, are interdicted by law unless the land is registered. These provisions are largely ignored by the general populace, but they nevertheless contribute to a sense of insecurity due to the legal concept of *mise en valeur*, which accords land rights to those who put land into production. Tree planting is one method of doing so, thus binding trees and land together. This concept is contrary to customary tenures and will discourage the planting of alley trees on all but owned land.

### Togo

**Customary Land Tenure.** Togo's current national land law came into force on 6 February 1974. It vests ownership of all land in the state and provides for a system of land registration by which farmers gain long-term use rights to land. The law has been applied superficially and mainly in urban areas, leaving customary tenure rules in force throughout most of the country.

The two research areas in Togo are comprised of ten ethnic groups (table 2). The indigenous groups are the Ewe, Mina, and Ouatchi in the maritime region and the Ewe, Akposso, and Akebou in the plateau region. The other ethnic groups represented in the research sample are immigrants, who tend to be tenants of the indigenous groups. All of these groups allocate and manage land at the level of extended family, though individuals of each nuclear family work the land.

Based on findings of the pilot survey, the most common means for gaining primary access rights to land are: inheritance, which has been the most important customary avenue to landownership; gifts of land, which are generally rare; and land sales, which are becoming more common throughout Togo, especially in the maritime region.

Customary tenure rules stipulate that ultimate rights to land are vested in the collective. The use of the land occurs on an individual basis. Customary rules provide that an individual member of the group has access rights to a parcel or parcels of the group-held land, which he is expected to put into production to fulfill his families' needs. In fact, continual use of the land is a condition of continuing occupation. The customary landholder possesses both the right to use the land and the ownership of all that he has planted or built on the parcels assigned to him. Tree crops may be planted by the individual on unassigned communal land, but the planter does not gain individual ownership of that land. He does, however, retain ownership of the trees.

The field survey in Togo indicated that one-third of the parcels sampled is farmed under some form of tenancy. This is an indication of increasing land shortage. Renting land is common but is practiced more in the maritime region than on the plateau. Pledging of land is practiced in all of the research sites except Glei. On the other hand, loans appear to be uncommon, especially in the maritime zone. Because of their significance, greater attention is given below to the terms and conditions of sharecropping or *abusa* tenancies, particularly as they affect tree planting.

**TABLE 2:**  
**Ethnic Groups in the Togo Research Sites**

<b>Ethnic Group</b>	<b>Maritime % (N)</b>	<b>Plateau % (N)</b>	<b>% of Total Sample (N)</b>
Ewe	38.2 (76)	31.1 (61)	34.7 (137)
Ouatchi	29.7 (59)	.1 ( 2)	15.2 ( 60)
Mina	24.6 (49)	0	12.4 ( 49)
Akposso	.1 ( 1)	32.7 (64)	16.5 ( 65)
Akebou	0	8.7 (17)	4.3 ( 17)
Kabye	.1 ( 1)	12.8 (25)	6.6 ( 26)
Ana	0	7.1 (14)	3.5 ( 14)
Fon	6.5 (13)	0	3.3 ( 13)
Losso	0	3.6 ( 7)	1.8 ( 7)
Kotokoli	0	3.6 ( 7)	1.8 ( 7)
<b>Total N</b>	<b>199</b>	<b>196</b>	<b>395</b>

Sharecropping is one mechanism for landless or land-short farmers to gain access to land and commercial tree products. Known as *abusa*, the owner of fallow land would give the land to a sharecropper to plant cocoa and coffee. At harvest time, the landowner normally receives two-thirds of the crop while the sharecropper receives one-third. The contract term is normally unspecified and can be canceled at any time, with the trees remaining the exclusive property of the landholder. Furthermore, no compensation is made to the land user for the improvements made to the land. In this situation, it is unlikely that sharecroppers would feel that alley farming provided sufficient return to their labor. Exceptions to this general model do exist. For instance, a sharecropper in the village of Sodo may plant trees if the owner agrees, and the proceeds from the harvest or the sale of the trees is divided equally between the landowner and the sharecropper.

A variant of the *abusa* is the *didi-madibi* contract, whereby a landholder will give a parcel of fallow land to another party for the purpose of establishing a plantation (for example, coffee, cocoa, palms). After the trees start to produce, the landholder and the tenant divide the trees by prearranged agreement. The tenant becomes the owner of the trees that form his share. But if the trees die, the tenant does not have the right to replant without first establishing a new contract with the landholder.

**Customary Tree Tenure.** Several rulings in 1963 by the Tribunal Coutoumier d'Appel (customary appellate court) in Lomé interpreted customary law as saying that tree planting is a prerogative of those with primary access rights to the land. The court stated that "the planting of palm trees and coffee trees constitutes in Ewe customary law an act of ownership and can only be exercised by the owner. Temporary land users only have the right to grow food crops or other seasonal crops." Another decision by the same tribunal on 10 October 1963 reiterates that "according to Ewe customary law, the cultivation of palm trees is the sole right of the customary land owner so that an individual who publicly and peacefully harvests palm trees on a parcel of land is assumed to be the customary owner of that parcel." (However, this principle is not absolute, as indicated by another court ruling that affirmed that a third party can plant trees on someone else's land provided that the landholder agrees.)

Another customary appellate court ruled that land used under "pledge" could be utilized only for annual food crops. Pledging is a temporary contract that can expire at any time with the repayment of the pledge price. It allows temporary use of the land without giving the land user any long-term rights to the land pledged. In this form, and in terms of the court's ruling, a pledgee has no opportunity to plant woody species.

The act of planting thus leads to the assumption that one is the owner of the land. Under these terms, to allow a temporary holder such as a pledgee, a borrower, or a renter to plant trees may lead to uncertainty as to the ownership of the trees when the contract ends. A temporary user who succeeds in establishing tree crops without the knowledge of the landholder may eventually be able to assert a claim of ownership. This fact acts to strengthen primary holders' prohibitions against tree planting by tenants.

**Rights and Obligations: Family versus Stranger.** Distinctions between the rights and obligations of land-using members of the family and those of land users who come outside the family will also determine the rights of different individuals to plant trees.

In general, members of the family have use rights to family land. On an individual allotted parcel, the family member may plant any crop and manage it as he sees fit. However, people in some of the research areas are reluctant to plant trees in a family field because they cannot be sure that

they will receive that particular field when the land is eventually divided. Nevertheless, this appeared to be the exception rather than the rule in most areas studied. Normally as long as an individual continues to work a field, he cannot lose it to someone else. An individual may neither sell nor give away the land he is using.

In contrast to family members, people from outside the landholding group ("strangers") have much more restricted rights over the use and management of land. Strangers must conform to the agreement worked out with the landowner. This is particularly true in the case of tree planting. In general, the stranger farmer may plant trees only with the express permission of the landowner. However, he is rarely allowed to plant trees that will tie up the land for a very long time. This would include growing trees for construction wood or beginning palm tree plantations.

**Women's Access to Land.** Typically, women in the research areas do not inherit land, and in the cases where they do, they cannot bequeath that land to their children. Instead, the land and improvements revert to the paternal family. In such cases, brothers and nephews usually benefit the most.

### **Nigeria**

**Customary Tenure in Nigeria.** Ethnic groups in the Nigerian study are associated with administrative regions. The southwest is home to the Yoruba, while the principal group in the southeast is the Ibo. Inheritance in both groups is through patrilineal descent. The Yoruba allocate and manage land predominantly at the household (extended family) level. The Ibo tend to have parcels that are managed by the household as well as parcels that the larger community (sublineage or village) reallocates periodically. Community management controls are more likely to regulate fallow cycles on parcels farthest from the homestead.

The basic landowning unit is the family, which holds land as a corporate entity and has the right to alienate land as a group. Individual members have the right to make fairly independent cultivation and management decisions about their farm parcels. However, individuals may not alienate ownership of the land to others without the permission of other family members. The family head is the oldest male family member, whose role upon death devolves to the eldest son. It is rare for women to assume the role of family head.

Ordinarily, land allocations to family members place few restrictions on the use of that land. However, land allocated to nonfamily members is subject to the terms arranged with the family head (or head chief for community land) before the allocation is granted. Many of these arrangements require that some form of tribute be paid. Persons allocated these secondary rights are of course prohibited from selling or otherwise alienating the land.

Revocation of land use rights rarely occurs but may take place in specific circumstances. First, any alienation (sale, mortgage, or lease) of land without the consent of the family head and the family's principal members is considered void. Some latitude in this principle exists, especially where a lease is concerned. Courts have upheld the revocation of land users' rights when the land user leased the land for a long period of time (for example, thirty years), while leaving intact the rights of land users who have entered lease agreements of six-to-eight years' duration. Second, the failure of nonfamily members to pay tribute (if the terms of allocation so required) can result in revocation of that allocation. Furthermore, should the land be used for purposes outside of the terms of allocation, the grant may also be revoked. Last, nonfamily members may find their allocations revoked if they commit serious crimes or commit adultery with the wives of family members.

Courts tend not to sanction revocation of tenant land rights except in extreme cases of misconduct. People failing to pay rent or tribute usually do not lose their land use rights but may be required to pay the landowner a sum imposed by the court.

Sales of land commenced with the arrival of Europeans in Nigeria. The customary rules that evolved to regulate land sales hinge on securing the consent of the family head and the family's more important members. In the same manner, the family head may not sell family land without the permission of the other principal members. Unauthorized sales are void. Witnesses are considered essential for verbal contracts of sale but not for written contracts.

Rental payments depend on the agreement reached with the landowner but are usually made as a stated weight of crop or its cash equivalent. Unpaid rental payments may be collected (through the courts) for only six years of arrears.

Unmarried women have the right to an allocation of family land even after marriage, but they may not give such land to their husbands nor allow them to farm it without the express permission of their families. A woman is entitled access to enough land from her husband to sustain her and her children.

**Tree Tenure.** Family members on allocated family land are commonly allowed to plant and manage trees. Tenant rights to plant trees are largely contingent on terms agreed with the landholder at the start of the tenancy. In addition, self-sown trees growing on the field before the onset of the tenancy belong to the landowning family or community, while those that grow after the tenant takes possession belong to the tenant. Tenants may not, however, harvest palm trees to make oil, though they may tap them to produce palm wine. If the tenancy agreement included the right to grow tree crops, the trees planted belong to the tenant. Under such accords, the tenant is also allowed to pledge (with the landowner's consent) economic tree crops, the pledge being redeemable at any time by the tenant. In principle, tree planting does not accord ownership rights to the land since it is the consent of the family that transfers ownership rights. However, it is not uncommon for someone to base his claim to a piece of land on the trees he has planted.

**National Land Legislation.** In an effort to end customary tenancy while according permanent use rights to agricultural land users, the government enacted the Land Use Decree (Act) of 1978 (LUD). Land was vested in the state, which would undertake to issue both statutory and customary rights of occupancy. The latter were to be allotted to people or communities occupying land in accordance with current customary law. Rents and tributes to customary owners were to cease, while the state assumed the power to collect rents on the allotted rights of occupancy. Alienation of such rights of occupancy require approval of either the state military governor or the local government, depending on the conditions of alienation.

In practical terms, the provisions of the LUD have not curtailed perpetual tenancy practices based on customary law nor has the state become the "landlord" as envisaged. However, it has become commonplace for tenants to refuse to pay rents based on their interpretation of the LUD. The courts have largely supported customary landowners in their attempts to collect tribute or rent, although the tenants rarely have their use rights revoked. This situation underscores the necessity of negotiating a witnessed agreement for those tenants who might wish to plant alley farms to eliminate any ambiguities about what will belong to whom upon termination of the tenancy.

**Customary Tenure in the Research Zones.** Landownership within the study areas derives from membership in a lineage who are descendants of a common

ancestor, and succession typically passes patrilineally. According to survey respondents in both regions, inheritance is the major means of acquiring landownership, while allocation by the family head remains the principal means of obtaining land use rights. Male offspring inherit their fathers' land while their sisters receive no ownership rights to the land. In the event that all offspring are female, the daughters inherit their fathers' land and may also pass it on to their children subject to the same restrictions. Except for Owu Ile among the southwestern sites, Yoruba communities have no stool or community land since this land has been parcelled out to various families.

This contrasts to the southeast sites where respondents corroborated earlier ILCA findings that land found farthest from the compound is subject to reallocation periodically to enforce the fallowing of fields. Typically land is cultivated for one to two years and then put into fallow for four to five years. In addition, there exists no certainty that a farmer will receive the same piece of land when the rotation comes back around in the sixth year. The respondents all tended to plant only short-term crops on these lands. Fields that are close to the compound, however, tend to be cropped continuously and are not subject to community strictures.

**Rights of "Stranger" Farmers.** The sale of agricultural land occurs in all of the research areas, and membership in a family or community does not appear to play a significant role. According to our respondents, renting is not a common method of obtaining access to land in either region studied. Nevertheless, one form of access closely resembles a nascent form of rental. A farmer will request an allocation of land from a landowning family in return for tribute. This payment is said to be more of a token acknowledging the owner's superior claim to the land than an economic rent. In addition, most of these types of tenants among our respondents tended to be family members and relatives. Many respondents appeared reluctant to admit paying or receiving tribute, perhaps because it is proscribed by the LUD.

Borrowing land is common among those interviewed in both the southeast and the southwest. Both local community members and immigrants may borrow land. Ordinarily borrowers are prohibited from planting economic tree crops in either region, although they are occasionally permitted to plant plantains or bananas since these are seen to be easily destroyed, and therefore do not threaten ownership rights. Among our informants, there is general agreement that alley trees would fall within this same category since they are pruned back frequently, used as an input to agriculture, and could be cut down relatively easily. This indicates a willingness on the part of landowners to allow alley trees to be grown by borrowers and other tenants, but it does not indicate the willingness of tenants to plant on such lands.

Sharecropping was most common in the southwest. Sharecroppers there may establish a plantation in return for an equal division of the trees and use rights over half the land. The use right may be inherited by the sharecropper's children but may be exercised only as long as the original trees live.

### CHAPTER 3:

#### Land Tenure Security

In this chapter, we evaluate the findings of the questionnaire surveys carried out in Cameroon, Togo, and Nigeria for relationships between land tenure security and alley farming adoption. Little alley farming is practiced in Cameroon and Togo. However, other relationships to alley farming adoption, such as those between tenure and planting of nonalley-farming trees and use of such inputs as mulch and fertilizer, were examined in the research. Analysis of these analogous relationships allows us to draw certain inferences about tenure and alley farming adoption.

Alley farming has been practiced on a limited number of farms in Nigeria since 1984, when on-farm trials were first begun in the southwestern and southeastern regions of the country by ILCA and IITA. Survey research in Nigeria has yielded data comparing populations of farmers who currently alley farm, those who once alley farmed but no longer do so, and those who never alley farmed. Thus, the Nigerian research was able to examine how tenure may have been a factor in choices farmers made in participating in alley farming activities initially and in deciding whether or not to continue to maintain alley farms.

In all of the country research programs, we were concerned with examining a few key relationships between tenure and farmer behavior. These are summarized in the following hypotheses, adapted from the working hypotheses set out in the Cameroon and Nigeria research design documents.

1. Alley trees have a production cycle of five to fifteen years. Therefore, the farmers most likely to adopt this technology are those who have long-term access to and control over land, such as those possessing primary access rights to farmland.

2. The corollary to (1) above is that the farmers least likely to adopt alley farming are those who have secondary rather than primary access rights to the land they farm. These include persons who farm land under borrowing, renting, and pledging and/or sharecropping arrangements.

3. There are relationships between land use and land tenure which affect adoption of alley farming. Tenure rules reflect variations among agro-ecological zones in population density, length of fallow, and soil fertility. Tenure rules may also vary among the individual parcels which together constitute the total holdings of an individual farmer in relation to variations in length of fallow, soil fertility, and other management factors. Two subhypotheses are indicated.

- a. Where land is plentiful, tenure rules are informal, strong individual rights are not necessary, and mechanisms for solving disputes are undeveloped. When land becomes scarce, tenure rules develop which assign stronger individual rights and which adjudicate those rights in cases of dispute.

- b. Tenure may vary among the various parcels held by individual farmers due to variations among the parcels in choice of crop, intensity of use, proximity to the residence, soil fertility, and population pressure within the

subzone where the parcels occur. Individual tenure will be stronger on land near residences and on land which is cultivated more or less continuously. Individual tenure will be weaker in areas farmed under long-term forest fallow.

Data which evaluate the above hypotheses are presented in the following sections for each of the three participating countries.

Each country section begins with a summary description of the physical and sociocultural characteristics of the research areas. Research areas were selected to represent distinct zones within each country, permitting the comparison of potential land and tree tenure constraints under different physical and cultural conditions. Ecological zones are divided between forested and forest-savanna transition zones in both Cameroon and Nigeria. Togo's maritime and plateau areas have characteristics of derived savanna and forest-savanna zones, respectively. Nigeria is further partitioned by sub-national regions, the southeast and the southwest, which constitute two markedly different cultural regions.

## **Cameroon**

### **Physical Characteristics**

The research sites are located in and around the towns of Obala and Matomb. Vegetation at Matomb is evergreen, deciduous forest, while Obala is located in a transitional forest-savanna zone, with under 30 percent of the land remaining in evergreen, deciduous forest. The climate of both research sites is characterized by a bimodal rainfall pattern which allows two cropping seasons: March to June, and August to December. The average annual rainfall is 1500 millimeters.

The research areas vary from between 650 and 750 meters in elevation. Soils in both areas have clay contents of 15 to 45 percent, organic matter content of 2 percent or less, and nitrogen levels of 1 percent. Obala soils are very acidic with a pH of 4.5 to 5.5, while Matomb has slightly less acidic soils with a pH of 5 to 6. Over half of the arable land in Matomb has slope gradients surpassing 25 percent, while Obala farmers mostly cultivate land with slopes less than 3 percent. Population density in Matomb is 10 people per square kilometer while Obala has 100 people per square kilometer.

### **Sociocultural Characteristics**

The data sample for Cameroon includes 99 households from the savanna zone and 47 households from the forest zone. Over 90 percent of the household heads in both zones cite agriculture as their primary occupation, and only a fifth is engaged in off-farm work. Heads of household in the savanna tend to be much younger than those in the forest areas. In the latter, 63 percent of household heads are at least 46 years old, while 64 percent of their savanna counterparts are younger than 46 years of age. Fifteen percent of the respondents are women. There was a higher proportion of women respondents in the savanna zone (19 percent) than in the forest (4 percent). Women are ordinarily responsible for the production and sale of food crops such as plantains, groundnuts, cassava, maize, yam, and vegetables, while men manage cash crops such as cocoa, coffee, and oil palm.

Household size in the savanna tends to be larger (24 percent of the households have more than 10 people) than in the forest region, where only 7 percent of households have more than 10 people. The population is fairly stable in both zones: 60 percent of the respondents in Obala and Matomb have resided in their respective areas for at least 20 years. Forest households

possess fewer parcels of land (2 on average) than savanna households (3 on average). Sixty-eight percent of forest households have 2 or fewer parcels, as compared to the 57 percent of savanna households which have 3 or more parcels.

### Land Tenure

Nearly all of the holdings surveyed in Cameroon were farmed by farmers possessing primary access rights (table 3). Only two farmers admitted to farming under a tenancy arrangement; in both cases the land was pledged. The categories of primary access or farmer-owned land identified were: purchased land (8 percent of holdings); gift land (4 percent of holdings); and inherited land--both divided inheritance and undivided inheritance (together accounting for 88 percent of all holdings). The predominance of land held under primary tenures would appear to remove concern for the effects of a large tenant farming sector on alley farming adoption. However, further examination of the data suggests distinctive management practices for divided and undivided inheritance holdings, with potential implications for the adoption of alley farming.

TABLE 3:

### Tenure of Parcels Surveyed in Forest and Savanna Zones, Cameroon

		ZONE By ORIG1		Country Zone Tenure of Parcels			
ORIG1->	Count Row Pct Col Pct	Pur- chase	Divided Inherit	Undivid Inherit	Gift or Exchange	Pledge	Row Total
ZONE	Forest	8	56	34	3	1	102
		7.8 23.5	54.9 24.3	33.3 24.6	2.9 42.9	1.0 50.0	24.8
Savanna	26	174	104	4	1	309	
	8.4 76.5	56.3 75.7	33.7 75.4	1.3 57.1	.3 50.0	75.2	
Column Total	34	230	138	7	2	411	
	8.3	56.0	33.6	1.7	.5	100.0	

Number of missing observations = 7.

**Divided versus Undivided Inheritance.** Over half (56 percent) of all field surveyed at the Cameroon sites were held under divided inheritance. However, a large percentage (33.6 percent) were held under undivided inheritance. In Togo, 26.3 percent of all parcels surveyed were undivided inherited parcels, a slightly larger percentage than parcels farmed held under divided inheritance (25.5 percent). In Nigeria, 33.8 percent of inherited parcels were undivided, compared to 48.6 percent of divided parcels.

In terms of tenure rights, what is the difference between land held under divided and undivided inheritance? Land under undivided tenure is land which is held by a (usually) multigenerational, extended family but which has not been assigned for the exclusive use of a smaller family unit, which would normally constitute the basic farming enterprise. Divided inheritance land, on the other hand, is land which has been allocated for the exclusive use of the family unit. Undivided inheritance land is farmed by members of the extended family, sometimes on a collective basis but more often individually. But its final disposition has not been made for a variety of possible reasons. In Cameroon, some undivided holdings may be too small to yield viable divided units. In other cases, division has not proceeded because of real or potential disputes arising over its division. While family members may farm individual plots within a larger undivided holding, they will not necessarily be given the right to farm the same plot on a year-to-year basis. Thus, farmers plant mainly annual crops and tend not to plant tree crops or engage in intensive farming practices on these holdings. Attempts to plant tree crops may be seen by other family members as an effort to pre-empt inheritance decisions to be taken in the future.

In Togo, an owner may request that his land not be divided upon his death. In the maritime zone, where market transactions in land are occurring with increasing frequency, some family members may fear that divided parcels might be alienated from the family through sale. Sale of undivided parcels, on the other hand, requires the unanimous consent of all family members.

Data presented in table 4 below support the proposition that in the Cameroon research areas, a relationship exists between intensity of use and likelihood that an inherited parcel will be undivided. In this case we use proximity of the field to the residence as a proxy for intensity of use: the closer the field, the more intensive the use. Looking at table 4, we see that in both ecological zones, approximately half of the parcels closest to the house are divided inheritance parcels while about half of the farthest parcels are undivided inheritance.

Another proxy for land use intensity is use of inputs. Likewise, respondents' use of inputs on parcels shows that 15 percent of close and far parcels have inputs applied compared to only 6 percent of very far parcels. Input use also varies by tenure status: 21 percent of bought parcels, 15 percent of divided inheritance parcels, and 9 percent of undivided inheritance parcels have inputs applied. (Inputs used include fertilizer, manure, and green manure.)

Evaluating the relationship between tree planting behavior and tenure, the survey data show that the percentage of parcels on which farmers had planted nonfruit trees is low overall (8.1 percent) but is least for undivided inheritance (4.4 percent) and most for purchased land (14.5 percent). Farmers had planted trees on 7.9 percent of divided inheritance holdings.

If only tenure is taken into account, it appears that purchased parcels provide the most potential for alley farming, followed by divided inheritance parcels. Undivided inheritance parcels provide the least potential for successful alley farming adoption.

**TABLE 4:**  
**Relationship of Parcel Location and Land Tenure, Cameroon**

Distance to Parcel	Forest (N=102)		Forest/Savanna (N=306)	
	Undivided Inheritance	Divided Inheritance	Undivided Inheritance	Divided Inheritance
Close	32.7%	55.8%	34.7%	57.6%
Far	19.4%	77.4%	25.8%	63.4%
Very Far	57.9%	15.8%	48.8%	37.2%
% (N) of Total Fields in Zone	33.3% (34)	54.9% (56)	34.0% (104)	56.5% (173)

Missing Observations = 10.

Inherited parcels that have been divided tend to have been the subject of fewer land conflicts (28 percent of fields) than parcels held as an undivided inheritance (37 percent). Purchased land has an even lower incidence of conflict (17.6 percent). Most disputes are over alignment of parcel boundaries.

We will briefly consider the effect of Cameroon's land laws on tenure from the perspective of farmers. Eighty-three percent of respondents in the transition zone and 91 percent of forest zone respondents have heard of the 1974 Land Law, but their understanding of the law is vague. Forty percent of savanna dwellers correctly identified the law's primary provision that land belongs to the state, compared to 29 percent of forest heads of household. A number of respondents believe that the law means that parcels must be delimited (in the savanna region, 34 percent; in the forest, 21 percent). Despite the flawed understanding of its legal provisions, 75 percent of all farmers had a favorable attitude toward the law. Coupled with information gleaned from the case study phase, this high ranking by farmers probably arises out of the requirement that parcels be surveyed before being registered. Many people would prefer to survey their parcels as a way of limiting encroachment by others, but the high costs and time involved discourage all but the most wealthy and perseverant from doing so.

## Togo

### Physical Characteristics

The research areas are located in the southern third of Togo and include several villages in both the plateau and the maritime regions. The maritime region supports a shrub savanna that includes baobabs and palms. Plateau vegetation at lower altitudes comprises shrub or tree savanna, while higher altitude and rainfall areas include patches of gallery forest.

All of the research sites exhibit a bimodal rain pattern, with the longer rainy season occurring from mid-March to mid-July, followed by an extremely variable short rainy season lasting from September to mid-November. Annual maritime rainfall varies from 900 millimeters on the coast to 1300 millimeters inland. Annual rainfall in the plateau region varies by elevation, with areas lower than 300 meters receiving 1000 millimeters to 1300 millimeters while areas over 300 meters receive 1400 millimeters to 1700 millimeters.

Soils in the low-lying coastal areas tend to be hydromorphic (vertisols), while those of the coastal peneplain immediately inland are ferrolitique. The ferrolitique soils of the plateau are largely infertile and have a uniform profile with little clay content in the surface horizons.

Topographically the land adjacent to the ocean is very flat with an extensive system of lagoons, while the peneplain immediately inland is slightly rolling and bisected by three river systems that serve to divide a system of low plateaus (15 meters) further north. The rolling, hilly plateau region averages 400-600 meters in elevation, though the highest elevation approaches 1000 meters.

### Sociocultural Characteristics

The maritime region is less forested and more populated than the plateau region. The data include 200 households from each region, with women representing only 7 percent of the maritime zone respondents and 3.6 percent of the plateau respondents. Although most respondents list agriculture as their main occupation, twice as many maritime respondents say that they work off-farm (40.2 percent) than do their plateau counterparts (19.9 percent). This almost certainly reflects the close proximity of Lomé, the capital, to all areas along the coast.

The proportion of heads of household who have attended school is 55.3 percent in the maritime region and 67.9 percent in the plateau region. Households tend to be larger in the maritime zone, where 51.2 percent have nine or more members, compared to the plateau region, where 40.3 percent of households have nine or more people. In both cases, there is a fairly extensive family labor pool, a potential advantage for alley farming which, due to frequent and heavy pruning requirements, tends to be labor intensive (Hoekstra, 1987). Many farmers reported belonging to cooperatives, though the incidence is higher in the maritime zone (37.2 percent) than in the plateau region (23 percent). Depending on their resources and needs, these cooperatives may provide a ready-made target group. Indeed, one forty-member cooperative is operating a 1-hectare alley farm in the maritime region primarily to increase soil fertility and provide staking materials.

The Togo respondents had access to 1268 parcels; households in both zones held an average number of 3 parcels. Despite similarities in parcel distribution, data presented in the following section suggest that land tenure patterns differ markedly between the zones.

### Land Tenure

As was noted in chapter 2, despite the enactment of a new land law in 1974, access to land is still predominately governed by customary tenure rules. As illustrated in tables 5 and 6, land may be obtained in a variety of ways: through primary access such as inheritance, purchase, and gift, and through secondary access such as rental, sharecropping, borrowing, and pledging. A high percentage of parcels, 32.4 percent, is farmed under secondary tenure. Of the three countries studied, the Togo research areas have the highest percentage of holdings farmed under secondary tenure. Comparable figures for Cameroon and Nigeria are 1 percent and 12 percent, respectively. The proportion of holdings farmed under secondary access tenure is higher in the maritime zone (37 percent) than in the plateau region (27.6 percent). More formal types of secondary access arrangements, that is, those based on cash payments, are common in the maritime zone. All pledging occurs in the maritime zone as does almost all rental. Conversely, gift, sharecropping, and borrowing occur more frequently in the plateau area.

Conflicts over land are rare (3.9 percent of the parcels), though conflicts were highest on undivided inheritance holdings (7.3 percent), representing 62 percent of all reported conflicts. Conflicts were reported on 3.7 percent of land held under divided inheritance; there were no cases of conflicts recorded for purchased land in either zone.

Seventy-six percent of maritime households state that only sons inherit land. One-third of plateau households say that the son inherits, with another third saying that both son and daughter inherit. In any case, women appear to possess stronger access rights to land in the plateau.

**Tenure and Tree Planting.** Data presented in table 8 indicate that the frequency of tree planting by farmers is considerably lower on land held under secondary tenure than on primary tenure holdings. Farmers had planted trees on 56 percent of land farmed under primary access, while trees had been planted on 25 percent of land farmed under tenancies.

In general, parcels in the plateau region are used to grow a wider variety of trees than those in the maritime area. Additionally, while tenants had planted trees on only 13 percent of maritime parcels, 27.2 percent of the parcels farmed under secondary access arrangements in the plateau region had been planted with trees. This latter figure mostly comprises coffee fields which have been established under sharecropping arrangements, whereby tenants provide labor to establish trees in exchange for a share in future production. Such arrangements could provide precedence for establishment of alley farms on land farmed under secondary access arrangements.

In Togo, land tenure does not appear to be closely related to the distance of parcels from the house. There is significantly less fallow practiced on parcels held under secondary access than on inherited parcels. Respondents rated purchased and secondary access parcels as having the poorest soil fertility while inherited parcels tended to be ranked as having moderate to good fertility.

**Tenure and Use of Inputs.** Table 9 below illustrates some relationships between tenure and use of inputs which may have some implications for adoption of alley farming by tenants. The table shows that use of fertilizer is near the expected value and slightly above the expected value for use of fertilizer and other inputs on parcels farmed under tenancies. These are categories of inputs which have an immediate and relatively short-duration payoff for improved soil fertility. We would expect tenants to prefer fertilizer over techniques such as mulching, which yield improvements to soil fertility over a longer period and often beyond the life of typical tenancy agreements.

TABLE 5:

Tenure of Parcels Held  
under Forms of Primary  
Tenure, by Zone, Togo

	Count Row Pct Col Pct	Maritime	Plateau	Row Total
Purchased	71 59.7 17.6	48 40.3 10.6	119 13.9	
Divided Inheritance	161 51.6 39.9	151 48.4 33.3	312 36.4	
Undivided Inheritance	166 40.8 41.1	241 59.2 53.2	407 47.5	
Gift	6 31.6 1.5	13 68.4 2.9	19 2.2	
Column Total	404 47.1	453 52.9	857 100.0	

Chi-Square = 18.42407    D.F. = 3  
Significance = .0004  
Min E.F. = 8.957  
Cells with E.F. < 5 = None  
Number of Missing Observations = 0

TABLE 6:

Tenure of Parcels Held  
under Forms of Secondary  
Tenure, by Zone, Togo

	Count Row Pct Col Pct	Maritime	Plateau	Row Total
Rental	94 98.9 41.6	1 1.1 .6	95 24.8	
Sharecrop	16 15.2 7.1	89 84.8 56.7	105 27.4	
Pledge	90 100.0 39.8		90 23.5	
Loan	26 28.0 11.5	67 72.0 42.7	93 24.3	
Column Total	226 59.0	157 41.0	383 100.0	

Chi-Square = 245.40388    D.F. = 3  
Significance = .0000  
Min E.F. = 36.893  
Cells with E.F. < 5 = None.  
Number of Missing Observations = 0

TABLE 7: Parcel Tenure Distribution in Each Zone, Togo

Count Row Pct Col Pct	Maritime	Plateau	Row Total	
Purchased	71 59.7 11.2	48 40.3 7.9	119 9.6	
Divided Inheritance	161 51.6 25.5	151 48.4 24.8	312 25.2	
Undivided Inheritance	166 40.8 26.3	241 59.2 39.6	407 32.8	
Secondary Access	234 58.2 37.0	168 41.8 27.6	402 32.4	
Column Total	632 51.0	608 49.0	1240 100.0	

Chi-Square = 28.96869  
D.F. = 3  
Significance = .0000  
Min E.F. = 58.348  
Cells with E.F. < 5 = None  
Missing Observations = 28

TABLE 8: Land Tenure and Tree Planting, Togo

PLT->	Count Row Pct Col Pct	Yes	No	Row Total	
LT2					
Purchased	63 55.8 11.4	50 44.2 7.8	113 9.4		
Divided Inheritance	184 61.3 33.2	116 38.7 18.1	300 25.1		
Undivided Inheritance	208 53.2 37.5	183 46.8 28.5	391 32.7		
Secondary Access	100 25.5 18.0	292 74.5 45.6	392 32.8		
Column Total	555 46.4	641 53.6	1196 100.0		

Chi-Square = 106.9706  
D.F. = 3  
Significance = .0000  
Min E.F. = 52.437  
Cells with E.F. < 5=0.  
Missing Responses=72

In contrast, farmers are most likely to use mulch to improve soil fertility where they hold land under divided inheritance. They are least likely to use mulch alone where they farm under secondary tenure. To the extent that alley cropping produces a mulch, these relationships suggest that it may be more readily adopted as a fertility-enhancing technology by farmers possessing primary access rights, and especially rights over inherited parcels which have been divided.

TABLE 9:

## Relationship of Parcel Tenure Type and Use of Agricultural Inputs, Togo

		LAND TENURE				
	Count Row Pct Col Pct	Purchase	Divided Inheritance	Undivided Inheritance	Secondary Access	Row Total
I	Fertilizer	8	11	52	43	114
		7.0	9.6	45.6	37.7	10.8
N	Manure or Manure & Mulch	2	17	3	12	34
		5.9	50.0	8.8	35.3	3.2
U	Mulch	49	167	159	145	520
		9.4	32.1	30.6	27.9	49.2
U	Fertilizer & Other Input	25	60	111	144	340
		7.4	17.6	32.6	42.4	32.2
S	Other Input	28.1	22.8	33.3	38.8	
E	All Inputs	5	8	8	27	48
		10.4	16.7	16.7	56.3	4.5
D	All Inputs	5.6	3.0	2.4	7.3	
Column Count		89	263	333	371	1056
%		8.4	24.9	31.5	35.1	100.0

Chi Square = 75.94596    D.F. = 12    Significance = .0000  
 Cells with E.F. < 5 = 10%  
 Missing Observations = 212

## Nigeria

### Physical Characteristics

The research sites in Nigeria encompass both the southeastern and southwestern areas of the country. Both regions include forest and transitional forest-savanna ecological zones. The southern part of the southwest (Ayepe group of villages, Ofa-Igbo, and Arikuyeri) is covered by thick deciduous forest, while the northern part (Alebiosu, Aba Oku, Olori, and Emi Abata) is a transitional forest-savanna with more shrub vegetation. In the southeast, Mgbakwu is located in a savanna zone while Okuwe is in the forest zone.

The southwestern transitional zone receives 1700 millimeters of rainfall annually while the forest zone receives 1800 millimeters per year. The rainfall occurs bimodally and thereby supports two cropping seasons. The main food crops grown are cassava, yam, and maize, on a three-to-four-year cropping and three-to-four-year fallowing rotation. In the southeast, rainfall is unimodal. The savanna zone receives 1800 millimeters annually while the forest zone receives 2100 millimeters per year. For lands farthest from the farmstead, the principal crops are cassava, cocoyam, yam, and maize, which are grown on a one-to-two-year cropping to four-to-five-year fallowing rotation. Land closer to the compound is cropped continuously or in alternating years. The more distant parcels produce primarily cassava.

In the southwest, ferruginous tropical soils generally exhibit a sandy surface horizon underlain by a weakly developed, clayey, and mottled subsoil. Although usually considered fertile, current agricultural production practices have degraded the soil. It is easily eroded, and its low water-holding capacity in the savanna areas makes it susceptible to periods of drought, though under forest conditions, occasional water logging occurs due to the underlying clay horizon.

Ferralsolic soils predominate in the southeast and are ordinarily yellow in color and sedimentary in origin. Due to the porous nature of these soils and the high rainfall received in the southeast, they are often extensively leached and highly acidic with a corresponding low base saturation at depth in the profile. The organic matter on the surface under forest vegetation is rapidly depleted within the first two years after clearing due to cultivation and exposure to high temperature and rainfall.

The population densities for the southwestern areas have been estimated to range from between 138 to 404 people per square kilometer, though the villages located in the transitional zone have lower population densities than their forest zone counterparts. Population densities in the southeast vary from 370 people per square kilometer in the savanna zone to 430 people per square kilometer in the forest zone.

### Sociocultural Characteristics

The sample of 240 households included 122 current and former alley farmers. Of these, 79 were practicing alley farmers, representing 32.9 percent of all respondents. There were 43 former alley farmers in the sample, representing 17.9 percent of the total. The balance of the sample consisted of 118 farmers who had never alley farmed, or 49.2 percent of the total. Only 10.8 percent of the heads of household are women, most of whom are widowed or divorced. The sample is almost evenly divided between forest and transitional households, though two-thirds of the sample are Yoruba (southwest) and one-third are Ibo (southeast). Most heads of household listed agriculture as their primary occupation; 32 percent engage in livestock raising or business

as a second occupation. Twenty-one percent of the respondents, mostly younger persons, work off-farm as well.

As a group, practicing alley farmers are older than those who have either abandoned alley farming and or never practiced it at all: 65 percent of practicing alley farmers are over 50 years old, whereas 55 percent of former alley farmers and 75 percent of nonalley farmers are younger than 50.

Two-thirds of savanna landholders have resided in their home area for over 40 years compared to only one-third of forest landholders. Household size is much smaller in the savanna zone than in the forest zone; 90 percent of households in the savanna have five or fewer members, while 47 percent of forest households have six or more members. In addition, farmers who have abandoned alley farming have smaller households (88 percent with five or fewer people) than do either alley farmers or nonalley farmers (67 percent with 5 or fewer people), suggesting that labor availability may be a factor in the adoption of alley farming.

Surveyed households on average held 2.7 parcels. Farmers in the southeastern region on average have more parcels per household (3.6) than southwestern households (2.3). Furthermore, forest farmers have on average more parcels (3.2) than savanna farmers (2.1). However, there appears to be no relationship between alley farming status and the number of parcels held per farmer.

All alley farmers in the sample were participants in ILCA and IITA on-farm research activities or extension programs sponsored by the Nigerian National Livestock Development Project (NLPD). Table 10 below shows the

**TABLE 10: Number of Nigerian Alley and Nonalley Farmers Surveyed, by Location and Sponsoring Organization**

PROJECT	VILLAGE	ALLEY FARMERS			NON-ALLEY FARMERS			TOTAL
		Male	Female	Total	Male	Female	Total	
ILCA	Alebiosu(SW)	11	-	11	7	3	10	21
	Aba Oku(SW)	10	-	10	6	1	7	17
	Olori(SW)	9	1	10	8	2	10	20
	Emi Abata(SW)	6	-	6	8	-	8	14
	Okwe Oboro(SE)	17	2	19	19	2	21	40
	Mgbakwu(SE)	26	2	28	12	3	15	43
SUBTOTAL		79	5	84	60	11	71	155
IITA	Ayepe and its satellite villages(SW)	18	-	18	24	2	26	44
NLPD	Arikuyeri(SW)	12	2	14	6	4	10	24
	Ofa-Igbo(SW)	5	1	6	10	1	11	17
TOTAL		114	8	122	100	18	118	240

number of farmers interviewed in relation to village of residence and contact organization. In assessing the data on alley farmers, it is important to clarify the relationship between farmers and researchers in farm-level decision-making, especially with regard to decisions to retain the technology as part of the farming system. In the case of ILCA-affiliated farmers, all current and former alley farmers in this sample were participants in what were intended to be farmer-managed field trials. In 1985, ILCA provided farmers interested in trying the technology with tree seeds and advice on tree establishment and management. Actual alley tree management was the responsibility of farmers. Two ILCA agents were resident at each site to monitor tree condition, cultural practices, and uses made of trees and to record farmer comments on the system (Francis and Atta-Krah, 1988).

Only at the IITA site in and around Ayepe did researchers maintain a role in the management of the alley farms. Current and former alley farmers sponsored by IITA represent 14 percent of the sample. The NLPD sites were part of an extension effort in alley farming and were farmer-managed farms from the beginning. These comprise about 16 percent of the sample of current and former alley farmers. Thus, the majority of surveyed alley farms were managed by farmers. Decisions to continue alley farming were taken at the discretion of the farmers. Current alley farmers were distinguished from former alley farmers on the basis of their response to the question, "Do you continue to use the field as an alley farm?"

#### Land Tenure

Among holdings surveyed in Nigeria, the great majority (82.4 percent) was farmed by persons who had secured primary access rights through inheritance. Purchased and gift land each constituted an additional 3 percent of holdings. Tables 11 and 12 show the distribution of tenure types by region and agro-ecological zone, respectively. Sixty-four percent of southwestern farmers have divided inheritance land, compared with 56.5 percent of southeastern farmers. In the savanna and forest zones, the rate of inheritance is similar, but gifts of land are more common in the savanna. Land purchases are most common in the forest zone.

For purposes of comparison with primary tenure categories, we have grouped land farmed under rental, pledge, and loan arrangements into a single category of secondary access tenure. The distribution of parcels obtained through secondary access is provided in table 13. Overall these forms of access account for 12 percent of all the parcels in our sample. Loans are by the far the most common form of secondary access.

**Land Tenure and Alley Farming.** Important land tenure relationships distinguish farmers who continue to alley farm from those who quit alley farming. As can be seen in table 14, those who continue to alley farm are more likely to hold inherited land that has been divided (69.2 percent of all holdings). Farmers who quit alley farming possess a comparatively small percentage of divided land (26.4 percent) and a high percentage of undivided inheritance land (60.3 percent).

Table 16 below shows the tenure of parcels which were planted to alley farms by current alley farmers and former alley farmers. The table shows that former alley farmers, by a ratio of four to one, favored undivided inheritance land over divided inheritance land as the location for their alley trees. Current alley farmers show an opposite relationship, planting alley trees on divided land by a ratio of six to one over undivided inherited land.

As is the case in Cameroon (see table 4), divided inheritance land tends to be closer to the household than does undivided inheritance land: 85 percent of divided holdings are within a 30-minute walk of the compound, compared to

**TABLE 11: Land Tenure by Country Zone, Nigeria**

	Count Row Pct Col Pct	SW	SE	Row Total
Purchased	5 26.3 1.4	14 73.7 4.7	19 2.9	
Shared Inheritance	51 23.1 14.4	170 76.9 56.5	221 33.8	
Divided Inheritance	226 71.1 64.0	92 28.9 30.6	318 48.6	
Gift	12 66.7 3.4	6 33.3 2.0	18 2.8	
Secondary Access	59 75.6 16.7	19 24.4 6.3	78 11.9	
Column Total	353 54.0	301 46.0	654 100.0	

Chi-Square=144.09473 D.F.=4  
Significance= .0000 Min E.F.=8.284  
Cells with E.F.< 5 = None  
Missing Cases=1

**TABLE 12: Land Tenure by Vegetation Zone, Nigeria**

	Count Row Pct Col Pct	Forest- Savanna	Forest	Row Total
Purchased	1 5.3 .4	18 94.7 4.4	19 2.9	
Shared Inheritance	87 39.4 35.1	134 60.6 33.0	221 33.8	
Divided Inheritance	116 36.5 46.8	202 63.5 49.8	318 48.6	
Gift	13 72.2 5.2	5 27.8 1.2	18 2.8	
Secondary Access	31 39.7 12.5	47 60.3 11.6	78 11.9	
Column Total	248 37.9	406 62.1	654 100.0	

Chi-Square=18.19201 D.F.=4  
Significance= .0011 Min E.F.=6.826  
Cells with E.F.< 5 = None  
Missing Cases=1

**TABLE 13: Forms of Secondary Access to Land, Nigeria**

	Secondary Access To Land		
	Rent	Pledge	Loan
As % of Secondary Access Parcel	23.1%	5.1%	71.8%
As % of All Parcel	2.8%	0.6%	8.6%

TABLE 14:

Tenure of All Holdings Held,  
by Alley Farmer Status,  
Nigeria

	Count Row Pct Col Pct	Alley Farmer	Non- Alley Farmer	Former Alley Farmer	Row Total
Purchased	6 31.6 2.7	12 63.2 3.9	1 5.3 .8	19 2.9	
Shared Inherit	39 17.6 17.4	109 49.3 35.3	73 33.0 60.3	221 33.8	
Divided Inherit	155 48.7 69.2	131 41.2 42.4	32 10.1 26.4	318 48.6	
Gift	5 27.8 2.2	8 44.4 2.6	5 27.8 4.1	18 2.8	
Secondary Access	19 24.4 8.5	49 62.8 15.9	10 12.8 8.3	78 11.9	
Column Total	224 34.3	309 47.2	121 18.5	654 100.0	

Chi-Square=88.94786 D.F.=8  
Significance=.0000 Min E.F.=3.330  
Cells with E.F.< 5 = 2 of 15 (13.3%)  
Missing Cases=1

TABLE 15:

Tenure of All Holdings  
Still in Use, by Alley  
Farmer Status, Nigeria

	Count Row Pct Col Pct	Still Use Alley Farm		Row Total
		Yes	No	
Purchased	3 100.0 3.6			3 2.3
Shared Inheritance	12 30.0 14.3	28 70.0 57.1		40 30.1
Divided Inheritance	57 79.2 67.9	15 20.8 30.6		72 54.1
Gift	4 66.7 4.8	2 33.3 4.1		6 4.5
Secondary Access	8 66.7 9.5	4 33.3 8.2		12 9.0
Column Total	84 63.2	49 36.8		133 100.0

Chi-Square=28.67530 D.F.=4  
Significance=.0000 Min E.F.=1.105  
Cells with E.F.< 5 = 5 of 10 (50%)  
Missing Cases = 522

TABLE 16:

**Distribution of Tenure Types on  
Parcels Planted as Alley Farms, Nigeria  
(both Current and "Abandoned" Alley Farms)**

	Count Row Pct Col Pct	Alley Farmer	Former Alley Farmer	Row Total	
Purchased	3 100.0 3.4			3 2.3	Chi Square = 49.68225 D.F. = 4 Significance = .0000 Min E.F. = 1.038 Cells with E.F.<5 = 50% Missing Responses = 0
Shared Inheritance	9 22.5 10.3	31 77.5 67.4	40 30.1		
Divided Inheritance	63 87.5 72.4	9 12.5 19.6	72 54.1		
Gift	4 66.7 4.6	2 33.3 4.3	6 4.5		
Secondary Access	8 66.7 9.2	4 33.3 8.7	12 9.0		
Column Total	87 65.4	46 34.6	133 100.0		

65 percent of undivided land. Land under more intensive management and thus requiring higher labor inputs tends to be located closer to the compound, thus reducing time spent in commuting. Half of current and former alley farm parcels are located within 15 minutes of the household compared to 38 percent of nonalley farm parcels. In describing compound farming systems in southeastern Nigeria, Okafor and Fernandes (1987) attribute the higher intensity of cropping found on compound parcels to their proximity to the residence. More distant parcels had a smaller number of crops requiring less frequent visitations. "This minimizes the time spent visiting distant fields" (p. 157).

**Tenure and Tree Planting.** Farmers were more likely to plant trees of all kinds on divided inherited parcels (53.5 percent) than undivided inheritance parcels (38 percent). Even when alley fields are removed from the sample, trees were still planted on more of the divided parcels (48.5 percent) than on the undivided parcels (33.1 percent). However, self-sown trees are more likely to be left on undivided parcels when they are cleared than on divided parcels. Farmers are more likely to plant such commercial tree species such as coffee, cocoa, kola, fruit trees, and oil palm-fruit tree combinations on divided inherited parcels: 72 percent of all such plantings occur on divided

parcels compared to 16.7 percent on undivided parcels. Only oil palm is found predominantly on shared inheritance parcels. It would appear that for purposes of management and ownership security, farmers find divided inherited parcels most suitable for tree planting.

**Tenure and Use of Inputs.** Yet another indication of higher levels of management devoted to divided inherited parcels is the use of inputs. Fertilizer was used on 56 percent of divided parcels compared to 41.6 percent of undivided parcels. There were no inputs applied to 48.4 percent of undivided parcels, while no inputs were applied to only a third of divided inheritance parcels.

Farmers rate the fertility of their divided inherited parcels higher than that of undivided inherited parcels. On a scale of "poor," "moderate," and "good" soil fertility, respondents stated that 60 percent of divided parcels have good soil fertility (38.3 percent were rated as moderate; 1.3 percent, as poor). In comparison, only 30 percent of undivided parcels were rated to have good soil fertility (63 percent were rated as moderate; 55 percent, as poor). While more divided inherited parcels tend to be fallowed than undivided inherited parcels, the latter are fallowed for longer periods of time (27.3 percent for five to six years compared to 7.4 percent of divided inherited parcels). When comparing alley farmers to nonalley farmers, alley farmers fallow parcels for shorter periods of time.

Lastly, over three-quarters of the small number of people who graze their animals on parcels pasture them on divided inheritance parcels, suggesting that this practice is more easily accommodated where it is not necessary to secure the consent of other family members with interests in the holdings, as might be the case with undivided inherited parcels.

### **Concluding Remarks**

In summarizing the findings on land tenure security and alley farming adoption, it would be useful to return to the hypotheses set out at the beginning of this chapter. The first hypothesis states that because alley trees have a long-term production cycle, farmers most likely to adopt alley farming are those who have long-term access to and control over land, such as those possessing primary access rights. Examples of primary access are land secured through inheritance, by purchase, or as a gift. The second hypothesis is a corollary of the first: farmers least likely to adopt alley farming are those who have secondary rather than primary access rights to the land that they farm. These include persons who farm land under borrowing, renting, pledging, and sharecropping arrangements.

The data tend to support both hypotheses but with important caveats. The Cameroon survey detected a very small percentage of holdings farmed under tenancy arrangements, so it was not possible to consider differences in farm management practices between primary and secondary access tenure. However, significant differences exist among primary access holdings in management practices on inherited land which has been divided and undivided. In both the forest and savanna zones, divided parcels tend to be nearer the place of residence, while undivided parcels are the farthest away. Although rates of use of fertilizer, manure, and mulch were generally low, they were higher on divided field than on undivided parcels (and highest on purchased parcels). Farmers were nearly two times more likely to plant trees on divided parcels than on undivided parcels.

These relationships were borne out in the Nigeria study. Farmers were more likely to plant trees and to apply fertilizer to parcels held under

divided inheritance. Divided parcels tend to be located closer to the residence than undivided parcels. Importantly, persons who continue to alley farm were more likely to hold divided parcels than were those who had quit alley farming. Sixty-nine percent of parcels held by active alley farmers were divided compared to 26.4 percent of parcels held by former alley farmers. (Sixty percent of all parcels farmed by former alley farmers were undivided inheritance.) It is useful to think of parcels held under undivided inheritance as holdings with undivided interests in their use and management. As such, they are less likely to provide farmers with the degree of long-term control necessary to merit investment in alley farming.

The most direct test of relationships between primary and secondary access was in Togo, where one-third of all surveyed holdings were farmed under secondary tenure. There, the frequency of tree planting was considerably lower on land farmed under tenancy arrangements. Tenant farmers were more likely to use fertilizer as an input, whereas those farming under primary tenures were more likely to use mulch. Use of fertilizers, with their short-term and relatively immediate returns, is appropriate to the short duration of many forms of tenancy; mulching, and by inference alley farming, is not. However, where longer-term tenancy agreements are contemplated (for instance, for five years or more), it may be possible for both parties to agree at the outset of the tenancy that the tenant may plant alley trees, with the understanding that such tree planting does not challenge the landholder's primary access rights.

Unfortunately, the data collected in the field surveys are inadequate to evaluate all of the questions raised by the third hypothesis. Hypothesis 3(a) states, "Where land is plentiful, tenure rules are informal, strong individual rights are not necessary, and mechanisms for solving disputes are undeveloped." One way of testing this hypothesis is to compare the distribution of land held under divided and undivided inheritance with area population densities, assuming that division of inherited parcels is more likely to occur as land becomes scarcer. In Cameroon, where there are marked differences in population densities between the forest (10 persons/kilometer<sup>2</sup>) and the forest/savanna (100 persons/kilometer<sup>2</sup>) research sites, there is no significant difference in the distribution of divided and undivided inherited parcels (see table 2). Reliable population density figures are not available for the research areas in Nigeria. However, it is believed that population densities are considerably higher in the southeast than the southwest. However, in the southeast, levels of divided inheritance are considerably higher, and divided inheritance, lower than in the southwest, in contradiction to what would be expected.

Hypothesis 3(b) states, "Tenure rules may vary among various parcels held by individual farmers due to variations among the parcels in choice of crop, intensity of use, proximity to the residence, soil fertility, and population pressure within the subzone where the crops occur." Hypothesis 3(b) further states that individual tenure will be stronger on land near residences and on land which is cultivated more or less continuously. Generally speaking, the data support these propositions. In all three countries, tree crops are more likely to be planted on divided than on undivided inheritance parcels. In Togo and Nigeria, trees are least likely to be planted on tenancies. More intensive use of inputs is likewise associated with inherited parcels and with purchased parcels in all countries. Divided parcels are more likely to be found nearer the residence than other tenure types in Cameroon and Nigeria. A clear relationship between tenure type and distance from the residence is not evident from analysis of the Togo data. Reliable data are not available on soil fertility and intrazonal differences in population density, and we are thus unable to evaluate how these variables might relate to tenure of holdings.

**CHAPTER 4:****Tree Tenure Security**

Before investing in alley farming, farmers must be confident that they possess the maximum possible control over the management and use of their alley trees. There are several ways in which farmers may be constrained from exercising needed levels of control over tree use and management. This chapter identifies some possible constraints and, on the basis of research findings, considers the extent to which they are present in the study areas.

What are some ways in which farmers might be constrained from exercising control over their alley trees?

First, customary tenure rules may restrict the range of rights held by landholders to trees on their farms. Restrictions might vary depending upon whether the tree is self-sown or planted or produced as a commercial or non-commercial product. Generally persons with primary access rights to land have a wide range of rights over trees on their farms. But as we have seen, tenant rights to trees may be expressly limited to the point that they are prohibited from planting trees.

Second, women often have severely limited rights to trees and tree products. If they are to benefit from alley farming, they must have assurance that they can make needed tree management decisions with minimum interference from others.

Third, forestry legislation may vest ownership of trees, including trees occurring on individual farms, in the state. To use certain species of trees, farmers may be required to seek authorization from forestry officials. Forest codes in Cameroon and Togo severely limit farmers' rights to trees.

Fourth, members of the community often possess overlying use rights to land for certain purposes and at certain times of the year. A common right of this type is the right to graze livestock on fields after harvest and before the next planting season. Where this is the case, alley farmers may have to bear additional costs in protecting their seedlings and alley trees from browsing livestock.

**Farmer Rights to Trees on Farms**

Customary tenure rules in all three countries generally accord persons possessing primary tenure rights use of the trees on their farms with minimum interference from the community. For instance, 90 percent of survey respondents in Cameroon stated that rights to commercial and noncommercial trees were vested in the landholder. Evaluating the relationship between tree planting behavior and tenure in Cameroon, the survey data show that the percentage of fields on which farmers had planted nonfruit trees is very low overall (8.1 percent) but is least for undivided inheritance (4.4 percent) and most for purchased land (14.5 percent). Farmers had planted trees on 7.9 percent of divided inheritance holdings.

In Togo, tree rights generally follow land rights. Even on undivided family land, the exclusive rights of individuals to trees they have planted are normally recognized by other family members. This is borne out by the data in table 17, which shows higher than expected tree planting on both divided and undivided inheritance.

TABLE 17:

## Distribution of Tree Planting by Parcel Tenure, Togo

Count Row Pct Col Pct	Planted Tree(s) On Parcel		Row Total	
	Yes	No		
Purchased	63	50	113	Chi-Square = 106.9706 D.F. = 3 Significance = .0000
	55.8	44.2	9.4	
	11.4	7.8		
Divided Inheritance	184	116	300	Min E.F. = 52.437 Cells with E.F. < 5=0.
	61.3	38.7	25.1	
	33.2	18.1		
Undivided Inheritance	208	183	391	Missing Responses=72
	53.2	46.8	32.7	
	37.5	28.5		
Secondary Access	100	292	392	
	25.5	74.5	32.8	
	18.0	45.6		
Column Total	555	641	1196	
	46.4	53.6	100.0	

Furthermore, the data show that the frequency of tree planting by farmers is considerably lower on land held under secondary tenure than under primary tenure. Farmers had planted trees on 56 percent of land farmed under primary access, while trees had been planted on 25 percent of land farmed under tenancies.

In general, fields in the plateau region of Togo are used to grow a wider variety of trees than those in the maritime area. Additionally, while tenants had planted trees on only 13 percent of maritime parcels, 27.2 percent of the parcels farmed under secondary access arrangements in the plateau region had been planted with trees. This latter figure is accounted for mostly by coffee fields, which have been established under sharecropping arrangements wherein tenants provide labor to establish trees in exchange for

a share in future production, or for ownership of a proportion of the coffee trees themselves. Such arrangements could provide precedence for establishing alley farms on land farmed under secondary arrangements.

In Nigeria, rights to commercial and noncommercial planted trees and to self-sown trees are generally recognized as belonging to holders of primary access tenure. However, our data demonstrate that farmers are more likely to plant trees of all kinds on divided inherited fields (53.5 percent) than on undivided inheritance fields (38 percent) (see table 18 below). Even when alley fields are removed from the sample, trees were still planted on more of the divided parcels (48.5 percent) than on the undivided parcels (33.1 percent). However, self-sown trees are more likely to be left on undivided fields when they are cleared. Farmers are more likely to plant such commercial tree species as coffee, cocoa, kola, fruit trees, and oil palm-fruit tree combinations on divided inherited fields: 72 percent of all such plantings occur on divided fields compared to 16.7 percent on undivided fields. Only oil palm is found predominantly on shared inheritance fields. It would appear that for purposes of management and ownership security, farmers find divided inherited fields most suitable for planting trees.

TABLE 18:

## Distribution of Tree Planting by Parcel Tenure, Nigeria

PL1→ ACC2	Count Row Pct Col Pct	Yes	No	Row Total	
		1.0	2.0		
Bought	1.00	6 31.6 2.1	13 68.4 3.6	19 2.9	Chi Square = D.F. = 4
Shared Inheritan	2.00	84 38.0 29.1	137 62.0 38.0	221 34.0	Significance = .0000 Min E.F. = 8.003
Divided Inherita	3.00	168 53.5 58.1	146 46.5 40.4	314 48.3	Cells with E.F. < 5 = 0
Gift	4.00	10 55.6 3.5	8 44.4 2.2	18 2.8	Missing Responses = 5
Secondary Access	5.00	21 26.9 7.3	57 73.1 15.8	78 12.0	
Column Total		289 44.5	361 55.5	650 100.0	

Significant limits to tree ownership arise where tenants contemplate planting trees on land owned by others. These limits and their origins were described in chapters 2 and 3. However, findings from our pilot studies and questionnaire surveys suggest that tenants planting alley trees may not be subject to the same limitations applying to many other tree species. In this regard, Fabiyi (1990, p. 16) noted,

Economic (cash) trees cannot be planted by borrowers in either of the research regions. However, borrowers are sometimes permitted to plant plantains or bananas since these economic crops can easily be destroyed if the need arises, and are therefore not seen to convey ownership rights. When the possibility of allowing borrowers or other tenants to plant alley farms was raised, most of the respondents thought that tenants would be permitted to plant alley farms. They reasoned that alley trees could not be used to establish tenurial rights to the land because [they] are pruned frequently, used primarily for non-economic objectives such as soil fertility, and can be easily removed from the fields. This indicates that landowners may permit alley tree planting on their tenants' parcels. However, it is unclear whether tenants believe that they will be allowed to use an alley farm for a sufficient number of years to recoup their labor and time investment.

Similarly in Togo, many respondents to the survey questionnaire believed that tenant planting of mulch-producing alley trees would be more easily accepted by landowners than planting of trees producing commercial products. About 30 percent of respondents felt that alley farming would be readily acceptable to landholders and tenants alike when contracts specifying the rights of both parties were agreed at the start of the tenancy. Such contracts would stipulate that tenants had no rights to trees after the end of the contract term. Respondents in the plateau and maritime regions had different assessments of the appropriate length of tenancies for accommodating alley farming. Most plateau respondents felt that from the point of view of tenants, a viable contract would need to be at least ten years in duration. Most maritime respondents believed three to five years was an adequate term.

Current rental agreements in Togo tend to be of short duration. Of rented parcels surveyed, 89 percent were for one or two years.

In Nigeria, there is a long tradition of landowners according ownership rights to commercial tree species such as cocoa and oil palm to tenants. However, fewer than 5 percent of survey respondents in Nigeria believe that tenant farmers retain ownership rights to noncommercial trees they have planted. Only 1 percent of alley farmers stated that the tenant planter of a noncommercial tree would retain rights to the tree at the termination of the tenancy. These responses suggest that landowners may not see in alley tree planting a basis for subsequent claims by tenants of landownership and as such may bode well for accommodation of alley farming in tenancy arrangements. Concomitantly, however, tenants may conclude that they lack adequate control over trees to merit adoption of alley farming.

### Women's Rights to Trees

Responses to the survey questionnaire in Cameroon underscored the extent to which women have severely attenuated rights over tree planting and management, at least in the eyes of men, who as household heads constituted 90 percent of respondents to the survey. Even where planting occurs on purchased or inherited land, less than 2 percent of respondents believed that women acting alone had the right to plant either commercial or noncommercial trees. For the great majority, planting rights rest solely with men.

Fabiya (1990) drew a useful distinction between women farmers, who farm parcels independently of their husbands, and farming women, who along with their husbands and other family members contribute labor to production on a family parcel or parcels under the overall control of male decisionmakers. Women farmers tend to take all key production decisions themselves. Women farmers as a group consist mainly of widows or women who live apart from their husbands. Of the eight women alley farmers identified in the Nigeria sample survey, seven were widows and one was divorced.

Survey respondents in Nigeria (once again, principally male household heads) accorded few exclusive tree ownership rights to women in their households. Only 9.2 percent of respondents said that women in their households owned trees of commercial value, compared to 74.6 percent of respondents who stated that they themselves owned commercial trees.

The Togo pilot survey found that women are considered to have few exclusive rights over trees on any type of land, but they are often assumed to share rights with men. The sample survey largely supports this notion, though on inherited land, 79 percent of the maritime respondents accord exclusive tree planting rights to men, compared to the 87 percent of plateau respondents who accord such planting rights to both men and women.

### Effects of Forestry Legislation

The potential effects of forestry legislation on adoption of alley farming are a concern especially in Cameroon and Togo, where forest codes are based on a French colonial legacy of strong state interests in tree use and management.

The 1974 Cameroon Forest Code stipulates that farmers must secure a permit before cutting down any self-sown trees. Farmers planting trees on their own land have full rights to those trees. The law further stipulates that tenants who plant trees on land owned by others do not have any rights to those trees after the termination of the tenancy. Only twenty-two survey respondents (15 percent) were aware of the law's requirement that permits be secured before cutting down self-sown species. Generally this aspect of the law is applied to commercial forestry operations and not to the relatively small-scale cuttings of the kind undertaken by villagers. The code grants to villagers rights to collect firewood, prune trees, and collect various tree products without state authorization. The code should not impede adoption of alley farming by farmers possessing primary access rights. In fact, its provision that landowners have rights to trees planted by tenants should provide assurance to owners that tenants will not have the backing of the state in asserting land rights based on tree planting. However, farmers are more generally aware of the concept in Cameroon land law of *mise en valeur*, which uses tree planting as a measure of private investment in land. Such investment could be used as basis for making land claims in cases of dispute. This fact may weigh against efforts to promote alley farming on rented,

sharecropped, borrowed, and pledged land, unless landowners can be assured that tenant planting of alley farming species will not contribute to a claim of *mise en valeur*.

In Togo, one must secure authorization from the forestry service before cutting down any tree, including trees planted on farms. The authorizations are not provided free of charge and are not easy to obtain. Villagers are, however, accorded free rights to collect firewood and to prune trees for household purposes. Almost all survey respondents were aware of these provisions of Togo forestry law. Almost no one believes that a permit is necessary to prune trees, gather firewood, or collect other products from trees. It appears that unless alley trees are left unpruned and reach marketable size, forestry law in fact as well as farmers' perceptions of the law should not impede the introduction of alley farming. A new forestry code is being prepared in Togo. Reportedly it will reorient forestry policy away from strict policing of tree use toward greater emphasis on extension and farmer training. It will grant a wider range of tree rights to farmers.

#### **Overlying Community Rights: The Case of Grazing**

Landholders in all three countries appear able at all times to restrict access by livestock belonging to others to their fields. No conventions allowing livestock owned by others to graze harvested fields operate in the research areas. This could be explained by the high proportion of parcels already planted with tree crops and long-term field crops such as cassava. In such systems there is no regular time, except during multiyear fallow periods, when crops are not present. Thus, rules and conventions are more likely to ascribe stronger rights over livestock access to the farmer than the herder. In Cameroon, 10.4 percent of landholders allow others to graze livestock on their fields and 13.7 percent graze their own livestock on their own fields. Comparable figures are: in Togo, 7 percent permit others to graze livestock and 14.4 percent graze their own livestock; in Nigeria, 4.3 percent permit others to graze livestock and 2.6 percent graze their own livestock.

## CHAPTER 5:

### Tenure Change, Land Use, and Agricultural Management

Tenure is obviously not the only factor affecting alley farming adoption. Adoption will occur in the presence of a number of socioeconomic and agronomic conditions conducive to agricultural intensification. Our research has demonstrated that there are important interrelationships between tenure and intensity of land use and agricultural management. A better understanding of how these factors interact with one another can help with predicting the suitability of alley farming for a given region.

The first section of this chapter describes in general terms the process by which tenure rights become individualized. To an important degree, tenure will be shown to be adaptive to farmer needs for greater control over farmland as land use becomes more intensive: to behave as a more or less dependent variable. But it will also be shown that tenure institutions serve a variety of social and economic purposes not directly related to agricultural management. Even where technical and other conditions support intensification, tenure may exert independent effects which reduce the ability of some farmers, on some land, to intensify management.

In the second section of this chapter, data collected in the questionnaire surveys are presented on measures indicative of fallow management, input use, labor use, and livestock management.

#### How Tenure Changes to Accommodate Agricultural Intensification

Where land use is extensive, for instance, on low-productivity rangelands or in sparsely settled forests, customary tenure may accord several users rights of access to the same general area with little concern given to strict assignment of property rights to a specific parcel. Tenure rules may regulate who has access to the area generally and may coordinate the use patterns of qualified users. Levels of labor input and use of physical inputs per area of land will be low. Individuals will lack a sense of proprietary rights to improvements which would otherwise accrue where inputs were applied. Strong individual rights to a discrete area of land are unnecessary precisely because resources are plentiful. Lineage leaders might enforce village-wide fallowing rules or field rotations (as in "distant" fields in southeast Nigeria) which require farmers to abandon their fields and cultivate an undeveloped parcel or one returned to farming from long-term fallow.

Shortened fallows which result from more continuous cultivation will require more intensive management of holdings through application of higher levels of labor and physical inputs. Intensity of agricultural management will vary with land use and will be subject to a great number of independent constraints such as labor endowment, the nature of available technologies, farmer production objectives, and management skills.

Farmers will intensify use and management of land where their rights permanently to occupy the land in question and reap its harvests are widely recognized in the community. Greater tenure security emerges out of the needs

farmers have for rules which protect their investments as the value of those investments increase and the costs of securing and farming other land increases (Ault and Rutman, 1979; Shipton, 1989).

It is common for farmers to cultivate a number of parcels distributed over an extensive area within the agricultural domain of the village. The extent to which farmers require strong individual rights may vary among the parcels held. Even where there is plentiful land for new cultivation available in the hinterland of the village, labor use and other factors may favor more continuous cultivation on fields nearer to the place of residence, at least for certain kinds of crops.

Alley farming is a technology associated with intensification of land use and with intensification of agricultural and livestock management. It was designed to enhance soil fertility on parcels where, for a variety of reasons, fallow is not of sufficient duration to maintain productivity and desired levels of crop production. As a more or less permanent tree crop, returns to alley tree planting will be realized over a number of years. Alley farming requires relatively intensive management and high levels of labor input. To facilitate easier access to alley farms, farmers would normally choose to plant alley trees on parcels located near their residences.

Our data have shown that farmers take up alley farming or analogous land uses and management practices where they have clear individual rights to land. We have postulated an association between intensive use and management and security of tenure. This relationship is generally borne out by the data. Alley farming in Nigeria and similar practices in Cameroon and Togo were more likely to occur on land held under primary forms of tenure such as bought land, gift land, and inherited land, and especially on inherited land which has been divided among heirs.

#### **Tenure as an Independent Factor in Agricultural Intensification**

It would be incorrect to postulate an unidirectional relationship between land use intensification and tenure change. Land use is not the only variable affecting tenure. Tenure is shaped by a number of other social and economic factors not directly related to agriculture. Because this is the case, tenure can have important independent effects on the nature and extent of intensification in a given region. These effects may be general and may impede intensification throughout a region; alternatively, effects may be limited to land held by certain social groups or to only a portion of the land used by a region's farmers.

We have seen some of these factors at work in the regions studied in this research. For instance, a large percentage of inherited land in all three countries has not been divided and assigned exclusively to individual heirs. The fact that a number of family members share interests to these holdings appears to impede their planting trees and their more intensive management of the land. The land may remain undivided due to a number of factors not directly related to land use. We noted that some family members may resist division of land in the urban periphery of Lomé for fear that those receiving divided parcels will sell them in increasingly active land markets, thus alienating the land permanently from the family legacy. In cases where adult family members have taken up off-farm employment, decisions about division may be delayed until heirs return to agriculture, sometimes at the end of long careers in the cities.

The emergence of tenancies is an important adaptation of the tenure system to growing population pressure. As undeveloped land becomes less available, inheritance becomes the main mechanism by which farmers gain access

to land. In due course, rates of population growth outstrip the ability of inheritance mechanisms to meet the demand for land. Young farmers especially turn to secondary forms of access, such as renting, sharecropping, and borrowing, to meet their land needs. Growing rates of tenancy are themselves a measure of intensification of land use in that greater areas of land are cultivated, with shorter fallows, than ever before. However, tenancy terms, which limit the length of occupation and may prohibit tree planting, will not accommodate intensification of management based on alley farming.

#### **Agricultural and Livestock Management in the Research Zones**

In this section, we present descriptive data on land use and agricultural management from the three research countries. The data are fairly general in character and were not collected in a sufficiently systematic fashion to permit rigorous analyses of relationships between tenure status and intensity of land use and agricultural management. However, the data provide general information relevant to alley farming adoption, including information on fallow management, use of inputs, division of labor and decision-making responsibilities within farming households, and livestock ownership and feeding and management practices. Associations between tenure and fallow management and use of inputs are presented for Togo and Nigeria.

##### **Cameroon**

**Land Management.** Ninety-one percent of the respondents in both the Matomb and the Obala research zones believe that crop yields are declining on their holdings. Farmers rated 80 percent of their fields as having "poor" soil fertility; 11 percent, "moderate" fertility; and 9 percent, "good" fertility. Fields considered to have poor soils tend to be located closer to residences than moderately fertile fields, which in turn are closer than the most fertile fields.

Despite the generally poor assessment of soil fertility, fertility-enhancing inputs were applied to only 14 percent of fields in the sample. Of the fifty-five fields where inputs were used, 34.5 percent were fertilized, 21.8 percent were manured, 1.8 percent were mulched, and 41.8 percent were treated with some combination of these inputs. Considered on a household basis, seven savanna households (7 percent of the total) use inputs compared to twenty-four forest zone households (51 percent of the total). Forest zone households apply inputs to a minority of their fields. The low rate of input use in general, and mulch in particular, indicates that alley farming, which produces a mulch, may not be readily taken up as a solution to widely perceived soil fertility problems.

The length of fallow periods on the two major land tenure types indicates that land management remains more extensive on shared inheritance parcels than on divided inheritance parcels. Almost a quarter of shared inheritance parcels are fallowed for six years or longer compared to only 5 percent of divided inheritance parcels.

**Household Decision-Making.** Men are the principal household decision-makers for most key land management decisions, though table 19 below suggests that women acting alone or in concert with their husbands are involved in agricultural decision-making in a large percentage of households. Women are most likely to be have a say in deciding which crops to plant on specific fields. One-third of savanna farmers say that only women decide which crops are to be planted in their household, while one-third claim that women and men share this decision. In the forest, one-quarter of respondents said only

women decide which crops to plant; half said that men and women shared such decisions. Inasmuch as women have a strong say in what is planted in fields, preferences and priorities of women must be taken into account in extending alley farming as a technology. The agronomic role of alley trees especially needs to be given priority, since women in Cameroon have greatly attenuated rights to trees.

TABLE 19

## Agricultural Decision-Making and Gender, Cameroon

Decision Taken		Men Only	Women Only	Shared	% of Pop. (N)
Crops to Plant	Savanna	33.7% (32)	35.8% (34)	30.5% (29)	67.9% (96)
	Forest	24.4% (11)	24.4% (11)	51.1% (23)	32.1% (45)
Field to Plant	Savanna	51.0% (49)	21.9% (21)	27.1% (26)	67.6% (96)
	Forest	54.3% (25)	17.4% ( 8)	28.3% (13)	32.4% (46)
Field to Fallow	Savanna	52.6% (50)	22.1% (21)	25.3% (24)	67.4% (95)
	Forest	56.5% (26)	15.2% ( 7)	28.3% (13)	32.6% (46)
Fallow Length	Savanna	54.7% (52)	21.1% (20)	24.2% (23)	67.4% (95)
	Forest	54.3% (25)	15.2% ( 7)	30.4% (14)	32.6% (46)

**Animal Management.** Less than half the surveyed households own sheep, goats, or pigs (table 20). The percentage of households owning goats is considerably higher in the forest zone (43 percent) than the savanna zone (13 percent). The low rates of animal ownership may help explain the generally negative response of the pilot survey respondents toward adopting alley farming for animal feeding. Both goats and pigs tend to be owned by heads of household between the ages of 36 and 45, while sheep are more evenly distributed among the age groups.

Of households which own livestock, the three most commonly used feed sources are pasture (85.3 percent), household garbage (82.2 percent), and crop residues (56.3 percent). Twenty-eight percent of livestock owners fed cut-and-carry leaves. There are no data on the relative contribution of each food source to overall feed supply. Use of leaves *in situ*, household garbage, and crop residues varies significantly among zones.

TABLE 20:

## Household Animal Ownership and Feeding Patterns, Cameroon

		Both Zones	Transition	Forest	Men	Women
% HEADS OF HOUSEHOLDS OWNING:	Sheep	11.3% (16)	10.4% (10)	13.0% ( 6)	9% (11)	29% ( 6)
	Goats	33.1% (47)	42.7% (41)	13.0% ( 6)	27% (33)	71% (15)
	Pigs	12.0% (17)	14.6% (14)	6.5% ( 3)	3% ( 4)	14% ( 3)
% OF ANIMAL OWNERS USING:	Leaves in Situ	18.0% (11)	14.3% ( 7)	33.3% ( 4)		
	Cut/Carry Leaves	28.8% (17)	29.2% (14)	27.3% ( 3)		
	HH Garbage	82.2% (60)	75.9% (41)	100.0% (19)		
	Crop Residue	56.3% (40)	50.0% (26)	73.7% (14)		
	Pasture	85.3% (58)	86.3% (44)	82.4% (14)		

**Animal Care.** Survey households either share animal care tasks as a collective unit or assign individual household members responsibility for animal care. Animal care in the savanna zone is much more individualized than in the forest. In the forest, 55 percent of households collectively care for sheep and 75 percent share care of goats. Sheep are cared for on a collective basis in 26 percent and goats in 46.5 percent of the savanna households.

Despite the fact that over two-thirds of animal owners claim that they tether their livestock, 65 percent of savanna households and 22 percent of forest households complain that animals damage their crops. This large difference between zones may reflect the fact that only 42 percent of savanna animal owners fence in some of their livestock compared to 59 percent of forest animal owners. According to 71 percent of the respondents, it is neighbors' animals that cause crop damage. Nevertheless, only 6.3 percent of the respondents fence fields to keep animals out. Limiting initial alley farming extension efforts to farmers who enclose animals (or tether them) and use leaves as feed may be advisable, since these farmers already have in place key components of a cut-and-carry feeding regime.

### Togo

**Land Management.** About three-quarters of respondents believe crop productivity is declining. Explanations for declining productivity center around a combination of poor soils and unreliable rainfall (in the maritime zone, 73.3 percent of respondents; on the plateau, 58.9 percent). Unreliable rainfall is cited as a single explanatory factor by 18.7 percent of maritime

tended to have different assessments of the fertility of their soils, with maritime farmers as a group ascribing poorer fertility to their soils than plateau farmers. Maritime respondents rated 40 percent of their fields as having "poor" fertility and 44 percent as having "moderate." In comparison, 45.5 percent of fields on the plateau were rated as having "moderate" fertility and 48.5 percent as having "good."

In both regions, assessments of soil fertility improve significantly with increasing length of fallow. The use of fallow and fallow length differ markedly between the two areas. Data presented in table 21 show that only 28 percent of maritime fields are fallowed compared to 63 percent of plateau fields. Although there is a tendency for shared inheritance parcels to be fallowed longer than divided inheritance fields, the relationship is less strong than was the case in Cameroon.

TABLE 21:

## Fallow Characteristics, Togo

Zone	% Fields Fallowed	Fallow Length		
		1-2 Yrs	3-5 Yrs	Over 6 Yrs
Maritime	27.9%	35.7%	53.2%	11.1%
Plateau	63.2%	27.2%	64.9%	7.9%

TABLE 22:

## Distribution of Inputs Used on Parcels, Togo

Count Row Pct Col Pct	Fertil- izer	Manure/ Manure & Mulch	Mulch	Fert. & Other	All Inputs	Row Total
Maritime	72 13.0 62.1	31 5.6 91.2	217 39.2 40.3	190 34.4 55.9	43 7.8 87.8	553 51.3
Plateau	44 8.4 37.9	3 .6 8.8	321 61.3 59.7	150 28.6 44.1	6 1.1 12.2	524 48.7
Column Total	116 10.8	34 3.2	538 50.0	340 31.6	49 4.5	1077 100.0

Chi-Square = 81.84465 D.F. = 4 Significance = .0000  
 Min E.F. = 16.542 Cells with E.F. < 5 = 0 Missing Observations = 191

Maritime farmers as a group tend to use a greater variety of inputs than plateau farmers (table 22). Interestingly, mulch (*fumier vegetaux*) is the only input more often employed on the plateau (by 59.7 percent of respondents) than in the maritime zone (40.3 percent). This may be explained in part by the higher natural vegetative cover on the plateau. Unlike in the Nigeria and Cameroon research areas, input use is common among farmers in Togo. Inputs of some kind were applied on 85 percent of plateau fields and 88 percent of maritime fields.

**Animal Management.** Seventy-one percent of male-headed households and 57 percent of female-headed households own livestock. Table 23 below presents data on percentages of households owning at least one head of various types of stock. (Data on numbers of livestock owned were not solicited due to the reluctance of respondents to give such information. However, holdings are known to be small.) Over two-thirds of the households own goats; about 40 percent own sheep. Despite the high rate of livestock ownership, little interest was expressed by informants to the pilot study in supplemental feeding for animals. This lack of interest may reflect the low numbers of animals per household, relegating livestock production to a minor economic role. The percentages of female household heads owning livestock closely mirror those for men, with the exception of cattle.

TABLE 23:

## Animal Ownership, Togo

		% of Heads of Households			% of Livestock Owners	
		Both Zones	Maritime	Plateau	Men	Women
OWN:	Cows	7.4% ( 21)	4.9% ( 7)	10.0% (14)	7.5% ( 20)	0% ( 0)
	Sheep	40.5% (115)	39.6% ( 57)	41.4% (58)	40.3% (108)	41.7% ( 5)
	Goats	69.4% (197)	73.6% (106)	65.0% (91)	68.7% (184)	75.0% ( 9)
	Pigs	16.5% ( 47)	24.3% ( 35)	8.6% (12)	16.0% ( 43)	25.0% ( 3)

As can be seen in table 24 below, leaves are an important component of livestock feeding regimes. The proportion of people indicating that the supply of leaves is decreasing is much higher in the maritime zone (38.2 percent) than on the plateau (12.9 percent). Overall, higher numbers of maritime households believe that feed sources are decreasing than do their counterparts in the plateau region.

TABLE 24:

## Feeding Regime and Feed Availability, Togo

FEED SOURCE	% Heads of Households		% of Livestock Owners Who Say Feed Less Available	
	Maritime	Plateau	Maritime	Plateau
Cut/Carry leaves	87.5% (126)	65.7% ( 92)	38.2% (55)	12.9% (18)
HH Garbage	91.0% (131)	72.9% (102)	43.8% (63)	28.6% (40)
Crop Residue	80.6% (116)	76.4% (107)	38.2% (55)	28.6% (40)
Pasture	34.0% ( 49)	46.4% ( 65)	18.1% (26)	14.3% (20)

**Animal Care.** Animal care in both regions is a task shared by men and women in 85 percent of households, with little task differentiation. Animal ownership is correlated with larger household sizes in the plateau.

Even though most respondents say that they tether their animals during the cropping season, 46.5 percent of respondents complain of animal damage to crops. Livestock are allowed to graze on about 20 percent of maritime fields compared to only 8.1 percent of plateau fields. Grazing in both areas tends to take place on fields closest to the residence. Landholders allow animals belonging to others to graze in only 9 percent of maritime fields and 5 percent of plateau fields.

### Nigeria

**Land Management.** Respondents' beliefs about the state of their resource base vary by zone and region (table 25). Overall, only 2.6 percent of the fields in the sample were classified by landholders as "poor." About 49 percent of fields were rated as having "moderate" soils; 47.5 percent of soils were rated "good." Nonetheless, 55 percent of the respondents state that crop yields are declining. This assessment is held by a lower percentage of current alley farmers (53 percent) than nonalley farmers (59 percent). Only 44 percent of former alley farmers believed that yields were declining on their fields. However, three-quarters of the savanna households stated that yields were declining, which was twice the rate for forest households.

The use of inputs (fertilizer, manure, and/or mulch) varies by alley farming status (table 26). Alley farmers are more likely to use inputs than either nonalley farmers or former alley farmers. This effect is not entirely due to the mulch applied to the soil on an alley farm, since only 26 percent of the current alley farms use mulch. Inputs of some kind are applied to a higher percentage of fields in the forest (72 percent) than the savanna (50 percent) and a higher percentage of fields in the southwest (72 percent) than the southeast (43 percent).

TABLE 25:

**Land Management Indices, Nigeria**  
(as % of fields unless indicated otherwise)

Management Practice	ZONE		REGION		Alley Farmer	Non-Alley Farmer	Former Alley Farmer	
	Savanna	Forest	SW	SE				
Decreasing yield (as % of HH)	75%	36%	64%	37%	53%	59%	44%	
Use Inputs	50%	72%	72%	43%	70%	53%	51%	
Fields Fallowed	96%	76%	82%	86%	79%	84%	86%	
Decreased Fallow	74%	90%	91%	74%	93%	81%	67%	
SOIL	Good	47%	48%	71%	20%	69%	38%	32%
	Moderate	51%	48%	28%	75%	30%	58%	64%

Regardless of zone or region, alley farmers consistently judge the fertility of their fields to be better than do either former or nonalley farmers (table 25). Overall, 69 percent of fields held by alley farmers were rated as "good." Alley farmers tend to fallow fewer fields than other groups. The fields they do fallow tend to be undergoing shorter fallows than in the past. (These two differences are significant for each zone and region, except for the southwest.) It is difficult to separate the cause and effect between soil fertility and fallowing, but given the poorer soil quality on nonalley farmers' land, it is possible that alley farming is allowing more continuous cropping while maintaining soil fertility.

While 27 percent of shared inheritance parcels are fallowed for periods of five years or longer, only 7 percent of divided inheritance parcels fall into this category, suggesting that shared inheritance parcels in Togo are less intensively managed.

The data in table 26 below show that the fields of practicing alley farmers are significantly closer to their homes than are those of nonalley farmers. However, former alley farmers' fields tend to be closer than those of practicing alley farmers.

**Labor Use.** Data presented in table 27 indicate that women and female children are involved predominantly in cultivation and postharvest processing work. Male children tend to perform the widest variety of tasks, regardless of zone or region. It is only when we consider heads of household that we see variations among regions. The head of household in the southwest primarily clears land and performs cultivation work, while his counterpart in the southeast tends to perform a combination of all agricultural tasks. In the savanna, heads of household also tend to do a wider variety of work than the forest heads of household. Heads of household who are alley farmers tend to restrict themselves more to clearing and/or cultivation than former and

TABLE 26

Percent of Fields within 15 Minutes of the House, Nigeria

	SW	SE	Savanna	Forest
Alley Farmer	51%	40%	63%	41%
Non-Alley Farmer	36%	33%	38%	33%
Former Alley Farmer	62%	56%	73%	33%

TABLE 27:

Differentiation of Agricultural Tasks among Household Members, Nigeria, by Ecological Zone

Agricultural Task	Head of HH		Spouse		Son		Daughter	
	Forest N=124	Forest/ Savanna N=115	Forest N=101	Forest/ Savanna N=105	Forest N=95	Forest/ Savanna N=60	Forest N=91	Forest/ Savanna N=52
Clearing or Processing	3.2	2.6	1.0	3.8	2.1	3.3	6.6	7.7
Cultivation	8.1	7.0	23.8	8.6	7.4	3.3	18.7	11.5
Clearing & Cultivation	60.5	48.7	0	0	47.4	30.0	4.4	3.8
Cultivation & Processing	12.1	3.5	65.3	85.7	24.2	26.7	57.1	73.1
Clearing, Cultivation, & Processing	16.1	38.3	9.9	1.9	18.9	33.3	13.2	3.8

nonalley farming heads of household. The latter farmers are more likely to perform a combination of tasks.

**Alley Farmers.** Alley farmers tend to be older (65 percent are over 50 years of age) than former alley farmers (74 percent are under 50 years of age) and nonalley farmers (55 percent are less than 50 years of age). Seventy percent of alley farmers have practiced alley farming on currently planted fields for two to four years, and 27 percent started alley farming between five and seven years ago.

Table 28 presents responses offered by current alley farmers to the question, "Why did you decide to start alley farming?" Three-quarters of the savanna alley farmers cite fodder production as compared to 27 percent of the forest alley farmers. Compared to 7.4 percent of the savanna farmers, 39 percent of the forest farmers cited improved crop production as their reason for taking up alley farming. Fodder production is cited far more frequently in the southwest than the in southeast (though the number of active alley farmers in the southeast is small). Fourteen percent of the alley farmers stated that they alley farm because they were "told to," apparently a reference to the fact that tree planting was originally done with the encouragement of IITA or ILCA staff.

TABLE 28:

**Reasons Given by Practicing Alley Farmers  
for Starting Alley Farming, Nigeria  
(% of heads of household who currently alley farm)**

Reason for Starting Alley Farm	Ecological Zone		REGION	
	Forest/ Savanna	Forest	Southwest	Southeast
Fodder	74.1 (20)	27.3 (12)	49.2 (31)	12.5 (1)
Crop Production	7.4 (2)	38.6 (17)	23.8 (15)	50.0 (4)
Fodder & Crop Production	7.4 (2)	13.6 (6)	11.1 (7)	12.5 (1)
Told To	11.1 (3)	15.9 (7)	12.7 (8)	25.0 (2)
Other		4.5 (2)	3.2 (2)	
<b>TOTALS</b>	100.0 (63)	99.9 (44)	100.0 (63)	100.0 (8)

Current alley farmers control 34 percent of the fields in the sample (224 fields). On average, alley farmers possess 2.8 fields, which is only slightly higher than average holdings for former alley farmers (2.7) and nonalley farmers (2.6).

**Animal Management.** Table 29 below indicates that a significantly higher proportion of households in the savanna zone owns goats than households in the forested areas. This is consistent with data presented in table 28 above, which indicated that a high percentage of current alley farmers in the savanna cited fodder production as their principal reason for starting alley farming. Significantly more current and former alley farmers own sheep and goats than nonalley farmers, indicating that smallstock owners were initially attracted to alley farming at least in part to provide supplemental feed. There are no cattle owners among survey respondents, and only one household owned pigs.

TABLE 29:

## Livestock Management Indices, Nigeria

		ZONE		REGION		Alley Farmer	Non-Alley Farmer	Former Alley Farmer
		Savanna	Forest	SW	SE			
% OF HEADS OF HOUSEHOLDS OWNING:	Sheep	72%	38%	57%	51%	63%	44%	67%
	Goats	91%	68%	30%	77%	86%	70%	91%
% OF ANIMAL OWNERS	TETHER YEAR ROUND							
	Sheep	39%	48%	23%	83%	24%	37%	83%
	Goats	35%	33%	17%	69%	21%	27%	74%
	FEED: Leaves	91%	70%	82%	77%	91%	70%	88%
	Crop Residue	86%	70%	80%	74%	70%	70%	86%
	HH Garbage	17%	69%	27%	27%	27%	25%	30%

It appears that former alley farmers manage livestock more intensively than farmers in the two other survey categories. Nearly three-quarters of former alley farmers tether their goats compared to 21 percent of practicing alley farmers and 27 percent of nonalley farmers. Cut-and-carry feeding is practiced by 63 percent of former alley farmers compared to 14 percent of current alley farmers and 19 percent of nonalley farmers. Seventy-four percent of former alley farmers stated that they confine their livestock in the daytime compared to 32 percent of current alley farmers and 27 percent of nonalley farmers.

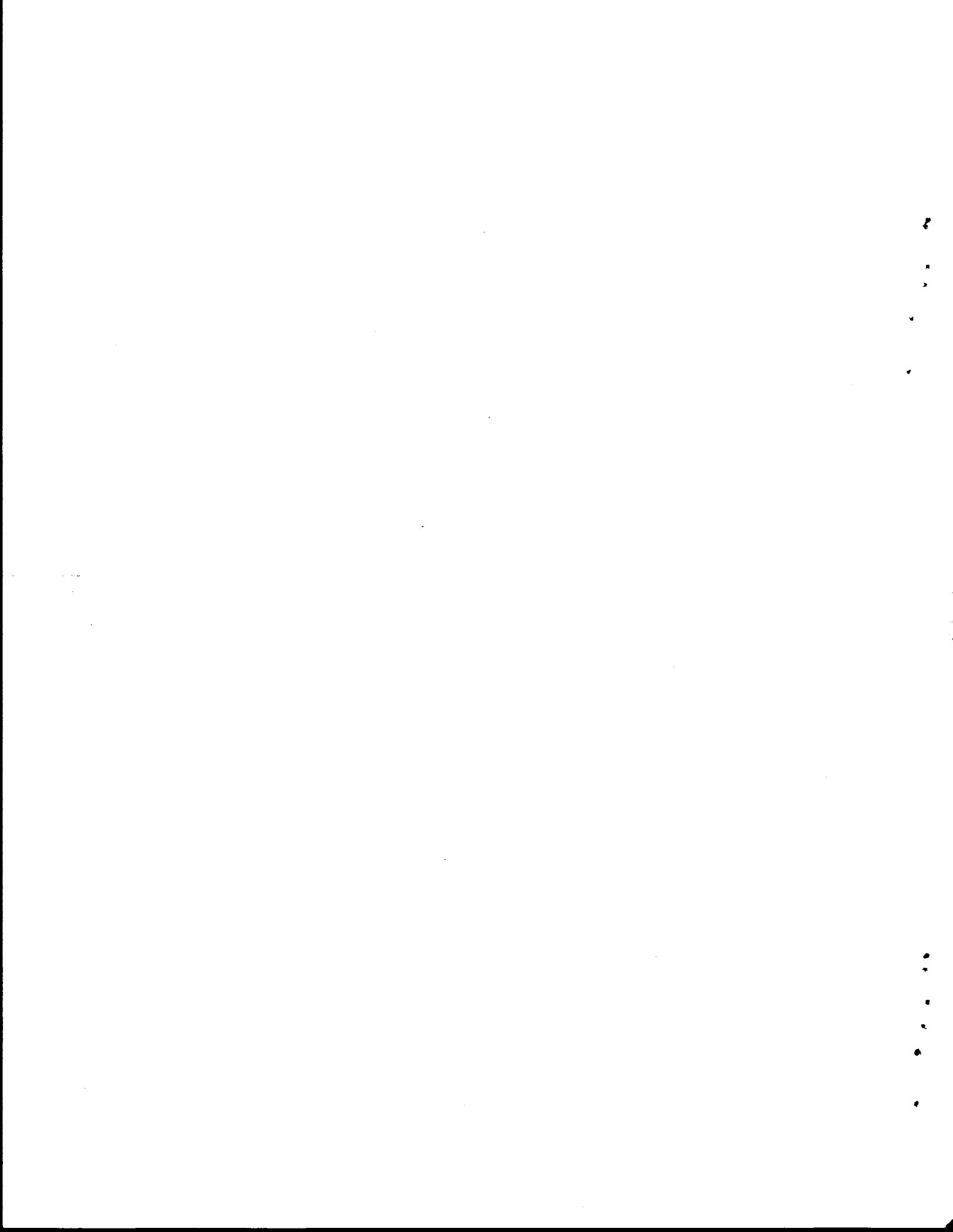
As can be seen in table 29, households in the southeast are more likely to tether their animals and to practice cut-and-carry feeding than are

southwestern farmers. Crop damage caused by livestock was reported to occur by 40 percent of savanna households compared to 10 percent of forest households. Crop damage was reported to occur by 45 percent of households in the southeast region compared to 14 percent of households in the southwest. This may explain why animal confinement is more common in the southeast.

Not surprisingly, leaves are cited as a source of livestock feed by a high percentage of alley farming households (91 percent). Crop residues are used by a higher percentage of former alley farmers than by either current or nonalley farmers. Fewer than 10 percent of any group in our sample feels that feed sources are appreciably declining. Pasturing animals on alley farms is practiced by about a quarter of savanna and southwestern alley farmers and by 15 percent of forest alley farmers. No southeastern alley farmers permit grazing on their alley farms.

Two-thirds of the alley farmers who use their farms to produce fodder stated that they prune their trees weekly. Those alley farmers who cite improving crop production as their principal reason for taking up alley farming say they prune less often; 62 percent prune monthly; and 29 percent say they prune their trees every six weeks.

**Animal Care.** Close to two-thirds of the households in both zones and the southwestern region use all family members to care for sheep and goats. The rate is slightly lower (53 percent) in the southeastern region. Significantly more alley farming households (75 percent) use all family members to provide animal care than do either former or nonalley farming households (58 percent). This may indicate that alley farming is more compatible with families who share tasks associated with livestock care.



**CHAPTER 6:****Conclusions: Tenure as a Factor in Adoption of Alley Farming**

This study has examined how land and tree tenure arrangements present in research areas in three countries in the West African humid zone--Cameroon, Togo, and Nigeria--affect adoption of alley farming. Currently little alley farming is practiced in the region: only in southern Nigeria has it been promoted in a systematic fashion, and there only in limited areas and mainly in the context of on-farm research activities. Nonetheless, the limited on-farm experience in Nigeria provided useful data for assessing more or less directly relationships between tenure and alley farming adoption. Because of the general absence of alley farming in Cameroon and Togo, research in those countries focused on an assessment of relationships between tenure and various land use and agricultural management practices thought to be conducive to alley farming adoption. Among these were tree planting practices, fallow management practices, and use of soil-improving inputs.

The data analyses revealed clear and consistent relationships between tenure and the various measures of land use and agricultural management examined in all three countries and between tenure and alley farming adoption in Nigeria. In Nigeria, alley farms were most likely to be established on land held under primary forms of land tenure, such as purchased land, inherited land, and gift land. Likewise in Cameroon and Togo, farmers were much more likely to plant trees on land held under primary forms of tenure than secondary tenure.

Inherited land is the most common form of tenure in all three countries, accounting for 88 percent of all holdings surveyed in Cameroon, 58 percent in Togo, and 82 percent in Nigeria. The data analyses revealed significant differences in land use and agricultural management practices on inherited parcels which had been divided and assigned to individual family members and parcels which remained undivided. In all three countries, landholders were more likely to plant trees and use inputs such as fertilizer and mulch on divided parcels. Divided parcels tended to be located nearer to residences than undivided parcels in Cameroon and Nigeria, while no clear pattern was evident in Togo.

Secondary tenure, in which farmers rented, sharecropped, or borrowed land, was most common in Togo, where it represented 33 percent of all surveyed parcels. Twelve percent of surveyed parcels in Nigeria were farmed under secondary tenure. Secondary tenure was insignificant in Cameroon. In Togo, the frequency of tree planting on secondary tenure was significantly lower than on primary tenure. Tenant farmers preferred to use fertilizer over inputs which yielded returns over the longer term such as mulch. Nearly 90 percent of tenancies in Togo were for terms of two years or less. Such short-term production horizons mitigate against tree planting by tenants.

In all three countries, the implications of tenant tree planting to the rights of primary landholders remain ambiguous. Customary tenure generally regards tree planting as a prerogative of landownership. As such, successful establishment of trees by tenants can be interpreted as an assertion by tenants of primary rights. However, it is the view of our affiliate researchers in Togo and Nigeria that formal agreements entered into at the

commencement of tenancies can sanction tenant tree planting in ways that do not disturb the rights of landowners.

We generally agree with this conclusion but would caution that tenants operate under a variety of other constraints that mitigate against intensification of land use and agricultural management in ways supportive of alley farming adoption. Even where formal agreements stipulate that tenant tree planting does not compromise the rights of landowners, landowners may be reluctant to forgo occupation rights to tenants for the long-term periods necessary for tenants to recoup their investments in alley farming. Tenants themselves may hold some land under primary tenure and, given the choice, would likely prefer to plant alley trees on those holdings. In time tenants, who tend to be younger, may accumulate holdings under primary tenure through inheritance or purchase. They may thus forgo taking up alley cropping until they have secured their own land. For these reasons, and in light of the generally less intensive management of land held under tenancies, it is our view that tenancies do not hold great promise for alley farming.

The pilot and questionnaire surveys confirmed that adult married women do not possess primary rights to land and trees. In Cameroon, survey data indicated that wives had no right to plant either commercial or noncommercial trees without the consent of their husbands. All of the female alley farmers in the Nigerian sample were either widowed or divorced. Thus, it would appear that only women living independently of spouses have clear tree planting rights. A large percentage of survey respondents in the plateau region of Togo stated that men and women shared rights to trees planted on inherited land, but no respondents accorded women independent rights. Despite the generally attenuated rights of women to land and trees, women undoubtedly directly and indirectly influence tree planting and management practices. Unfortunately, the questionnaire surveys did not collect the kinds of data needed fully to assess relationships between land and tree rights of women and tree use and management practices. These data are best collected and analyzed in the context of farm-management or farming-systems research activities. However, attempts to target women as alley farming beneficiaries should take account of the limited nature of their rights to plant and manage trees.

In conclusion, farmers in our research areas in Cameroon, Togo, and Nigeria are least likely to face tenure-related constraints to adoption of alley farming where they have primary access rights to the land which they farm in the form of inherited land which has been divided or land secured through purchase or gift. These categories constitute a large percentage of parcels sampled in the three countries: in Cameroon, 66 percent; in Togo, 50.3 percent; and in Nigeria, 56.1 percent.

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