

# **Fencing agricultural land in Nigeria: why should it be done and how can it be achieved?**

Field investigations on pastoralist-farmers crises areas and enhancement of MISEREOR's partners interventions in Nigeria, Phase 3

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SUNMISSION FINALISED FOR MISEREOR/JDPs

Roger Blench  
8, Guest Road  
Cambridge CB1 2AL  
United Kingdom  
Voice/ Ans (00-44)-(0)1223-560687  
Mobile worldwide (00-44)-(0)7847-495590  
E-mail [rogerblench@yahoo.co.uk](mailto:rogerblench@yahoo.co.uk)  
<http://www.rogerblench.info/RBOP.htm>

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**ABSTRACT**

Agricultural land in Nigeria has historically not been fenced because land was abundant, farms moved frequently under slash and burn systems, and disease kept pastoralist cattle out of most regions of the country, reducing the problem of livestock incursions. However, the unprecedented increase in human population in the twentieth century has led to increasingly codified systems of land ownership, and the movement of cattle into new ecological zones, leading to conflict between farmers and pastoralists, but also friction with other farmers. The paper considers technical options for enclosing land, including the comparison industrial fencing versus live fencing. Nigeria has changed and agricultural systems that were appropriate in pre-colonial times are no longer realistic.

Keywords: Nigeria; fencing; policies; agricultural land

## 1. Introduction: traditional land tenure in Nigeria

Land tenure throughout Sub-Saharan Africa is usually described as ‘customary’, in other words, by oral agreement in the community. This makes sense where land is abundant, relatively infertile and where new areas of bush must be opened up regularly. Except on the periphery of large towns, land could not be bought and sold. Typically, strangers could approach the chief and request allocation of an area of bush. The owner of the farm was the person who cleared it. Systems like this still persist in low-density areas of Central Africa, but elsewhere they have been rapidly disappearing in the twentieth century as land becomes a more valuable resource. The complexity of these systems in West Africa has been described in Delville et al. (2001, 2002) as it was in the early 2000s. Already these descriptions seem like historical documents, as attitudes to land ownership have developed rapidly in the last two decades. A consequence of this open attitude to access to land was that fields were rarely fenced, as this represented a high investment in labour for no obvious return.

Ownership of trees and their products was frequently kept distinct from ownership of the land area. For example, is an area of unfarmed bush includes economic trees which are regularly exploited by the community or an individual, the sale or leasing of that land may exclude rights to harvest fruits or other products FAO 1995. Similarly, the rights over planted trees may be the cause of some dispute with traditional tenure systems. Broadly speaking, farmers leasing, borrowing or using land on a temporary basis may not have the right to plant unless this is explicitly included in the agreement. Typically this is not an issue in the subhumid areas, where most farmers own their land, but further north, in the high-density regions of the semi-arid zone, leasing (and even sharecropping) is far more common, and this must be taken into account when recommending fencing options.

Agriculture, in Nigeria, as in most of Sub-Saharan Africa, was based on the swidden or ‘slash and burn’ system. The principle was to clear an area of bush by burning and then make use of the ash thereby generated as fertiliser. After harvest, the fields were again burnt, and this continued until the natural soil fertility was exhausted. The farmer would then move to a fresh area of uncleared bush and begin the cycle anew. The colonial authorities were opposed to this practice and made many attempts to introduce chemical fertilisers and types of composting, but these were not sustainable. The one exception to this was the high-density areas such as the Kano Close-Settled Zone (KCSZ), the fields around large settlements which were kept fertile with manure, ash and urban waste (Mortimore 1993).

Rather unusually, globally speaking, Sub-Saharan agriculture was based almost entirely on rainfed systems. Unlike the complex irrigation networks which have dominated the Middle East and China for millennia, African farmers made little or no use of rivers for agriculture. Rivers and lakes were reserved for fisheries. Contra-season agriculture along waterways was introduced in the medieval period, when the *shaduf* water-lifting device was brought from North Africa along the trans-Saharan trade routes. In Nigeria, the main adopters were the Hausa, and in pre-colonial times, they had begun dry-season horticulture along the rivers of Northern Nigeria. With the establishment of British rule, Hausa farmers began to move southwards into the Middle Belt and to claim land along the rivers. By and large the indigenous peoples were willing to allocate this land to the migrants, because they did not perceive it as having economic value.

This situation began to change in the 1980s, when cheap petrol pumps suitable for irrigation were introduced. Population and thus demand for vegetables, increased rapidly, and the Hausa migrants realised that a great deal of money could be made by supplying the market with tomatoes, for example. Dry-season horticulture multiplied and the question of land ownership began to be contentious, together with the issue of access to rivers by cattle for drinking. In the 2000s, this type of market gardening had spread to the indigenous peoples, who now valued the land they had once given away. Increasing conflicts over land claims stimulated both the legal processes involved in land ownership and the introduction of fencing to assert those claims.

Since the 1960s, when, following new oil wealth, economic expansion began to place great demand on land, there has been growing emphasis on legal, documented ownership. In Nigeria this was achieved through the Certificate of Occupancy (C of O) process, whereby an individual could claim ownership of a plot of land

either through the local or state government. The issuing of Certificates of Occupancy was typically taken advantage of by medium to large-scale farmers, or those who were migrants and had some disquiet about their long-term rights over the land.

In 1978, the Federal Government passed the Land Use Decree, which effectively transferred the ownership of all land to the Government. The logic of this has never been very clear; either it was to prevent predatory land grabs in urban areas and ensure that customary tenure was reinforced, or it was in fact to give legal support to developers and large-scale farmers. In the event, it has been used for the latter purpose and both peri-urban areas and rural land have passed into the ownership of powerful individuals. For most smallholders this has made little difference until recently because their land was not perceived as valuable. However, the relentless expansion of cities and the pressure on rural areas, especially along rivers, for food production, implies very soon that the legal provisions for land ownership will be relevant to all citizens and 'wild west' climate currently prevailing will need to be dealt with or else there will be an increase in social friction.

## **2. Why has pastoral movement become a problem?**

Until 1900, the beginning of the colonial era, the great majority of cattle were confined to the extreme north of Nigeria, indeed the Sahel Belt of West Africa, because of the threat of trypanosomiasis, carried by tsetse flies. By the 1920s, the authorities had both begun to introduce new veterinary medicines, and initiated programmes of tsetse spraying, which reduced infestation substantially in the Middle Belt. This stimulated the nomadic pastoralists, mainly the various clans of the FulBe [Fulani], to move south and graze on the more abundant grasses, as well as allowing their herds to drink at the extensive rivers (Blench 1991, 1994).

This was unproblematic in a period of low population density and scattered farms. A system of cattle routes and grazing reserves kept herds and fields apart, except where farmers agreed to allow cattle to graze on crop residues in exchange for manure. However, as the human population increased, so did the land under agriculture. The cattle routes were farmed and the riverbanks increasingly under horticulture. The pastoralists saw this as an encroachment on 'their' land, while farmers saw their right to claim unfarmed bush.

Needless to say, the consequence was an accelerating spiral of crop damage through cattle entering farms. Most of this was probably accidental and usually settled when the herder paid the farmer compensation. But the situation has changed in two important ways. The FulBe are using ever younger and less experienced herders. Indeed it is not uncommon to children under ten years of age managing large herds. At the same time, a system where families no longer move together but instead send only young men, has led to intentional crop damage. Why graze on increasingly thin pasture resources if you can allow the cattle to enter a field of growing crops? In a country like Nigeria, where the civil authority is extremely weak, these practices are effectively uncontrolled. The result has been a significant increase in conflict between herders and farmers, and the proposals for anti-pastoralist open grazing laws in some states. These have been passed in Ekiti and Taraba, and are currently being read in Benue State.

The solution to this clash of conceptions of access to land is not easy to find, mainly because both sides have a remarkable faith in the power of government, something which does not correspond to empirical reality. Typically government sends in the police, the army or vigilantes after a clash has occurred. Unfortunately, this is at best a very temporary solution, and the cycle renews itself. Similar, NGOs typically try and bring together the communities in peace processes and dialogue. This has similarly proven unsustainable even in the short term.

In many parts of the world, agricultural land has gradually been fenced, as land tenure has become established and the rule of law is broadly functional. However, the suggestion that land be fenced often meets strong resistance in Nigeria. Farmers feel this is an unnecessary cost in both cash and labour. A century ago, this would have been true, but in the present era, it is one of the few strategies with a chance of producing a positive outcome. This working paper looks at why the introduction of fencing is almost inevitable, given global trends, and what species or mix of species have potential in Nigeria.

### 3. Is fencing the answer?

#### 3.1 Enclosures: a global pattern

The enclosure of land in response to increasing population pressure and monetisation of the economy is a global trend. Temperate Eurasia, where agriculture is also largely rainfed, originally had a system of ‘customary rights’, whereby, for example, a pig-owner or shepherd had the rights to graze their animals in a forest or pasture over a certain period. This kept the flocks separate from the growing crops and no fences were necessary. However, from the medieval period onwards when increased demand for meat and wool meant that large-scale producers required exclusive access to land, enclosures, the abrogation of customary tenure and the fencing of land, became the norm. This was highly controversial in the late Middle Ages and led to civil protests (e.g. Allen 1992). Nonetheless, enclosed land became the norm across the most fertile areas of middle Europe and Asia. Similarly, in the New World and Australia, fences were unknown in the pre-European era, but once sheep and cattle were introduced, ranches and enclosed farms became the norm.

#### 3.2 Why introduce fencing in Nigeria?

These well-documented historical processes reflect trends similar to those which Nigeria is currently experiencing. Large cities and high urban demand for food stimulate producers to expand the area under cultivation, and to adopt more intensive agricultural practices. These enterprises are not economic unless large-scale farmers can establish secure land tenure and be fairly sure that livestock will not invade their farms. As their counterparts in Europe discovered, this can only be achieved by enclosing the land.

Interviews on this topic often receive the objection that ‘fencing is not our custom’ and it is ‘too expensive’. Despite the willingness of Nigerian farmers to adopt icons of modernity, such as the mobile phone, in some areas they are innately conservative. Indeed fencing is not customary, but this was at a time when the human population was a twentieth of the figure today. Large-scale supply of foodstuffs to cities of millions is not customary either, but this is now evolving. The objection about the expense is only relevant if modern fencing is under consideration. Live fencing is cheap and sustainable.

More importantly, emerging trends are such that the farmer who grasps that fencing is the key to reducing conflict with herders and asserting a claim to land will be successful in the long term. Credit is also increasingly a component of rural agricultural production and the farmer who fences will find it easier to get loans on more favourable terms, as the risk to the crop is reduced. So the introduction of fencing can be haphazard, and fragmented, or it can be managed and bring benefits to early adopters.

#### 3.3 Possible fencing strategies

There are essentially four possible strategies for fencing land, which are shown in summary form in Table 1. The category of fencing is given together with the general level of cost and the disadvantages of each strategy.

**Table 1. Costs and disadvantages of fencing strategies**

Category	Cost	Disadvantages
Industrial fencing only	High	Susceptible to theft, or destruction by pastoralists
Mixed live and industrial	Medium	Unlike to be stolen, but still easily destroyed by pastoralists
Single species live fence	Low	High establishment cost (and in some species, long establishment times)
Mixed species live fence	Low	High establishment cost

Industrial fencing is discussed below in §3.4. The option to mix live and industrial fencing, for example, stringing barbed wire between trees such as *Newbouldia laevis* (§4.1.3), is open to the same objections as industrial fencing in terms of cost. The main strategy, and the one in use in parts of Nigeria, is the use of single species. Some of the species already in use are considered in more detail in §4.1. The main objection is establishment time. For example, if *Euphorbia kamerunica* is planted from cuttings, it may take up to three years to create an impenetrable fence. Some of the trees listed in §4.2 can take even longer.

Nonetheless, if a nitrogen fixing species is used, this is a minor investment in terms of the long-term sustainability of the farm, especially in an era when fertiliser is too costly for most smallholders.

In terms of sustainability, an even more attractive strategy is the mixed species live fence or living hedge. In this, the farms are surrounded by thick hedges composed of a large number of species, including fruit-trees and leguminous green manures. Such systems are in use in parts of West Africa, particularly the Fouta Djallon Plateau of Guinea and parts of Northern Cameroun. Portères (1965) presents a remarkable overview of the many plants used in living hedges across West Africa, listing more than one hundred species. Such systems have grown up over centuries and trying to introduce a complex mix of species in a short period of time would present a challenge to any agricultural extension service. Nonetheless, it is worth bearing in mind that such living hedges are more robust than single species, which are vulnerable to insect pests and other pathogens.

### 3.4 Industrial fencing and its economic feasibility in Nigeria

Typical agro-industrial fencing in Europe and America consists of fence-posts and barbed wire. These are relatively cheap as they can be manufactured on a vast scale and can enclose very large areas. They are not subject to theft or (in general) intentional breakage, because of the system of land tenure. Neither of these conditions hold in Nigeria. Barbed wire is too expensive to enclose large areas, and is regularly subject to theft or intentional breakage. A herder wishing to access crops or grazing simply destroys the fence. An example of this is the Mambila Plateau in Southeast Nigeria. The Mambila is a high grassy upland, largely disease free and ideal for cattle production. FulBe herders entered the region in the 1900s and have long enjoyed the favourable conditions (Blench 1991). In the 1980s, a number of generals claimed ownership of large swathes of land and fenced it off, intending to create European-style cattle ranches. However, they were never able to employ managers with the skills or motivation to sustain these enterprises, and within a few years the nomadic herders had broken down the barbed wire and the land reverted to open grazing.

The other problem of barbed wire is that it has to be very densely strung to prevent goats entering fields. Nigeria goats are both small and persistent, and unless there are many strands, they will be able to pass through. It is unlikely that modern fencing will be either practical or economic in Nigeria for some decades.

## 4. Live fencing options

### 4.1 Already in use

#### 4.1.1 'Cactus' (*Euphorbia kamerunica*)

*Euphorbia kamerunica* is usually known as 'cactus' in Nigeria (Photo 1), although it is not a true cactus, since the cacti are New World genera. The plant is indigenous to West Africa, and is used as a fence-plant in a region across from Chad to Nigeria and also in Ethiopia (e.g. Seignobos 1980). It has spines which prevent animals approaching and a poisonous milky sap, formerly used as an ingredient for arrow-poison. It seems to have been introduced as protection for houses in Central Nigeria in the slave-raiding era, and was later adapted

Photo 1. 'Cactus' (*Euphorbia kamerunica*)



Source: Wikimedia Commons

to fencing of fields in high-density regions such as the Jos Plateau. It is now found all across the Plateau and is being newly planted, as holdings of smallstock (principally goats and pigs) are on the increase. The

advantage of Euphorbia is that it is very effective at deterring livestock incursions and is fire-resistant. However, the spines are quite dangerous to children, as is the toxic sap, and it has no other advantages, contributing no useful products or nitrogen to the soil.

Dolbeare (2016) is an interesting account of the attempt to extend the planting of fences of *Euphorbia balsamifera*, a closely related plant, in the Sahelian area of Senegal. This Euphorbia species also creates extremely dense hedges and is effective in countering soil erosion. Despite the relative ease with which it can be propagated, and the low cost, Dolbeare's survey showed that despite the acknowledged benefits, farmers tended to wait for NGOs rather than take positive action to plant Euphorbia themselves.

Spiny species can also be combined with nitrogen-fixing trees to create impassable hedges. For example, in southwest Ethiopia the shrub *Erythrina abyssinica* is combined with *Euphorbia tirucalli* to create a fence which increases soil fertility and also deters animals.

**Photo 2. Cactus (*Euphorbia*) fencing on the Jos Plateau**



Source: Author photo

#### 4.1.2 Physic nut (*Jatropha curcas*)

The physic nut, *Jatropha curcas* (Photo 3, Photo 4), is a shrub which creates dense hedges, through which animals do not easily pass. Although of New World origin, it is well established in West Africa. The nut is extremely bitter, and is widely used as a purgative medicine, hence the name. The bitterness of the plant deters animals from trying to browse the hedge, and the fresh seeds are actually poisonous to livestock. However, the physic nut has another benefit, in that the nut is extremely oily, and can be used both industrially, when planted on a

**Photo 3. Physic nut (*Jatropha curcas*)**



Source: Wikimedia Commons

**Photo 4. Physic nuts**



Source: Wikimedia Commons

large scale, or for lighting lamps in rural areas. As a biofuel it is widely used outside Africa and its use for aviation fuel has been demonstrated. As an oil-plant, it is well-established in East Africa, and is also widely used in Mali (Henning 2002). The physic nut is known in Nigeria, but not much used. Given its success in other African countries, it is an obvious choice for further extension. Experience in Mali and other Sahelian countries shows that *Jatropha* is an effective windbreak, but that oil yields from the nut are low in semi-arid environments. However, the areas in Nigeria where it would be most useful are all in the subhumid zone, where rainfall is sufficient.

### 4.1.3 Boundary tree (*Newbouldia laevis*)

The boundary tree (*Newbouldia laevis*) was probably domesticated in Cameroun (Photo 5), and is widely planted in Nigeria as a fence tree. As can be seen, it does not grow densely enough to prevent animals entering a field, so it would have to be interplanted with a smaller shrub. *Newbouldia laevis* is widely appreciated for the medicinal properties of its bark, so there are no cultural barriers to acceptance.

**Photo 5. Boundary tree (*Newbouldia laevis*)**



Source: Wikimedia Commons

### 4.2 Alternatives

The plants discussed in the previous section are highlighted because they are already in use in Nigeria, albeit on a small scale. Many other trees and shrubs are possibly candidates; they would need to be evaluated for their growth potential in particular areas, as well as the value of their products to local communities. Table 2 lists a few well-known species with comments on their uses and disadvantages.

**Table 2. Further alternative living fence species for Nigeria**

English	Latin	Comments
African myrrh	<i>Commiphora africana</i>	Shrub which creates a thorny hedge. Grows in Nigeria, but not generally used as a hedge. In East Africa, used to enclose stock and prevent them from lion attacks [!]. More suitable in semi-arid regions
?	<i>Erythrina abyssinica</i>	Africa-wide indigenous species which can be planted tree and which is nitrogen-fixing but must be combined with thorny plants to create a hedge.
quickstick	<i>Gliricidia sepium</i>	A fast-growing medium-sized tree originating in Central America, but now spread widely across the tropics. Valuable as fodder, a green manure, nitrogen fixing, soil stabilisation and firewood. Known in Nigeria but not widely used.
jumbay	<i>Leucaena leucocephala</i>	A small tree of Central American origin, touted as a ‘miracle tree’ in the 1970s, and valuable as a green manure and nitrogen fixer, it can grow extremely quickly However, highly susceptible to psyllids, insect pests and now little used. <i>Leucaena</i> contains mimosine, a toxic amino acid, which can only be metabolised by animals in some areas, which implies that it should be used only in moderate quantities. <i>Leucaena</i> has the potential to be an invasive plant in some areas.
?	<i>Caesalpinia bonduc</i>	Native to West Africa, has thorns which can deter livestock and nitrogen-fixing



**Photo 6. African myrrh, *Commiphora africana***



Source: Creative Commons

**Photo 7. Jumbay, *Leucaena leucocephala***



Source: Creative Commons

**Photo 8. *Erythrina abyssinica***



Source: Creative Commons

Photo 9 shows the thorny *Caesalpinia bonduc*, ayo, which seems to be highly suitable for West Africa.

**Photo 10. Quickstick, *Gliricidia sepium***



Source: Creative Commons

**Photo 9. Thorny plant, *Caesalpinia bonduc***



Source: Author photo

## 5. Conclusions

The population of Nigeria is rising inexorably and imports will no longer be available to make up the gap in the food supply. Inevitably, more and more land must be turned over to agriculture. Traditional agriculture developed in a period of low population density when fencing was unnecessary. The broad trajectory is for fencing to be gradually introduced, to demarcate land ownership and prevent incursions by both people and livestock. Industrial fencing is too expensive to be adopted on a wide scale and is furthermore less sustainable as it is more susceptible to theft. Live fencing is therefore the best option. It is already used in parts of Northern Nigeria and to create boundaries within villages. Existing systems, for example, Euphorbia, keep out animals effectively but contribute nothing to household income in the way of useful products. Many options exist, all of which are already in use in other regions of Sub-Saharan Africa, which could be more productive, both in increasing soil fertility, preventing erosion and in producing saleable products, such as oils and fats. Introducing and extending such systems would improve productivity in rural Nigerian agriculture as well as reducing the incursions of pastoral livestock.

Economic and ecological conditions in Nigeria vary and it is unlikely that one plant, or mix of plants, will be suitable everywhere. However, if a programme of evaluation of fence-plants were undertaken and the results were then adopted by agricultural extension services, this could contribute to a rational strategy for agricultural intensification. This type of agroforestry is a staple of NGOs and CSOs in other parts of Africa, but Nigeria has been poorly served in this respect. The use of industrial fencing by well-funded agricultural development projects has contributed to a rather negative stereotype of live fencing in Nigeria. This can and should change.

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