TENURE AND ALLEY FARMING IN THE HUMID ZONE OF WEST AFRICA

TENURE AND ALLEY FARMING:

A Literature Review,
with Particular Reference to
the West African Humid Zone

by

Douglas M. Stienbarger

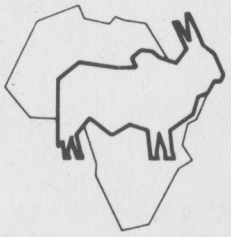
A Collaborative Research Program Between

LAND TENURE CENTER
University of Wisconsin-Madison

and

INTERNATIONAL LIVESTOCK CENTRE FOR AFRICA
Ibadan, Nigeria

LTC



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PREFACE

In June 1989, the International Livestock Centre for Africa (ILCA) and the Land Tenure Center (LTC) entered into an agreement by which the LTC would undertake research on the implications of land and tree tenure for the introduction of alley farming in three countries in the humid zone of West Africa. The agreement provided that LTC carry out the research in collaboration with national research institutions in each of the countries selected. Since concluding the agreement with ILCA, the Land Tenure Center has begun collaborative research programs in Cameroon, Nigeria, and Togo. Our affiliate in Cameroon is the Institut de la Recherche Agronomique, Yaoundé, Dr. Jean Tonye, Principal Investigator; in Nigeria, a team led by Dr. Yakub L. Fabiyi, Professor of Agricultural Economics at Obafemi Awolowo University in Ile-Ife; and in Togo, a team led by Dr. Messanvi Foli, Professor of Law at the Université du Benin, in Lome.

An initial activity of the research program was to carry out a review of relevant literature on tenure and alley farming, and particularly on land and tree tenure systems in the humid zone of West Africa. Douglas Stienbarger prepared this review in Madison before taking up his position as field manager of the tenure and alley farming project in October 1989, from his home base in Mali.

The principal purpose of the literature review was to assist the LTC and country research teams in delineating some of the key research issues to be examined in field work. The review has proved very useful in this regard. Subsequently, ILCA and LTC agreed it would be appropriate to make the review available to a wider audience of researchers, policy planners, and agriculturalists interested in alley farming. A French translation of this paper is also available.

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Introduction

Alley farming is an agroforestry technology involving production of leguminous trees and shrubs in intercropping arrangements 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.

The systematic implementation of alley farming in West Africa is a recent phenomenon, attempted only after experimentation on research stations designed to elicit data on production characteristics of a few species of fast-growing trees. The International Livestock Centre for Africa (ILCA) and the International Institute for Tropical Agriculture (IITA) have taken the lead in these research efforts. Because of the dearth of information on the production attributes of various species, the initial emphasis was on researcher-controlled production trials. Subsequently, an information-dissemination model was developed to incorporate farmer feedback. On-farm trials, viewed as a necessary step in the dissemination process, began in Nigeria in the early 1980s and met with mixed success. Land and tree tenure systems were found to play major roles in determining who adopted alley-farming techniques and which parcels of land were given over to alley farming.

Given the apparent importance of both land and tree tenure, additional research is planned to study the relationships between tenure and the particular requirements of alley farming in the humid zone of West Africa. This paper is an initial step in this follow-up research. Its purpose is to outline the salient features of land and tree tenure systems as reported in the literature, both in general terms and with specific reference to the adoption of alley farming in Nigeria. From these observations, an outline of critical research issues will be formulated.

Alley farming's emphasis on sustainable production based on utilizing tree biomass to fertilize the soil and feed livestock unites rights to trees and land by requiring long-term access to the land for agricultural purposes and long-term access to planted trees and their products. This requirement is at odds with many West African tenure systems, which treat trees and land as

separate, albeit interacting, entities. To avoid the potential problems to which this distinction may give rise, agroforestry strategies in general, and alley-cropping strategies in particular, frequently target households, whose individual members often farm discrete parcels of land. This targeting of households was deemed necessary after problems were encountered by both on-farm research and project efforts to mobilize cooperative forces at the community level to plant and manage trees. What planners originally saw as a tradition of community land use has now been found to be a misinterpretation of the systems of land tenure prevalent in West Africa. Whereas control over the allocation of land parcels ordinarily rests in the hands of a larger corporate group, or its representative, the individual most often works the land. With few exceptions, these corporate groups in the humid zones of West Africa are based on lineage (Adegboye 1977; Ollennu 1962). With this in mind, we will first explore the attributes of lineage-based systems of land rights.

Lineage as a Basis of Land Rights

Lineage arrangements not only determine which members of the lineage hold interests in land, they also indicate how land rights are inherited. Analysis of their structure provides valuable information for the researcher. The general discussion on lineages which follows draws significantly from Fox (1967) and Radcliffe-Brown and Forde (1956).

In general in West Africa—areas which have undergone a period of conquest by outsiders (notably in the more arid areas of West Africa) are an exception—original rights to land were gained through settlement or clearing. Settlers on formerly unclaimed land "founded" lineages, which would exercise control over the land in the area. Even though they may have originally been based on residence in an area, land-controlling groupings in humid West Africa maintain their identity through kinship groups based on lineal descent.

There are three basic types of descent groups that determine access to land and generational transfer of property rights: matrilineal, patrilineal, and double descent. The first two types are considered unilineal while the third type is a combination of the first two. Within a matrilineage, whose members are descendants of a common ancestor or ancestress, property rights pass through the female line. However, actual control over property, including land, is held by the brothers and uncles of a particular woman. A man's children belong to his wife's lineage and not to his. In matrilineal societies, it is in the interests of the men in a matrilineage to keep the women close, since the women provide them with heirs. In rare cases, a woman in a matrilineal society may stay with her brother while her husband resides with his mother and her brothers. Such a **natolocal** system of residence has been observed among the Ashanti of Ghana. The desire for heirs dictates that this **natolocal** system encompass a limited geographical area to allow the husbands to visit their wives. In most matrilineal societies, however, the man either stays with his wife's group (**uxorilocal** residence) or takes his wife to live in his own group (**virilocal** residence). In the latter case, once the children reach puberty (especially the males), they must return to live with their mother's brothers and uncles (called **avunculocal** residence for the children).

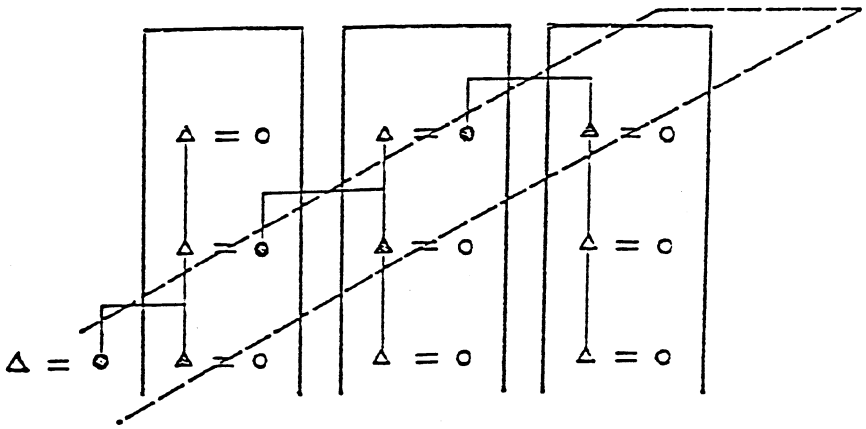
This latter type of residence pattern may cause some instability in the matrilineal system since the father may wish to maintain control over his immediate family. Fox (1967, p. 113) states that the attempt to "combine continuity and recruitment through females with control by the men of the lineage" remains the fundamental stress point within the matrilineal system of kinship identification. In tenure systems, this problem manifests itself in a tension between the husband, his son, and the wife's brother's son. Although a man may control land for his mother's matrilineage, it is not uncommon for a man to make **inter vivos** gifts of land acquired outside of matrilineal control to his sons.

Patrilineal kinship groups (males linked to a common ancestor) combine continuity and control in the male. Residence is most commonly **virilocal**, although sometimes the couple will form a new and separate residence (**neolocal** residence). Property rights are passed from father to son, although the form that inheritance division takes is quite varied. Sometimes the eldest son will inherit his father's land, but more often all male progeny will inherit part of the father's land, with the eldest sometimes holding the land in trust for his younger brothers. If a man has more than one wife, each wife with sons may be allotted an equal share of the father's land to be distributed among the sons--though the wife may continue to work the lands she worked while her husband lived. Thus, the more sons each wife has, the less land each son will receive. If a man dies without male heirs, his eldest brother will usually get control over the land. Although these categories of inheritance appear very neat on paper, they become very complex in application since different forms of inheritance may be used for different parcels of land, depending on how and when the land was acquired (lineage land, self-acquired, pledge, and so forth). Inheritance of land rights, then, varies both between and within ethnic groups.

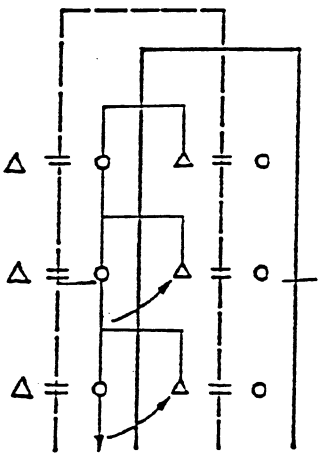
In the case of double descent, kinship is calculated through both the patrilineal and the matrilineal lines. Usually each line of descent bestows distinct obligations and rights upon the members of the kinship group. The residence of these groups is usually **virilocal**, with the matrilineage remaining dispersed. Most often, land rights are passed along patrilineally, while the matrilineage assumes importance for ritual traditions or for inheritance of movable forms of property. For example, the Yako of Nigeria inherit land and houses patrilineally from father to son(s), but money, livestock, and other movable property are passed matrilineally, from mother's brother to son(s) (Fox 1967). In other societies, land rights may be split, as is the case with the Afikpo of the Eastern Ibo in Nigeria, where most, but not all, interests in land pass matrilineally and the patrilineage is the conduit of movable property (Allot 1968). One must be particularly cautious to distinguish membership within a descent group, where land is transferred generationally, from affiliation with a descent group, whereby favorable access to land is obtained through more distant relationships but is not transferred generationally.

It is also critical to realize that women are rarely allocators of land rights. Even their right to use land generally comes through men, either from a husband as a part of his holdings or from other male family members. This normally means that women take little part in land-management decision-making

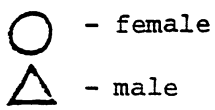
Examples of Lineage Descent and Residence Patterns

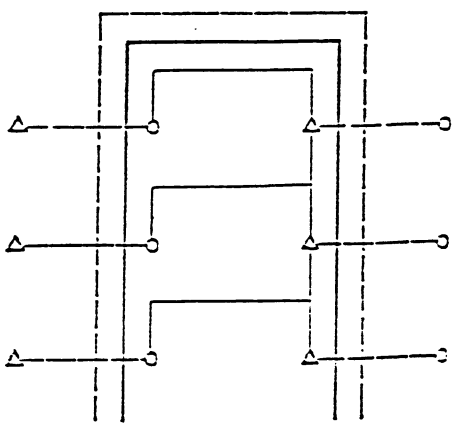


matrilineal descent with virilocal residence (also called double descent as matrilineal bonds weaken)



matrilineal descent with wife virilocal, children avunculocal





patrilineal descent virilocal residence

Source: Robin Fox, Kinship and Marriage: An Anthropological Perspective (Harmondsworth: Penguin, 1967), pp. 107, 110, 114.

processes, even though they are likely to be directly affected by those decisions. As a result, a man's decision to use certain strategies, such as alley cropping, may require that the woman working the land commit resources (particularly labor) she can ill afford to spare. If no effort is made to incorporate the woman into the process of technology formulation and adoption, the success or form the adoption takes on-farm may be quite different from that envisioned by planners. This becomes especially important in conjunction with rights to trees, a subject covered later in this paper.

While an understanding of lineage characteristics provides a means of assessing how land rights pass generationally within a given type of social structure, lineage and residence norms do not necessarily govern which groups within a descent group hold the controlling interests in land exploited by the individuals of that group. Ascertaining at what level this locus of control resides provides a crucial predictive tool of the best potential areas for adoption of alley cropping vis-à-vis land tenure rules. If the farmer does not expect to maintain access rights to a piece of land, he is unlikely to adopt a long-term strategy such as alley cropping for that parcel.

Levels of Lineage Control over Land

As kinship groups increase in numbers over generations, the population outgrows the land base and groups break off to form separate kinship groups, each a little farther removed from the original settlement area. Eventually, this process of segmentation results in groups isolated by distance each from the original lineage and with its own "pool" of land. Control of the land then passes from the original representative of the lineage to representatives of the sub-lineages. Sub-lineages located within a limited geographical area may still form a group which recognizes a common ancestor, and rights to land may still be controlled by the eldest member of the oldest sub-lineage. Residence certainly plays a strong role in shaping the geographical extent of each lineage group, but--in contrast to other areas of Africa, where land-holding groups define themselves on the basis of common residence--lineage membership is the primary origin of land rights in many West African societies. The chart below characterizes corresponding group structures and descent groupings and provides a useful conceptualization of the hierarchy for determining land rights.

The concept of clan in West Africa today connotes a grouping of people who acknowledge a common ancestor, but who in fact may not be directly related to each other (Radcliffe-Brown and Forde 1956; Bentsi-Entchill 1964; Kludze 1973). These clans do not retain any control over land allocation, although they may still perform social or ritual functions. Group rights to land and control over land allocation rarely adhere to groups larger than the village, where descent is direct and demonstrable. (The pastoral peoples of semi-arid and arid West Africa are notable exceptions to this generalization.)

Current literature alludes to clan-held rights to land, but closer inspection reveals that these "clans" more closely resemble what we described above as a lineage whose members are directly descended from the settlement founder or original clearer of land. The literature on descent groups and

SOCIO-POLITICAL GROUPING	DESCENT GROUPINGS
Group of Villages	Clan
- Primary divisions	- Clan or sub-clan
Village	Lineage
- Village section	- Sub-lineage
- Village subsection	- Sub-lineage
Compound	Extended Family
- Household	- Nuclear family

Source: Adapted from G.I. Jones, "Dual Organization in Ibo Social Structure," Africa, vol. 19 (April): 151.

their land rights is replete with lineage terminology that is poorly defined. In order to determine at what level these land rights are held, it is necessary to identify what socio-political groupings are actually associated with this vague terminology.

Who Allocates Lineage Land?

Generally speaking, land allocation rights are vested in the eldest male member of the lineage group. Depending on the society or ethnic group, the lineage group could include all recognized members and would roughly correspond to a village or town. This is the case for the Yoruba in Benin, the Sousou and Malinke in Guinea, some Ibo groups in Nigeria, and the Krou in Ivory Coast (Riddell and Dickerman 1986; Allot 1968). Sometimes allocation and management rights over land may reside with a sub-lineage, corresponding to a sub-village, section, or quartier, as is the case for other Ibo groups in Nigeria (Francis 1987). At the lowest end of the scale, the heads of extended families (equivalent to compounds or households) may allocate land or dictate management strategies to group members. This occurs among the Tiv of Nigeria, the Mandinke and Jola of Gambia, and the Mende of Sierra Leone (Riddell and Dickerman 1986; Patrick 1984; Little n.d.).

When trying to establish at what level allocation rights reside, one must remember that these rights may vary according to land use. While the head of the family, be it extended or nuclear, may allocate land use rights to members of his immediate family who will actually work the land, the right to allocate pasture may reside at a higher level than those for farmland. In addition,

individuals frequently acquire use rights through other mechanisms such as pledges, loans, lease, and so on. The variety of allocative arrangements makes it difficult to categorize broadly large geographical or ethnographical areas.

Overlapping political structures also blur the levels of allocative rights. The Ewe of Ghana, who have an integrated system of political and lineage structure, provide a good example of this (Kludze 1973). Briefly, the two top levels of chiefdom and sub-chiefdom are political in nature, with no lineage functions or rights over land allocation. The next level down, the clan, is both a political and a lineage structure, but it, too, has little to do with land allocation. Instead, it is the "families" which allocate land to individuals. On the other hand, there are more rigidly defined hierarchical societies whose political structures are directly superimposed upon the lineage structure, as exemplified by the Fon of Benin. This patrilineal group has a "king" as head of the founding lineage who allocates land to the "nobles" (heads of sub-lineages) who in turn allocate land to the extended families (Riddell and Dickerman 1986; Dissou 1972). A third structure is one in which customary land authorities have been absorbed into the state apparatus in appointed positions. This appears to have developed to some extent in the Cassamance region of Senegal (van der Klei 1978).

Attempts have been made in most West African countries to replace or reform customary tenure systems, both during the colonial era and since independence. These have generally failed to change the basic nature of group-controlled rights to land, although they have affected to some degree the mechanisms of group control. Most often, the authority of the group member responsible for land allocation and management decisions has been undermined, and as a result, kinship identity has been weakened. In some areas greater control over land has devolved to a lower level in the lineage hierarchy, usually to the head of the extended family. State attempts to change customary tenures have resulted in the widespread suspicion among land users that state management decisions are aimed at diluting farmers' claims to their lands. When combined with their suspicion of prescriptive state forestry codes (discussed later), farmers' distrust of government-sponsored efforts at land management may have a negative influence on farmers' adoption of alley cropping techniques. Francis and Attah-Akrah (1989) cite Mgbakwu in southern Nigeria as an area where mistrust of government has lessened farmers' willingness to plant trees. In other regions, trees planted by individual farmers in government-sponsored tree-planting schemes tended to suffer high seedling mortality rates, possibly arising from doubt as to the ultimate ownership of the trees (Fortmann 1987).

There is also some indication that as population increases and land becomes more scarce, the amount of land under higher-level lineage control diminishes, and control devolves to a lower-level group. This new pattern has resulted in the increased alienation of land, especially on a temporary basis (Hecht 1983; Raintree 1987). Loans, pledges, renting, and outright sale of land have occurred, as illustrated by the sale of cocoa land in Ghana (Hill 1963) and the use of pledges and loans of land in Nigeria (Famoriyo 1971, 1977). Although these transactions may not have the sanction of law, they occur nevertheless and need to be taken into account when targeting areas for the introduction of alley cropping. Farmers using land under rental, pledging, or other short-term tenures, for example, may be prohibited from planting trees.

Types of Allocated Land Rights

Land Rights Secured from the Lineage

In addition to understanding the existing structures for allocating land and arriving at decisions, it is also important to consider the nature of the use right obtained by the individual, which will substantially determine the suitability of an area for the introduction of alley cropping. Historically, the individual received the right to use the land on the basis of membership within a kinship group, but these rights did not allow the individual to alienate the land. In a situation of plentiful land, most cultivators followed a pattern of shifting cultivation and had little need to maintain rights to a particular parcel over time. However, with the pressures of increased populations and the introduction of perennial cash crops, management strategies and tenure rules changed.

As Francis (1987) points out, the existence of rights to use a piece of land over time is instrumental in fostering favorable conditions for the adoption of alley cropping. In practice, we find that various groups grant two fundamentally different types of land use rights.

(1) Land use rights from the group may be granted to an individual for a particular parcel which may be used indefinitely. Although the rights may theoretically be reviewed or renewed annually by the land-allocating authority, in effect, the individual has long-term access. Right to a particular parcel may even be inherited according to established inheritance rules, although the land is still considered "group" property. Under this system, the introduction of alley farming will require contact primarily with the individual user.

(2) An individual may actually receive access to a different parcel each year, or he may have access to the same parcel but on a rotational basis over time to allow for fallow periods. This type of use right may make it difficult for individual farmers to adopt alley cropping due to the uncertainty of future access to the same plot of land. The introduction of alley cropping under these conditions may necessitate altered institutional arrangements between the land allocator and the land user.

Rights allocated from the lineage may also vary by the location of the land in question. In Nigeria, land closer to the homestead may be allocated for a different period of time or under an alternative management system than distant farmland (Francis 1987). In the Gambia, rights to land close to the river are less likely to change than those to upland farmland (Riddell and Dickerman 1986).

Land Rights Secured from Other Individuals

There is a variety of ways in which individuals obtain rights to land other than by lineage allocation. One method closely tied to kinship is the practice of "borrowing" or "begging" land from fellow members of the lineage. This type of access is typically granted for only one cropping season. Loans

of land are similar to "borrowing" but are frequently arranged for a specific time period, which can be for longer than a single cropping season. Obviously, these short-term use rights will limit an individual's desire to implement longer-term strategies of land management.

A more formal arrangement that occurs quite commonly in many areas in West Africa is pledging. In Western terms, pledging approximates pawning, whereby a person exchanges use rights to a piece of land for a payment of some type. The land can be reclaimed upon repayment of the pledge price at any time, but the original holder must wait until the pledgee has harvested his crops. The duration of the pledge may vary from one cropping season to decades, and it is not uncommon for a pledge to be inherited. Alley cropping strategies can be applied to this type of use right if the problems of tree tenure, covered in a later section, can be overcome.

Land rental, a more formal arrangement, occurs more frequently than pledging. Normally executed on an annual basis, a rent contract may provide little incentive to adopt alley farming. It might be possible, however, to make rental arrangements that specifically confer the necessary rights in planted trees to the renter.

Despite the fact that it is often said not to occur, outright sale of land has taken place in several areas. These transactions are rarely officially recorded, however, and are often subject to dispute (for example, other kinship members may question the right of the seller to alienate the parcel). Furthermore, while the incidence of sales is increasing, their extent represents only a fraction of the total land area in West Africa. Unless the sale is disputed, alley cropping is compatible with this type of tenure.

Superimposition of Other Rights

As we shall explore, the rights outlined above operate in conjunction with yet other rights which serve to limit possible land-use strategies. Grazing rights, for example, are often very narrowly defined, a fact that may affect the introduction of more intensive land-management strategies. Even when an individual is accorded long-term use rights to a piece of land, the community may retain access to that land for grazing purposes after the crop has been harvested. Such a practice can impose constraints on alley cropping since seedlings need protection initially to permit them to become firmly established. Providing protection under such circumstances may: (1) prove expensive and labor-intensive, (2) infringe on community grazing rights, and (3) restrict new community post-harvest grazing rights.

The other major set of rights superimposed upon and interrelated to land rights is that of tree tenure. The rights to trees and their products may be held separately from the land they grow on and may depend on how they are used, who plants them, what species they are, what spatial planting arrangements are used, and what form of land tenure applies. The next section will first review the literature on the interaction of land and tree tenure and then tie that information together using Francis and Attah-Akrah's work on alley cropping in Nigeria. From this, we will derive the crucial research questions that will be addressed in this project.

Tree Tenure Issues

The most striking aspect of the published material on tree tenure is that there have been numerous references to rights in trees, usually in the form of passing comments embedded in sections dealing with land tenure or other property rights. Reflecting the predominance of the ethnographic approach in the literature on land tenure, these comments have been very site- or group-specific. It is only recently that much has been written analyzing tree tenure as a concept interdependent with but distinct from land tenure (Fortmann and Riddell 1985; Francis and Getachew 1987).

What Rights in Trees?

Fortmann's (1988) general framework of tree rights, shown on the preceding page, provides a structural framework for looking at tree tenure in relation to alley farming. Although oriented more toward land tenure, Bruce and Noronha (1987) have drawn similar distinctions in tree rights. Fortmann begins by categorizing the types of rights people may have in trees, some of which mirror rights people may have in land. First, it is possible to own or inherit trees. Second, people may or may not possess the right to plant trees. Third, a person may enjoy the right to use trees or tree products. This could include the right to gather products from certain trees (for example, dead branches, leaves), to harvest produce (for example, fruit, nuts, seed pods), and to cut either the whole tree or parts of it (for example, poles, stakes). In addition, Fortmann states that one may have the right to use the standing tree as a place to pursue an activity such as hanging honey barrels. And finally, a fourth right involves the capacity to dispose of trees by (1) destroying; (2) lending; (3) leasing, mortgaging, or pledging; and (4) selling or giving away the tree(s).

The distribution of rights among the state, lineage/community, or individual will obviously affect the attractiveness of alley farming to a given individual. If that individual does not have the right to plant trees or the right to use the products of those trees if he or she could plant trees, then there is very little incentive to adopt such a land-use strategy. Although this appears straightforward initially, once we enter the realm of partial and overlapping rights, evaluating the relative appeal of alley farming becomes much more difficult.

Who Has Rights and How Are Those Rights Established?

State Rights

Fortmann (Fortmann and Bruce 1988) states that rights to trees are vested not only in individuals but also in the state and in other groups. Most governments in West Africa have also laid claim to various amounts and types of land, being particularly concerned with regulating forest and tree use. Prohibitions on use (cutting, gathering, and so forth) of certain tree species

INTERRELATED FACTORS OF TREE TENURE

TYPE OF RIGHTS	DISPOSITION RIGHTS	WHOSE RIGHTS	USE	ORIGIN	LAND TENURE/ METHOD OF ACQUISITION
to own/inherit	to destroy	state	subsistence	planted	inherited
to plant	to lend	groups	commercial	self-sown	purchased
to use	to lease/pledge	individual			rented
-gathering	to sell/give	male/female			pledged
-standing tree					sharecropped
-cutting					leased
-harvesting					community-allocated

Source: Compiled from information in Louise P. Fortmann, "The Tree Tenure Factor in Agroforestry with Particular Reference to Africa," in Whose Trees? Proprietary Dimensions of Forestry, ed. Louise Fortmann and John W. Bruce (Boulder, Colo.: Westview Press, 1988), pp. 16-33.

are a common feature of many forest codes. These codes may be very specific, as is the case in Mali, where cutting branches for browse is severely restricted and where cutting branches for other uses is restricted to those a certain minimum height above ground level (Elbow and Rochegude 1990). Even though these codes are difficult to enforce, they may introduce an element of insecurity and thereby affect a farmer's willingness to plant particular species of trees to which the state holds certain management and use rights (ibid.).

The state establishes its rights in trees through the laws and administrative codes it promulgates. While these laws are meant to protect forests and valuable tree species, the impact of these measures may far exceed the intent of the law. State control is exercised through a system of permits and fines and administered by forestry agents. As Lawry (1989, p. 15) states,

> the permit-and-fine system is a case where the state is claiming certain rights over tree resources planted or tended by individual farmers. Exercise of use rights is shared with forest agents. This may reduce the ability of farmers to predict with confidence their returns to investment in forestry and agroforestry. Where regulatory practices are arbitrary and returns sufficiently uncertain, farmers will be disinclined to plant trees on their farms. The broad intent of other forest policies which seek to promote greater farmer interest in forestry may be defeated by a regulatory process put in place to "protect" trees that farmers are disinclined to plant given their severely attenuated rights.

The perceptions of land users and managers will influence their willingness to plant trees over which the state claims management authority. How these perceptions have altered security of tree tenure must be addressed in alley-farming planning. In the West African Sahel, state prohibitions on the utilization of specific tree species have been cited as contributing to the failure of tree-planting projects (Thomson 1982).

How acute these problems are in any given region will affect the development of both short-term and long-term strategies for introducing alley farming. For the immediate future, strategies will need to minimize effects of present forestry legislation through government-project agreements, species selection, and the like. Institutional changes, such as decentralized and participatory resource management, may permit the use of a wider variety of alley-farming strategies. However, institutional changes will require considerable time to implement, thus necessitating the formulation of interim strategies.

Group Rights

Groups may hold corporate rights to trees just as they hold rights to land. In the case of humid West Africa, this corporate entity usually corresponds to kinship groups based on lineage. Group rights to trees shape and limit the extent to which individuals may hold similar rights. Ordinarily, rights to trees that are self-sown stay with the person(s) holding rights to

the land on which they are growing while planted trees belong to the planter, irrespective of the rights the planter has to the land on which the trees are planted (Fortmann 1988; Berry 1971, 1975; Chubb 1961; Adegboye 1977; Obi 1988). Establishing rights in trees also depends heavily on the nature of their intended use (Fortmann 1988; Obi 1963). In a broad sense, this can be divided into commercial cropping of tree products and subsistence use. Indeed, much of the literature on tree rights in the humid zone of West Africa focuses on economic tree crops, with special attention given to cocoa. However, this division between subsistence and commercial cropping can be somewhat misleading, since many tree products may be used for both purposes concurrently. Lastly, both the type of land tenure rights and the relative strength of those rights on a given parcel of land will influence the type and strength of tree rights a tree user will be able to exercise (Fortmann 1988). One of the difficulties with analyzing land and tree tenure is the wide variation in system rules between specific groups and even subgroups. For this reason, we will provide illustrations of various tree-tenure system "rules" found in the literature.

Rights to Commercial Trees

Cocoa-tree rights are commonly discussed in relation to the Yoruba and the Ibo in Nigeria. Among the Yoruba, cocoa trees are the property of the planter, are heritable by the planter's heirs, and may be sold (independently of the land they grow on) (Adegboye 1977; Berry 1975; Eades 1980). Adegboye (1977) claims that the Ibo also treat cocoa trees in this manner while Obi (1963) states that all economic trees among the Ibo are separate from the land on which they are planted. Weber (1977) cites the Bulu of mid-south Cameroon as another example where rights in cocoa trees are independent of land rights. The Ewe of Ghana and Togo also treat economic trees in this fashion (with particular reference to coconut and cocoa trees). Oil palms are an exception, however, because they possess ritual significance and therefore remain the property of a member of the lineage group. Even if the land itself passes from lineage hands, the original owner retains the rights to the oil palms (Kumekpor and Banini 1970; Rattray 1969; Benneh 1970). Should alley-farming tree species come to be perceived as primarily economic in nature, then we might expect a trend toward individual ownership of trees. At the same time, though, this trend might curtail the participation of certain groups, notably women, who tend to lose resource access when the resource becomes a commercial good (Bukh 1979; Fortmann 1987).

Berry (1975) found that the willingness to grant independent rights in trees can vary within a single ethnic group. For example, while the people in the Ondo area of Yoruba territory in Nigeria frequently sell cocoa trees, people in other areas such as Ibadan and Ife are more reluctant to sell and will do so only under two conditions: (1) if the buyer is a member of the landholding family or one of its tenants, and (2) if the landowner receives land rent from the purchaser of the trees. Berry speculates that this difference is based on the historically weaker lineage rights in land in Ondo.

The mechanisms for transferring rights in trees while retaining land rights seem remarkably similar among groups. By payment of an annual land

rent, the renter acknowledges the rent-recipient's rights to the land upon which commercial trees are to be planted or are already growing. Historically, this rent tended to be token and rarely monetary. However, this relationship has become more monetized over time until rent is now paid in a set amount of tree produce or its cash equivalent. This evolution of economic rent is mentioned by numerous authors, most often in connection with cocoa farms (Berry 1975; Hecht 1983; Antheaume 1981; Weber 1977; Benneh 1970; Eades 1980). This form of tenancy offers reasonably long-term access to trees and their products but may nevertheless present problems to potential alley farmers. First, as land becomes more scarce, landowners may become less willing to tie up their land for the longer periods required to grow and manage trees. Second, it is not certain that alley farming will provide enough cash for payment of an increasingly economic land rent. Finally, trees in alley-farming systems may be perceived as subsistence trees and therefore not subject to the tenure rules governing commercial trees.

Much of the above discussion concerning the transfer of commercial tree rights comes from discussions on "stranger" farmers, migrants from other areas who come in search of land to plant commercial trees, notably cocoa. In the past, this migration resulted from a lack of suitable land in the home area and from plant disease which limited cultivation in the home area (Hill 1963). Mechanisms of land transfer evolved in the receiving areas to accommodate people who had no lineage ties in that region. Initially, strangers requesting land were required to live in the community for a period of time, which allowed them to be assimilated through marriage, observance of local customs, and the like. In exchange for land, these immigrants were required to make only a token payment of some good that served to recognize the community's ultimate right to the land. However, as suitable land became scarcer and immigrant numbers greater, this "trial residence" period tended to be replaced by reduced residence requirements and more economic land rents. Strangers then began maintaining identity with their home area instead of becoming assimilated. Thus, as social obligations and identification with local lineages decreased, transfer arrangements became more monetarily oriented (Berry 1971, 1975; Weber 1977; Hecht 1983). There are variations to this general scenario of stranger farmers: some strangers were sold land while others were sold only the rights to grow commercial trees. Many current transfers to strangers resemble sharecropping arrangements in which the tenant receives few long-term rights in either the trees or the land.

Sharecropping, another form of tenancy, is also evolving as a common means of exploiting commercial trees. In this form, however, the land tenant has few permanent rights to the trees she or he tends. Rather, the trees are owned by the landowner, with the tenant providing labor in return for a share of the harvest. As is the case among the Yoruba (Eades 1980), in the Anloga region of Ghana (Benneh n.d.), and in the Akposso region in Togo (Antheaume 1981), sharecroppers are often restricted in what they can grow and must accept an unfavorable division of produce. On already established tree farms, sharecroppers may be prohibited from planting trees of economic value for fear this will be used as a pretext to gain control over the land itself. A more restrictive example is cited by Adegboye (1974), in which landowners in an unspecified cocoa-growing area of Nigeria use sharecroppers to prepare land, plant cocoa, and plant and weed food crops of the landowner's choice. For

this work, the sharecropper receives a share of the food crop but gains no rights to the cocoa trees when they mature. In such a situation, alley farming may not be an appealing land-use strategy for sharecroppers or some stranger farmers unless arrangements for sharing the benefits of the system can be made with the landowner.

Pledging (or pawning) of trees also occurs frequently throughout the region (Kumekpor and Banini 1970; Adegboye 1974; Berry 1971, 1975; Abasiekong 1981). As with land rights, transfers of tree rights vary in duration. Although it is usually mature commercial tree crops that are pledged, immature trees may also be exchanged with the understanding that the pledgee will keep the trees long enough to realize at least his pledge price (Fortmann 1988). Abasiekong (1981) outlines a system of oil-palm pledging in the Cross River State of Nigeria, where most pledge transactions are supported by signed documents attesting to the pledge. These pledges ordinarily last a minimum of one year, with the price calculated on a per-tree basis. Only the palm trees on the land can be harvested and secondary pledging requires the consent of the pledgor. Abasiekong notes, however, that farmers use pledging only as a last resort due to the stigma attached to such transactions in this region. This treatment of trees as a good separate from the land may not enable farmers to realize the benefit of both increased organic matter for the soil and livestock-fodder production. Additionally, the unspecified duration of the contract reduces the compatibility of the pledge with alley farming since the prospective alley farmer is not assured of continued access to the land.

Rights to Subsistence Trees/Tree Products

Subsistence trees are those trees that are not systematically harvested specifically for sale, but whose products (branches, fruit) are gathered or collected for use within the household. As mentioned earlier, the difference between economic and subsistence trees is rarely neat and clear. Fuelwood is an example of this ambiguity: in areas of scarcity, it (or its processed form, charcoal) has become both a commercial and a subsistence crop, often shipped to cities for use by urban populations and, at the same time, harvested for domestic use by rural inhabitants. Although lists of species and their subsistence uses can be found in the literature, few authors address the tenure arrangements for noncommercial trees.

Nevertheless, certain generalizations can be made about the tenure status of subsistence trees. Products of trees on communal land, such as grazing areas, are often freely available to members of the community. Most of these trees are self-sown (naturally regenerated). However, Obi (1988) states that a tree planted on Ibo community land can be owned by the planter if the community does not contest the planting. Obi also contends that self-sown trees on farmland allocated by the community are for the land user's benefit during cropping seasons, but revert to the community during fallow periods. This appears to be true in many areas of West Africa. Obi asserts that self-sown trees on individually controlled land belong to that individual unless he or she leaves the group, at which time the trees revert to the community. Chubb (1961) adds that trees on Ibo compound land follow the tenure of the land, as do timber trees. Rights of community access between cropping seasons poses a

crucial challenge to alley farming since the alley farmer needs to possess exclusive rights to tree products.

Although we have seen that community subsistence rights to trees seldom override the right of the planter to commercial trees, an interesting case is provided among the Ibo, where palms belonging to individuals are accessible to the wider community for certain periods each year. Chubb (1961) says that this occurs at tax time and lasts two to three months, thus enabling everyone to pay the taxes. Obi (1988) does not give specific examples and states that it is not clear if this practice holds true for palms on compound land. An odd variant to this practice is found among the Yoruba (Lloyd 1988), in which community-owned palms are made available for one-day periods for people to harvest as much as they can on that day. However, participants must be members in good standing of the particular community.

Rights to Exotic Trees

Whereas rights to trees indigenous to an area have evolved over time, rights to trees introduced from outside a particular area may be ambiguous, since the uses for such trees are as yet unknown to the community. Intensive tree management has usually been practiced only for commercially valuable trees, whereas alley farming generally promotes trees as a supplement to the subsistence activities of crop and livestock production. As a result, there may be a tendency to consider exotic species as freely accessible to the community except when they are planted on an individually controlled parcel (especially during cropping season). Although how farmers perceive alley farming may depend on the specific application, it is important to remember that this application is initially defined by people other than the farmer. For example, alley-farming systems designed to provide fodder using new tree species may suffer from problems of tenure ambiguity because fodder has been considered a subsistence or common good. While alley-farming planners consider that the fodder-producing tree species produce an economic good, farmers may believe that the new species is subject to communal tenure rights and, therefore, is not a secure investment. In Mali, Montagne (1985-86) notes that farmers planted neem and eucalyptus trees for medicinal uses, even though the species had been promoted for fuelwood and timber production. (Unfortunately, he does not state whether or not the individual retained exclusive rights to these trees.) Planners must also pay careful attention to how much the products of a newly introduced species resemble those of indigenous types, since this may allow the planner to predict the tenure status of the exotic species. Tree utilization in alley farming may also create a hybrid bundle of rights distinct from current commercial or subsistence rights.

Gender Factors in Tree Tenure; Decision Loci

Up to this point, no distinctions have been made between the tree rights of men and of women. In fact, there has been an implicit assumption on the part of both natural resource planners and researchers that West African households vaguely conform to the Western notion of a family as a entity which

"pools" resources in daily household operation. Consequently, tree-planting projects have tended to regard the male as both the head of household and the primary land-use decision-maker (Fortmann and Rocheleau 1985). However, the recent literature on women's activities and responsibilities clearly indicates that West African women possess resources and responsibilities distinct from those of men and face different constraints on their resource-management choices (Guyer 1986). Thus, women's control over the components (trees, shrubs, animals, and pasture) and products (food, fodder, fuel, fiber, medicine, and the like) of alley-farming systems will be subject to different rules than those for men (Rocheleau 1988a). For this reason, alley-farming strategies must recognize women and men as distinct clienteles whose uses for trees will be different, though possibly overlapping. This may require the development of different land-management strategies for each group.

Rights and Roles of Women

Women's rights to trees tend to be derivative in nature, similar to their access to land in that a woman depends on her spouse or her own kinship group for access to trees (Jiggins 1988; Rocheleau 1988b; Obi 1988). Much of the scant literature on women and their rights in trees centers on women's acquisition of commercial trees, especially in cocoa-producing areas. Benneh (1970) found that among the Akan of Ghana, most women cocoa farmers had acquired their farms as gifts from husbands and fathers. Indeed, Okali (1983) found that although Akan women assist their husbands in establishing, planting, and maintaining cocoa farms, joint farm or tree ownership has not developed and rights to these farms remain vested in the men. Hill (1963) adds, however, that Ghanaian women in this area can own both land and trees in their own right. Kumekpor and Banini (1970) indicate that some Ewe groups in Ghana and Togo accord women the right both to own land themselves (usually obtained as gifts) and to plant and keep commercial trees. Other Ewe groups in Ghana do not allow women to plant cocoa, or do so only under very specific conditions (Bukh 1979). This latter situation also prevails in Cameroon, where women are rarely allowed to plant cocoa, even though they provide labor for their spouses' cocoa farms (Bryson 1979; Weber 1977). Fortmann (1987) maintains that the prohibition against women planting trees is widespread and thereby restricts women's secure access to trees, economic or otherwise. In areas where women do have rights to plant or acquire commercial trees, they tend to do so at a later stage in their lives than men, often after their children are grown (Okali 1983; Bukh 1979).

In contrast to their limited access to commercial trees, women are much more heavily involved than men in the collection and use of fuelwood and minor tree products such as fruits and fodder (Fortmann and Rocheleau 1985; Owusu-Bempah 1988) because of their pre-eminent role in subsistence and food-processing activities. Collection of these tree products occurs mostly under community gathering rights on fallow land and in communal grazing areas (Rocheleau 1988b). This reliance on community rights and derivative tenures to what are often labeled "secondary uses" of trees makes women particularly vulnerable to tenure changes that either reduce the land area available under community gathering rights (as may occur with fallow land) or transform subsistence tree products into commercial goods that then are co-opted by men.

Alley-farming strategies have the potential to introduce both of these tenure-related changes. First, alley-farming species may replace tree types used primarily by women. Furthermore, the introduction of permanent cropping techniques could preempt women's access to lineage or household fallow land or occupy land formerly allocated to women (Rocheleau 1988b). The elimination of current fallow systems could also remove woody shrub species used predominantly by women--frequently men consider trees they do not use to be shrubs. These divergent perceptions of the utility of various trees and shrubs may not be known to alley-farming planners and therefore may result in deflecting benefits to a group other than the one intended. Two surveys illustrate how far apart these perceptions can be. In Sierra Leone, women identified thirty items that could be gathered or made from the "bush" on fallow fields while men could city only eight (Hoskins 1980). Similarly, women in Ghana knew of fifty-seven products derived from local trees; men could name only fourteen (Owusu-Bempah 1988). In Burkina Faso (Jackson 1984), planners failed to consider women's use of common areas, designing a tree-planting project which was scheduled to clear an area described by local men as "worthless bush." The project was stopped only after the local women protested that they depended heavily on the area for subsistence shrub and tree products, and that the closest comparable area was a long walk away.

Intra-Household Decisions

Since men normally control local political structures and land allocation while also filling the ranks of forest and agricultural extension services, it is not surprising that men tend to be the first people contacted by outside organizations seeking to introduce new land-management practices. Unfortunately, many researchers and projects have not explored the extent to which women make decisions within the household. Providing 60 to 80 percent of all agricultural labor in Africa, women make decisions on the allocation of their labor that will affect how resources are used and distributed (Spiro 1981), despite the fact that they have only derivative access to resources. In the case of alley farming, which affects both agricultural practices and livestock management, women's involvement in both these enterprises needs to be assessed if we are to determine either how to incorporate them or, at a minimum, how to avoid undermining their farming and subsistence activities. For example, if women do not own livestock but perform weeding (a very common agricultural task for women) (Spiro 1980, 1981) and other chores associated with alley farming, then this new technology may increase the demand on their labor without offering much in return, particularly where tree biomass has been used principally for forage. Similarly, if women own livestock but do not have secure rights to land or trees, they may not be in favor of alley farming. On the other hand, women who participate in livestock production and possess some rights over resources (that is, over land and trees) may be more inclined to participate in alley farming. Such would appear to be the case in southern Nigeria (Okali and Sumberg 1986; Attah-Akrah and Francis 1987).

Although the question of gender roles frequently postulates a confrontational relationship, we must remember that there is a very large shared domain of responsibility within the household which includes decision-making, resource use and allocation, and general household goals. These must be understood in

relation to the areas of possible conflict if we hope to predict which situations are favorable for adoption of this technology.

The work on small livestock production by Attah-Akrah and Francis (1987), Francis (1988), and Okali and Sumberg (1986) in southwest Nigeria illustrates potential differences in decision-making roles between men and women. In this area, both women and men are said to own and raise goats and sheep. Okali and Sumberg provide a breakdown of ruminant ownership and management by gender with interesting results. First, they found that women prefer to raise goats since goats wander less than sheep and therefore remain closer to the house. Since women spend large parts of each day around their compounds, goats demand less of their time. Furthermore, goats are fed the by-products of women's work in food processing and cooking, thereby minimizing labor and time input. It appears that men, however, graze their animals in fields or near roadsides, which requires close herding. Sheep production is particularly time consuming and therefore carried out mostly by older people with sufficient available time. Thus, while men may rely on the agricultural production system to feed animals (cropping residue and trees/shrubs), women utilize fodder resources produced at one remove from agricultural production (processing). The differing resources under men's and women's control will influence how each reacts to alley-farming strategies.

In the work of Francis and Attah-Akrah (1988a) outlining gender concerns in the adoption patterns of alley farming in southwest Nigeria, there is an implicit assumption that increased participation by women resulted principally from the incorporation of one female research associate who disseminated information to women. While it is undeniable that information dissemination was originally heavily biased toward men, it would be erroneous to conclude that access to information was the most critical parameter in increasing women's participation. Instead, we need to look into why women, who possess derived rights to alley-farming resources, increased their participation to almost equal that of men. Francis and Attah-Akrah (ibid., p. 6) point out that women managed their alley farms as well as men did, despite "more severe constraints in access to labor and short-term capital." Because they used fewer resources to achieve the same result, women appear to be more efficient land managers than their male counterparts, at least in this case. Consequently, questions that should be addressed in our research include: (1) How do men and women gain and keep access to physical resources such as land and trees? (2) How do men and women allocate their time and labor? (3) How do men and women integrate alley farming with their other economic and domestic activities? (4) What do men and women do with the increased production? (5) How are men's and women's management strategies different or similar? Finding the answers to these questions will help us to predict in what situations alley farming might be successfully adapted and introduced, and to which clientele.

ILCA's Experience in Nigeria

As we found in our discussion on gender, general issues of land and tree tenure become more sharply focused when reference is made to actual practices. For this reason, we intend to use ILCA's pioneering effort in introducing

alley farming into southern Nigeria as a means of focusing on tenure issues specific to livestock production and the problems of tree use on land customarily devoted to other activities. From this specific case and our general discussion, we will delineate the major tenure-related research questions raised by the introduction of alley farming in the humid zone of West Africa. ILCA's efforts to introduce alley farming into both southwest and southeast Nigeria are described by Attah-Akrah and Francis (1987), Francis and Attah-Akrah (1988a, 1988b, 1989), Francis (1986, 1987, 1988), and Okali and Sumberg (1986).

Background

Small livestock production in southern Nigeria is a minor farm enterprise, providing 5 to 20 percent of farm income, with approximately 65 to 75 percent of the small ruminants being goats and 25 to 35 percent being sheep; this pattern holds for both the southwest and the southeast. An estimated two-thirds of the livestock produced are consumed within the household. In the southwest, where livestock are owned by individual household members, women own over half of all livestock (Okali and Sumberg 1986). In the studies of the southeast, however, no mention is made of gender differentiation in livestock ownership. The peoples of the densely populated southeast region confine livestock year-round, or at least during the cropping season, while people in the more moderately populated southwest region permit livestock to roam freely. Given these forage habits, the people of the southeast area cut and carry fodder much more often than those in the southwest.

Alley farming was introduced in a similar manner to both areas but with somewhat different results. At last report, two-thirds of the alley farms in each of two communities in southwest Nigeria were still fully functional while one community in southeast Nigeria had only half of the farms functioning and the second had none. In exploring the reasons for these differences in adoption, factors of tenure and established land-use management practices were offered as major determinants of farmer adoption and management.

Tenure and Land-Use Patterns

Reports about the adoption of alley farming in the southwest area furnish little detail about tenure, except to say that alley farms were established on parcels inherited, purchased, leased, loaned, and received as gifts. No data are provided on how these parcels are distributed among the participants still operating functional alley farms. Patterns of land use in this area follow a bush-fallow system, whereby parcels are cropped for four to five years and then fallowed for an equal amount of time. A primary goal of further research should be to define clearly the tenure and land-use patterns so that comparison of divergent trends in the adoption of alley farming in different regions can be made.

The description of tenure in the southeast area is much more detailed. Farmland is divided into compound land, nearby farmland, and distant farmland. In both communities, compound land is held and managed by the household head.

It also receives the most household wastes, making it the most productive land, though it is also the smallest in total area. In the first, more successful community in the southeast, where half of the alley farms are still operating, nearby farmland represented 79 percent of the alley farms established. This land is held and managed by individuals. Distant farmland, which is managed on a six-year rotation schedule set by sub-village authorities, was planted to alley farms in only 16 percent of the cases. In the second community, where all alley farms failed, 72 percent of the alley farms were established on compound land, which is the only land controlled by individuals. Near and distant farmlands in this second community are reallocated by community authorities every two and five years, respectively. In both of these southeast villages, reallocation of the same land to the same farms after rotation is unlikely. Thus, it would appear that the rotation and short-term use of land compose a major limiting factor to alley-farming adoption, since the participant would lose the benefits of any mulch produced. Further study needs to be done on how various rotation patterns affect adoption, and whether this varies by land tenure system. Research should consider whether adoption depends more heavily on an individual's long-term rights to the land or on an individual's willingness to break with customary agricultural practices. For parcels under community management and reallocation, alley farming may simply not be an appropriate intervention.

Tenure and Grazing Patterns

It is important to note that alley farms within the more "open range" southwest fared better than those under the more restricted grazing system in the southeast. In the drier regions of West Africa, where cattle predominate, establishing trees under open grazing regimes has proved difficult. This problem arose in the Guesseboldi area of Niger, where forestry guards were empowered to impound cattle found grazing in tree-establishment areas during the first three years after planting (Bognetteau-Verlinden 1980). In the Majjia Valley in Niger, guards were hired to prevent livestock incursion into the windbreaks during establishment (Heermans 1986). Other protection efforts have included individual tree protection using thorny branches or woven grasses, living hedges, and thorny hedges surrounding entire plots.

It would appear that alley farmers in the humid zone of Nigeria considered control over land to be more crucial than exclusive rights to tree foliage. Indeed, the alley farmers in the southwest made no noticeable effort to exclude other farmers' animals from foraging on their farms (Attah-Akrah and Francis 1987), even though this tends to reduce the benefits of the system to the alley farmer by either depriving the soil of nutrients (mulch) or diminishing the amount of forage available to the alley farmer's livestock. However, Jabbar (personal communication 1989), of ILCA/Ibadan, states that prunings were cut and transported to the homestead before animals grazed the fields. Understanding why alley farmers decided to utilize alley-farming strategies without maintaining exclusive access to their tree products could clarify the question of farmers' priorities and help predict what conditions are most favorable for alley-farming adoption. Within this question of nonexclusive rights to trees are other concerns of social and physical mechanisms that can be developed to assure protection of trees during their establishment.

In addition, the data from these two areas fail to depict clearly current livestock-feeding systems and how alley farming took advantage of, or changed, these systems. Accordingly, we need to study in more detail the relation between the two types of feeding regimes (cut/carry and grazing on the alley farm) and the various tenure types. Related questions include: Does the established management practice of open-access grazing preclude development of a cut-and-carry system? And if not, how and why does such a system develop? Jabbar (ibid.) relates that some alley farmers in Nigeria began building small rudimentary corrals at their compounds to keep neighbors' ruminants from browsing cut-and-carry tree prunings. This suggests that exclusive access is an important criterion to the alley farmer and may determine where alley farming will be an acceptable alternative.

Tenure and Livestock

Type of Livestock. Given the foraging and production characteristics of each type of livestock, it may be that the type of livestock raised relates to specific tenure rights held by farmers, which in turn influences their willingness to incorporate alley farming into their farm-management practices. This issue likewise merits further consideration.

Type of Livestock Operation. While the Attah-Akrah and Francis's (1987) Nigerian study lists meat production for sale and for social and religious obligations as the object of livestock production in this area, other purposes (for example, dairy farming) may be associated with different land and tree tenure rights. Lawry (1986) demonstrates that people in Lesotho who raise livestock as a principal cash source are much more likely to cultivate forage for cattle than are those who raise livestock as a secondary source of income or for subsistence purposes. Research conducted in other areas of the humid zone should address this question as a part of any study of alley-farming adoption.

Caretaking of livestock is another area that deserves further investigation. Although the Attah-Akrah and Francis (1987) study touches upon this issue, it does not explore it further. Women are reported to take care of other people's animals, but this phenomenon is not discussed in relation to alley-farming adoption. This separation of livestock ownership and management responsibilities results in varying perceptions of the utility of management interventions. As such, the nature of caretaking arrangements--for example, whether they are reciprocal or involve payment for services--may also influence whether farmers see alley farming as a worthwhile feeding strategy.

Size of Livestock Operation. Francis (1987) provides livestock distribution data for the population at large and makes the point that while most households owned four or fewer small ruminants, 9 percent of those interviewed owned more than twenty animals. Unfortunately, none of the information supplied on alley-farming adoption explored whether these "large"-scale livestock producers were more or less likely to adopt alley farming as a land-use strategy. Given the lengthy record of land-use interventions being co-opted by the wealthier peasantry, this question deserves serious consideration. The variation in land and tree tenure patterns between large and small livestock producers should be studied as a corollary to the issue of co-option.

In addition to the number of animals raised, differentiation between subsistence and commercial producers should be assessed. The management goals and practices of these groups will vary by the size of their land base, the relative importance of income derived from small ruminant production, and the extent to which people's daily subsistence relies on livestock production (Bennett et al. 1986). Subsistence production tends to be a low input/low output system while alley farming requires higher input to obtain a higher, but moderate and sustainable output.

Tenure and Size of Agricultural Landholdings

The size of agricultural holdings may also be linked to tenure and alley-farming adoption, though this has not yet been proved to be the case. Larger landholders may feel that they have less to lose than smaller landowners in trying alley farming, or they may use their greater resources (for example, hired labor) to implement this permanent cropping system in order to strengthen (or even acquire) tenure over the land. Given that many state-land laws predicate tenure on use of the land, this is a plausible scenario.

Determining the size of landholdings remains problematic at best. Although high accuracy is rarely necessary, most research relies on estimates by researchers, who are rarely trained in land-survey techniques, or by farmers, who respond in local measurements which are then converted to conventional units. A comparison (McLain and Stienbarger 1988) of farmers' estimates with actual land measurements (obtained with hand-held surveying instruments) on fragmented agricultural holdings in Haiti found that farmers' estimates bore little resemblance to reality and were consistently neither high nor low. Despite this unreliability, relative sizes (or perhaps numbers of parcels) can still be a useful tool in making comparisons, though not for statistical purposes.

Gender Differentiation

In each area proposed for further study, we should consider gender differences in looking for a profile of adopter and nonadopter characteristics. In a Nigerian case, Okali and Sumberg (1986) state that women defer to men in decisions on agricultural and livestock pursuits. Spiro (1981), however, found that the situation is much more complex and that women in Nigeria do take an active part in land-management decision-making. It appears that Okali and Sumberg's (1986) questions were administered by male interviewers, a practice that has often proved unreliable in eliciting responses from women. In an area such as southern Nigeria, where 60 percent of the adult population is women who own over half of the livestock, women's roles in land-use decision-making may be an important determinant in how alley farming is received.

Although we have already discussed many of the findings on gender differences in the Nigerian study on alley-farm adoption, a couple of observations remain. First, women alley farmers in the southeast were all widows (Francis 1987). It may be that life-cycle stages of women determine the extent to which they have independent access to the resources necessary to engage in alley farming. Francis's finding indicates that widows possess a greater

level of autonomy in decision-making. As we saw earlier, this was found also to be the case for commercial trees in certain cocoa-growing areas of Ghana. In such situations, involving women in alley farming in other regions may require addressing specific sub-clienteles, such as older women. Another finding showed that even when women did not have alley farms themselves, they frequently worked on their spouses' alley farms, weeding or cutting browse. Francis (ibid.) states that both women's and men's animals benefited from the browse. In such cases, we should determine, if possible, whether women's welfare is undermined or enhanced by their spouses' adoption of alley farming. As pointed out before, women's labor is often undervalued or underestimated. By answering these questions, we can hope to ascertain what conditions favor introducing alley farming without undermining the standard of living of other community members.

Research Agenda

We have broadly outlined the processes involved in lineage-based land tenure systems as well as the range of tenure types that might be found in West Africa. Of course, generalizations about dynamic systems that vary even within small geographic areas can serve only as a reminder of the need to examine carefully the elements of a given region's tenure systems. Furthermore, we have seen that tree rights interact with land tenure to influence how farmers view land-use strategies, such as alley farming, which link access to land to rights to tree products. It is this link that makes delineation of land and tree tenure systems and existing land-use patterns a critical goal in the research process. Once we know what tenure systems exist in an area, we can then turn our attention to investigating the interactions and relationships between tenures and alley-farming interventions. The following factors need to be considered: spatial arrangements, gender differentiation in household decision-making and in resource access and use, production characteristics and use, and livestock integration (feeding system, type, goals). As we have demonstrated, there are several important categories of questions that need to be addressed in our research, a brief summary of which follows.

Land Tenure. One of the most important considerations is at what level land allocation and management decisions occur. As Francis (1987) discovered, community-controlled parcel rotation discouraged alley-farming adoption. These community controls may be exercised at various levels, or not at all, and individual parcels of a farmer's holdings may be controlled differently. Research is needed to establish the terms and conditions of farmer access to land. Those farmers who have secondary access rights to land on a short-term basis are probably less likely to find alley farming an appealing investment than those farmers with some guarantee of long-term access. Land tenure types (means of acquisition) may include inheritance, purchase, gift, pledging or pawning, borrowing, renting, and sharecropping. Additionally, some lands are used by community members at-large who possess use rights such as grazing and gathering. Most importantly, community rights may be superimposed over nominally individual use rights, either on a seasonal basis or for a particular purpose. To eliminate ambiguity in our analysis, these rights and their attendant terminology must also be carefully defined.

POSSIBLE SCENARIO FOR RIGHTS TO TREES

MANAGEMENT FACTORS		RIGHTS VESTED IN:
propagation	self-sown	community/land user
	planted	planter
tree product use	subsistence	varies by use and land tenure
	commercial	generally planter
tree species	indigenous	varies by use and land tenure
	exotic	planter/community
loci of land control (self-sown)	community	community as whole/individual currently assigned parcel
	individual present on farm	land controller
	individual absent from farm/farm in fallow	community
land tenure	purchased	owner
	inheritance	varies by land control loci
	lease, rent, pledge	owner, but will vary by contract conditions and species/use of trees
	sharecrop, squatting	owner, user rarely has rights to trees

Tree Tenure. Fortmann (1988) provides a framework for analyzing tree tenure systems based on the bundle of rights that people have in trees. Understanding the existing rights in tree and land tenure not only provides us with a tool for analyzing conditions of adoption but also allows us to learn which groups may be disenfranchised, a point often overlooked in planning and assessing interventions. Women and the landless are often groups that depend on "common" resource areas which may shrink with the introduction of permanent cropping. As we see in the chart on the preceding page, certain associations can be made between tree characteristics and their tenure.

State Rights. The rights reserved by the State play an important role in influencing farmers' decisions on tree planting, both by the actual restrictions placed on specific species and by the regulatory process itself. For the immediate future, we need to assess the extent to which national codes and laws affect the willingness of farmers to adopt intensive land-management strategies such as alley farming.

Gender. We have found that intra-household access to resources and resource management differ by gender. Women's priorities will frequently differ from those of men because their resource base is different, as are the societal rules and constraints within which women operate. Therefore, we need to ask questions about the differences and similarities in male and female roles in decision-making, formulating land-use strategies, labor requirements and distribution, and rights of allocation of and access to tree/shrub products necessary for alley farming and other agroforestry approaches. We should also address the relationship between resource access and men's and women's life-cycle stage.

Livestock Production. A major goal of ILCA's alley-farming efforts is to promote sustainable livestock production. Attaining this goal requires that our research ask how tenure and livestock production/ownership patterns will influence adoption of alley farming. Will certain groups find alley farming more advantageous than others? And if so, what common characteristics do these groups possess? Does adoption correlate with livestock type, production goals, or feeding patterns? For what purposes do adopters use alley farming?

Studies will be designed to assure that each research site will provide comparable information. This will allow us to look at trends and to establish commonalities and differences that might apply to other regions and situations. The actual methodologies will be discussed in a separate paper, but at this point it is worth noting that general survey data of large samples tend to provide "snapshots" at a specific time of a given situation and, therefore, afford only limited insight into how systems work. A modified case-study approach provides a much better understanding of the processes at work in dynamic systems (such as tenure). Hence, a combination of these approaches will be used.

Collecting and analyzing information on these and related questions will promote our understanding of how tenure shapes the incentives to adopt intensified land-use management inherent in agroforestry strategies. Additionally, the research promises to expand our knowledge of how the introduction of agroforestry technologies interacts with existing management practices to evolve new land-use patterns and shape tenure systems.

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