

Land Use and Fertilizer in the Savanna of Northern Togo

by L. J. de Haan and V. Coenen

The savanna region of northern Togo is one of the most densely populated areas in the West African savanna zone. Densities ranging from 60 to 150 persons per km² have been reported in the canton of Kantindi (Direction de la Statistique, 1981)—an area 15 km northeast of Dapaong, the regional capital. A significant indicator of the increasing population pressure on arable land is an intensive cropping system which has led to significant losses of topsoil and a general decline in soil productivity.

The average annual rainfall in the area for the period 1958-1986 was 1,006 mm; in recent years (1981-1986), however, annual rainfall totals have decreased to 826 mm. The relatively short rainy season (180 days) and the long growing period (150-180 days) of some varieties of sorghum and millet grown in the area require that farmers plant soon after the first rains. Thus any dry spell after the first rains usually leads to severe crop damage and consequently a costly loss of time, labor, and seed.

Farmlands are generally owned by families; in a few cases, however, farmers rent land to grow specific crops. Farmers use small amounts of chemical fertilizers and farm manure to grow cotton, beans, groundnuts (mainly for market) and, in very rare cases, sorghum and millet. In very good years, surpluses of sorghum and millet are sold for cash. The unit of production and consumption is the soukhala—the traditional family group of between 2 and 50 members.

This paper examines the interrelationships between land quality, land tenure systems, field distances, cropping patterns, and fertilizer use. The settings are the villages of Kantindi Center, Baniame Kantindi, and Tossiegou, all in the canton of Kantindi in northern Togo.

Study and Methods

In 1985 a sample of 51 soukhalas was drawn from a general data base of demographic, migration, production and consumption characteristics of soukhalas. Complementary field work involving distance measurement, field characterization and quality assessment, and information on cropping systems and fertilizer use was conducted in line with the procedures of Coenen and Spaanderman (1987), and Jungerius and De Mas (1987). Two hundred and thirty fields were visited; 17 others that could not be reached were assessed with a land suitability map (Ouedraogo, 1976) and descriptions provided by farmers based on indigenous soil names and classification.

A 0-16 point binary field quality system, reflecting 16 soil properties and field characteristics relevant to agriculture, was used to classify the fields into four categories—classes 1 through 4—the higher the class the better the quality. Walking distances (in minutes) between the farmsteads and the fields were used as indicators of field distances. The categories were 0-2, 2-10, 10-20, and more than 20 minutes. Three types of fertilizer were considered initially under "fertilizer use," namely, crop residue, chemical fertilizers, and farmyard manures. However, because of its rapid decomposition as well as the increased demand for animal feed and

for other domestic use, crop residue was considered as "no fertilizer" and was not included in the analysis. Farmyard manure received little emphasis in the analysis because only small quantities are available to most farmers. Thus, fertilizer use in the analysis refers largely to chemical fertilizers.

There were two categories of land tenure—no fields rented and at least one field rented—based on farmers' response to questions on systems of land ownership.

Findings

Our first step in the analysis was to examine the distribution of field quality and relate it to fertilizer use in the three villages.

Table 1 shows that there are significant differences in field quality in the study area. About a third of the fields in Tossiegou are of low quality (Class 1). By contrast, only 9% of fields in Baniame Kantindi are of that quality. Surprisingly, the data do not suggest a relationship between field quality and fertilizer use. This was evident in Baniame Kantindi where 88% of farmers use fertilizers even though they have the best quality fields.

Some variations also exist in systems of land tenure in the three communities. Three-quarters of farmers in Tossiegou till only their own fields

Table 1. Field Quality, Land Tenure System, and Fertilizer Use by Village.

	Kantindi Center	Baniame Kantindi	Tossiegou
Field quality			
Class		(%)	
1	12	9	33
2	29	23	48
3	41	40	15
4	8	28	4
Land tenure system			
No fields rented	62	72	75
At least one field rented	38	28	25
Fertilizer use/soukhala	80	88	85

compared with 62% in Kantindi Center. But there appears to be no clear-cut relationship between property status and fertilizer use. In other words, farmers use fertilizers “regardless” of land tenure system.

The relationship between field distance and fertilizer use is presented in Figure 1. It is clear that virtually all fields in the immediate vicinity of the soukhalas (i.e., less than 2 minutes walking distance) are either fertilized with farmyard manure, chemical fertilizers, or a combination of the two. A significant proportion of the fields located more than 2 minutes walking distance (except in Tossiegou) are fertilized—mainly with chemical fertilizers. This pattern may lead us to conclude that fertilizer use in the area increases with increased distance from the soukhala. However, to the extent that the more distant plots are generally used for the cultivation of cash crops (cotton and groundnuts) and a significant proportion of these plots are fertilized, the type of crop grown appeared to be the overriding factor in chemical fertilizer use in the study area.

Summary and Conclusions

The three savanna villages of Kantindi Center, Baniame Kantindi, and Tossiegou form part of the densely populated area in the West African savanna region where farmers crop intensively without using any form of mechanization or animal traction. Main food crops are millet and sorghum; cotton and groundnuts are grown as cash crops. The climate is fairly suitable for arable agriculture, but the main problems are declining soil fertility and unpredictable rainfall. Emerging plantlets often desiccate because of dry spells after the first rain.

Since the 1960s, chemical fertilizer has been recognized by the farmers as

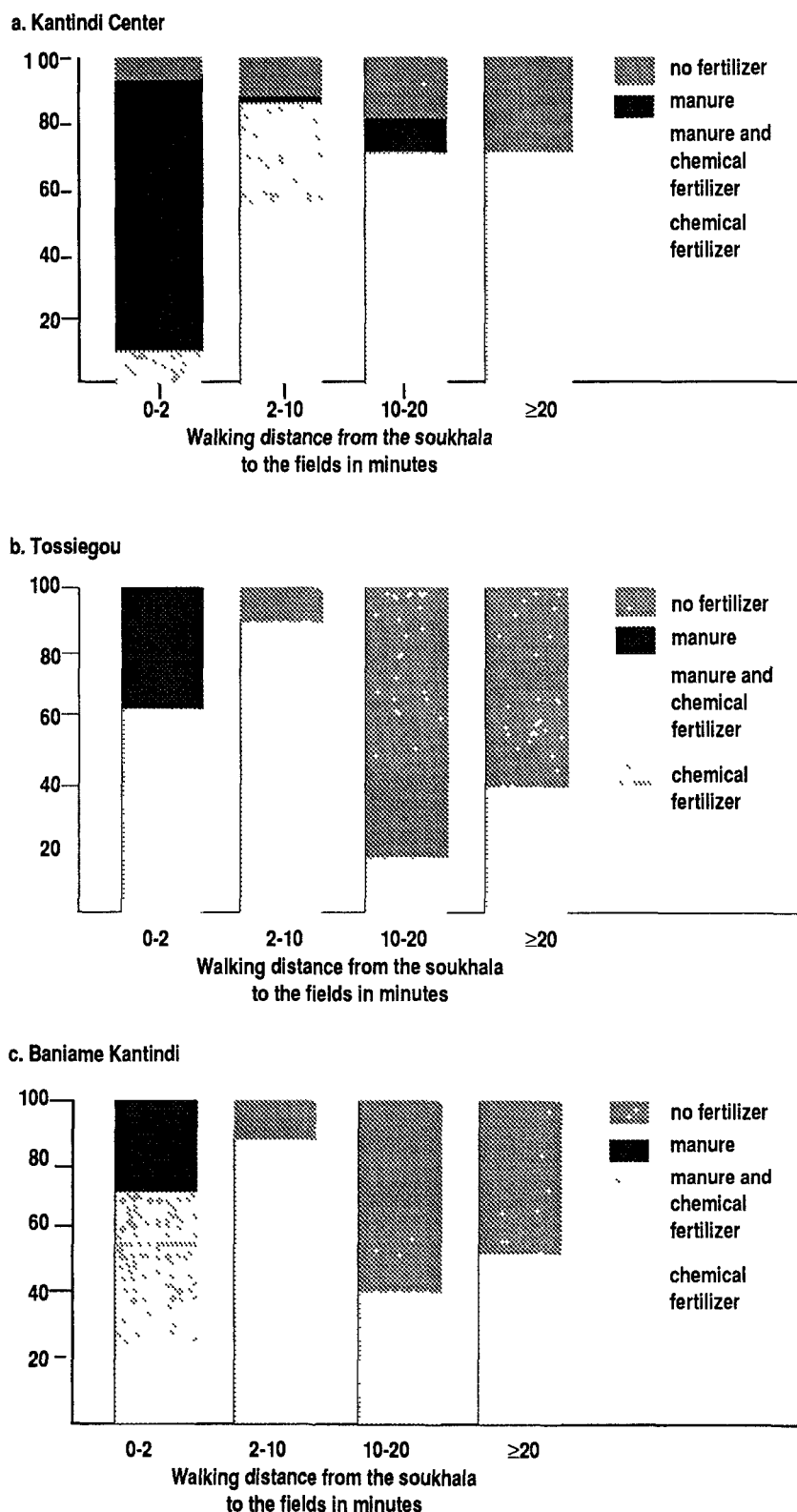


Figure 1. Fertilizer distribution on cereal

an essential input to improve crop performance. Despite rising prices of chemical fertilizers, more than 80% of farmers use them on a continuous basis. Although yields per hectare of cropland have increased somewhat since the introduction of fertilizers, they are not yet at levels that optimize food production and cash income in the villages. This study has focused on the relationship between soil quality, cropping pattern, land tenure systems, and fertilizer use.

While there was less soil degradation on the fields that were more distant from the farmstead, no relationship was found between distance to the soukhala and soil quality. This may be due to the unique geomorphology of the survey area.

The use of fertilizers—both farmyard manure and chemical fertilizer—depends mainly upon the crop grown and, to some extent, distance from the soukhala. Cash crops are almost always fertilized with chemical

fertilizers. Farmyard manure is generally applied to plots near the soukhala. Farmers do not take field quality into consideration in the application of fertilizers, and the system of land ownership makes little difference to farmers' decisionmaking in relation to fertilizer use.

Leo J. de Haan works with the Institute of Human Geography and Victor Coenen with the Laboratory of Soil Science in the University of Amsterdam, Jodenbreestraat 23, 1011 NH Amsterdam, The Netherlands.

Acknowledgement

The Editor is grateful to Dr. K. Acheampong, Visiting Sociologist, Rockefeller Foundation for his assistance in reviewing the above paper.

References

Direction de la Statistique, Ministère du Plan et de l'Industrie. 1981 Census. Recensement General de la Population et de l'Habitat Lomé.

Coenen, Victor and Aloukske Spaanderman. 1987. Fysisch-Geografische Inventarisatie van het Gebied rond de Dorpen Kantindi, Baniame en Tossiegou, Region des Savanes, Republiek Togo. Aspecten van het fysisch milieu en een onderzoek naar het landgebruik met van een binair landklassificatiesysteem. Fysisch Geografisch en Bodiemkundig Laboratorium, Universiteit van Amsterdam, Amsterdam.

Jungerius, P.D. and P. De Mas. 1987. Geïntegreerd fysisch-en sociaal-geografisch onderzoek op perceelsniveau naar traditionele irrigatielandbouw in semi-aride Marokko. Geografisch Tijdschrift, XX1, no. 1, pp.72-83.

Ouedraogo, H. 1976. Etude pedologique a 1:50.000 du bassin versant l'Oublarou (North-Togo). ORSTOM-Centre de Lomé.