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Plantain*

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*Bananas in the
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for domestic consumption and for local and
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Identification of banana production systems in urban and peri-urban agriculture in Yaoundé

S. Lemeilleur, L. Temple and M. Kwa

Urban development is one of the main features of socioeconomic change familiar to developing countries: it presents the problem of increasing the food supply to respond to the food requirements of the urban consumers (Dury *et al.* 1999). Although peri-urban agriculture provides favourable conditions for the intensification of production systems, there is little work on the subject which applies particularly to banana. We propose to do this for the peri-urban agriculture of Yaoundé (1.4 million inhabitants), the capital of Cameroon, situated in the Central province.

Methodology

Peri-urban agriculture has been defined in several ways (Moustier et Pages 1997). In this study we consider banana production to be peri-urban if it satisfies the following conditions :

- It takes place within the boundary of the urban district of Yaoundé. In this area, the *Délégation départementale de l'agriculture* (agricultural departmental delegation) estimates the area occupied by banana

plants to be 151 hectares, or 9.7% of the total cultivated area (Belinga 2000). Although this area has not decreased over the last five years, the total cultivated area has fallen by about 30%.

- It lies within a 30-km radius around the town, where building creates competition for the use of land (Moustier et Pages 1997) and more than 50% of farm production is sold in urban markets.
- It concerns those farms situated between 30 and 60 km from the town whose whole production is to be sold on urban markets.

In the absence of a recent agricultural census, the people surveyed belong to a non-random sample identified from information provided by experts working in the industry (PNVA technicians and NGO etc.). The people chosen had to be plantain or banana growers who sell at least part of their crop. The small sample (29 farms) prevents statistical analysis. This small size is however compensated for by the fact that nearly all the 50 gardens were visited, allowing us to present cultural practices, the types of growers and their intensification strategy in the peri-urban zone.

Production system

Results and discussion

Characteristics of the production systems

Peri-urban growers are characterized mainly by the fact that they do more than one job. Thus 71% of the farmers (75% of whom are men) have a second source of income: the grower himself has two jobs or else other members of the family bring in a non-agricultural income.

The great majority of growers having being born in their production zone, their access to the land is due to inheritance. However one must distinguish between "land ownership" and "land occupation". In fact, because of land shortages or financial pressures, many growers have sold part of the family land. They can continue to cultivate these lands, without the right to built on them, so long as they are not forced out. This distinction as to the nature of the land entitlement is an important factor differentiating systems of production. Producers who risk being forced to leave do not invest in semi-perennial crops such as bananas, but prefer small-scale market gardening.

Faced with a shortage of land, fallows, when they exist, are reduced to about two years for non-owners and five years for the others. They vary in size between 0.5 and 10 ha, with an average of 2.5 ha per farm. Forty-three percent of producers still own forests on their farms but the surface areas of these could not be estimated.

The size of the farms varies from 0.08 to 160 ha. The cultivated areas per garden are not correlated with the size of the farm. The majority of growers (88%) cultivate less than five hectares. This area corresponds to a "balance" between what it is possible to cultivate in terms of labour, linked to the number of active individuals, and what needs

to be cultivated to meet the needs of the household. Farms of more than five cultivated hectares often belong to farmers for whom agriculture is not the primary activity (7%) and who employ permanent paid workers. On farms of less than one hectare there are no paid workers. The farms consist on average of three gardens of between 0.04 and 2.7 ha, with an average of 0.77 ha per garden (Table 1).

Seventy percent of banana plantations are situated on slopes of varying steepness due to a shortage of land (Table 1). This localization has various advantages, such as better exposure to the sun and easy water management during the main rainy season, but it brings with it problems of erosion, leaching of fertilisers after heavy rain and exposure to the prevailing wind. Harvesting the bunches is also more difficult on the steeper slopes.

Within the town, some growers cultivate in low-lying areas which are flooded in the rainy season (Temple-Boyer 2002). Near streams, these growers prefer planting dessert bananas which tolerate excess water better than plantains.

Three quarters of the gardens are close to houses (on average 500 m). In fact the first land to be sold is often that which is least accessible and farthest from habitation. The distance from the home to the garden is an important factor determining the production system since, with limited means of transport, the gardens farthest away receive the least attention.

The main problems identified (apart from theft of the bunches) by the growers in the peri-urban zone are weevils and nematodes. The lack of access to pest and disease-free land and the short duration of fallows accentuate damages as time passes. Thus many of the losses described are due to toppling, often as the combined result of diseases, pests and wind. Black leaf streak disease is rare. This could be explained by the common practice of deleafing (practised for a variety of reasons) or because of the isolation of the gardens and their being surrounded by buildings, which limits the spread of the disease by the wind.

Planting densities vary from 300 to 1300 plants/ha. In high density plantations, the suckers are planted in lines. Among the cultural practices recorded, one should mention disbudding to replant new gardens. Small gardens near to houses often receive household refuse, ash from cooking and animal manures. Some growers make compost or manure. For all the other gardens, fertilization

Table 1. Characteristics of banana plantations according to farm type in the urban and peri-urban farming zones of Yaoundé.

Farms	Self-subsistence (intra-urban)	Self-subsistence (peri-urban)	Commercial (peri-urban)	Commercial (rurban)	Total
Farms (%)	15	44	34	7	
Mean garden area (ha)	0.07	0.64	0.91	0.91	0.77
Topography (%)					
Low-lying	40	0	0	0	6
Plains	40	25	20	0	24
Slopes	20	75	80	100	70
Bananas/1 food crop (%)	-	25	-	-	9
Bananas/food crops (%)	100	33	21	-	36
Bananas/cocoa (%)	-	33	29	-	23
Bananas/pineapple (%)	-	-	7	-	3
Bananas/palm tree (%)	-	-	7	33	6
Monoculture (%)	-	8	36	66	23

is hardly practised, apart from spreading the cleared weeds and leaves.

The growers weed twice a year. Deleafing is practised everywhere except on gardens of dessert bananas where growers do little to the crop. Residues from weeding and deleafing are used for mulching which conserves soil moisture during the dry season and acts as a fertiliser. One disadvantage is that leaves attacked by black leaf streak disease are used for mulching, just like the others.

Ridging is practised on a quarter of the farms. To prevent toppling, mentioned as one of the main types of damage, staking is commonly practised (85%) in the peri-urban zone, but hardly at all within the town because of lack of stakes.

Production systems

One can distinguish three systems for producing bananas. In contrast to rural areas (Temple et Châtaigner 1996), these do not co-exist, or hardly, within a given farm (Table 1).

Bananas in association with food crops: Practised primarily out of a desire for food security, intercropping also means that instead of exposing one crop to a given soil and pest pressure, the risk is spread over several crops. In our survey, 9% of growers mixed only one food crop with bananas - cassava (6%) or macabo cocoyam (3%). Thirty-six percent mixed bananas with from two to seven food crops per garden (cassava, macabo cocoyam, maize, groundnut, yam, potato). Of these, 36% also included vegetables and 18%, fruit trees.

Bananas intercropped with cocoa: The Central province was once an important cocoa area. Cocoa has been steadily abandoned in peri-urban agriculture but the cocoa trees are rarely cut down. They secure the land in terms of ownership or rights of use. As land shortage limits the possibility of obtaining extra land for growing food crops, 23% of growers plant food crops and fruit trees among the cocoa trees.

Bananas mixed with pineapples: This mixture is not yet widely grown - only 3% of producers do so. However pineapple sells well and it is advised to grow it in rotation with banana to reduce pressure from nematodes.

Bananas mixed with oil palm: 6% of growers practise this association, often on large areas from one to several hectares. Plantain however is only intercropped temporarily during the first few years of the oil palm plantation, before the

latter begins to produce (Raflegeau et Temple 2002).

Banana monoculture is practised by 23% of the growers. These gardens are intended specially for market production.

Classification of production systems

The table classifies the sample according to three criteria: producer's objective (home consumption or sale), position of the farm (intra-city, peri-urban, rurban¹) and access to the production factors, land and capital (Table 2).

Self-subsistence production systems

The low-density building pattern in Yaoundé encourages farming in the space between the buildings. This urban farming fulfils subsistence objectives. The farmers who do it have other jobs in town (carpenters, mechanics, shopkeepers etc.); but these do not bring in enough income. Without any agricultural training, they farm the land to feed themselves and cut down their food bills. They can access the land either by buying it or it can be "loaned". In the latter case, it is often an illegal occupation of low-lying areas, but it is allowed so long as it is not reclaimed.

In areas situated between 10 and 30 km from Yaoundé, the country folk near roads or tracks feel they belong to the urban environment. They are often born in the area where they farm the land they have acquired by

¹ Rurban describes the transformations of smaller towns that are rural geographically, but urban in cultural orientation.

Table 2. Characteristics of banana production systems in the peri-urban zone of Yaoundé.

Farms	Self-subsistence (intra-urban)	Self-subsistence (peri-urban)	Commercial (peri-urban)	Commercial (rurban)
Farmer's origin and education	City dweller Various educational levels	Rural Low educational level	Rural Average educational level	City dweller High educational level
Farmers' characteristics	• Urban worker	• Elderly • no children • Inadequate urban salary • Land sold off	• Urban worker • Agricultural training • Young farmer	• Urban background
External source of capital	No	No	Yes	Yes
Mean farm size	0.17 ha	11 ha	32 ha	57 ha
Mean area cultivated	0.17 ha	3 ha	3 ha	19 ha
Mean area of bananas	0.17 ha	1.5 ha	1.8 ha	2 ha
Paid labor	No	Rarely (or occasional)	Yes (occasional)	Yes (permanent)
% sold on average	37.5	35.5	72.6	90
Constraints encountered	• not owner • no fallow • small area • flooding of gardens	• no longer owner • little fallow	• high bunch loss • low productivity	• high bunch loss

inheritance. Many had other jobs (accountants, servicemen, masons, drivers, dressmakers) before returning to farm the land.

In the peri-urban area, the farmers are of three kinds: 1) elderly people (over 70 with no descendant) who employ labour; 2) women who run the farms themselves and thus contribute to the household income and 3) people who cultivate land they have sold. Because of their precarious land rights, they tend to grow vegetable crops, but keep one or two gardens for food crops where they grow plantain bananas for home consumption.

Market-oriented production systems

In the peri-urban zone, the farmers, who are relatively young (40 to 50 years) and quite well educated, have acquired their land by inheritance and have another source of non-farming income (business, nurses, tool operator etc.). Most have had some agricultural training. There are also some women whose husbands work in town and finance the farming activities of their wives. Finally there are young people who gradually inherit the land and capital of their parents. These are the ones most likely to grow two crops together, or simply banana monocultures.

Sixty-six percent of these farmers have a source of income outside the farm that covered the initial investment: 55% buy suckers; 33% use some insecticides and sometimes chemical fertilizers.

In rural areas, the farmers live in their home village and go every day into town where they have a second home. Their urban activity (doctor, lawyer etc.) is their main job. They are "part-time farmers" and regularly obtain technical advice from the research and extension services. They are young and only recently settled. Their farms are more than 40 km from Yaoundé. They are about 60 ha, and include large areas of forest. On average, two hectares are devoted to plantain, grown alone or intercropped with oil palm trees, before the latter start producing.

Shortage of land is partly responsible for the choice of production objectives. Within the town, because of the small areas which can be cultivated, production systems are largely aimed at subsistence. On the other hand, in the rural zone, land shortage is not yet severe and large areas can be farmed to grow cash crops. Between these two can be found the peri-urban agricultural zone near Yaoundé. In this area of change, two production systems exist side by side: a subsistence system which is gradually yielding to urban pressure

and a commercial system in which we see the beginning of an intensification of inputs. This intensification is more marked when the farmer has more training, which has already been noted in other areas (Nkendah et Temple 2002).

Conclusion

Peri-urban farming presents some contradictory aspects. It is a type of farming which is threatened by urban growth in the intra-urban zone and yet is itself growing on the edges of the town. Two forms of agriculture are differentiated by their objectives: a subsistence agriculture and a market agriculture. These types of farming reveal different profiles of farmers: somewhat disadvantaged farmers growing for self-subsistence with few inputs, mainly localized within the town; and then other farmers with second jobs, good education, technical skills and considerable capital available from other sources, farming in the peri-urban and rural areas. It is among the latter that we see strategies for intensification of inputs. However to respond to the need for food security in terms of productivity is still a challenge to be taken up for this Yaoundé peri-urban food cultivation.

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