The influence of land-use change on soil chemical properties in south-western Nigeria

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Introduction

- Major soils in Nigeria are low in fertility and susceptible to anthropogenic disturbance.
- Land-use change often causes soil degradation and loss of ecological productivity and natural resources.
- In this study, we aimed to examine the long-term impact of agricultural practices and soil management to evaluate sustainability of land-use and management system in southwestern Nigeria.
- To this end, **we compared soil chemical characteristics** between **the upland cropland and forest reserve.** In addition, the results obtained in this study were also **compared with the previous soil survey data** documented by Moormann *et al.* (1975).

Land history

Previous vegetation (n=4)

2:Secondary forest; 3:Secondary forest; 7:Bush regrowth after shifting cultivation; 9;Well developed secondary forest with many oil palms. The headquarters campus was established in 1967.

Cropland (n=5)

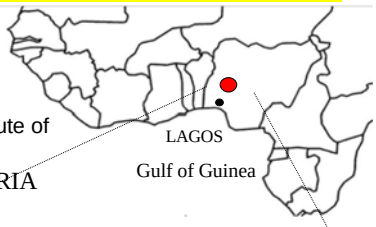
The experimental farm (East area) has been continuously used for the crop cultivation. It cropped with maize, yam, cassava, and mucuna. Chemical fertilizer were applied on few crops without correct record.

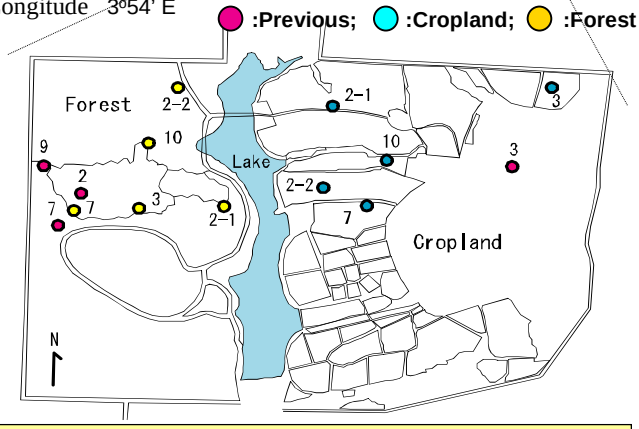
Forest (n=5)

The reserve area (West area) has been re-vegetated by tropical semi-deciduous forest .

Study site

IITA's headquarters ,
(IITA: International Institute of Tropical Agriculture)
Ibadan, Oyo State ,NIGERIA
Latitude 7°30' N,
Longitude 3°54' E





Result

- Bray-1 P content in the cropland surface soil was significantly (P<0.05) higher than those of the forest (Fugure).
- Exchangeable K of the cropland subsoil was significantly (P<0.05) higher than that of the forest (Table).
- The contents of Organic C and Total N of the forest surface soil were significantly (P<0.05) higher than those of the cropland surface soil (Figure).
- Comparing surface and sub soil data from the cropland and forest in the present study with those of the previous soil survey (Moormann *et al.*, 1975), previous data was comparable between two present study (Figure and Table).

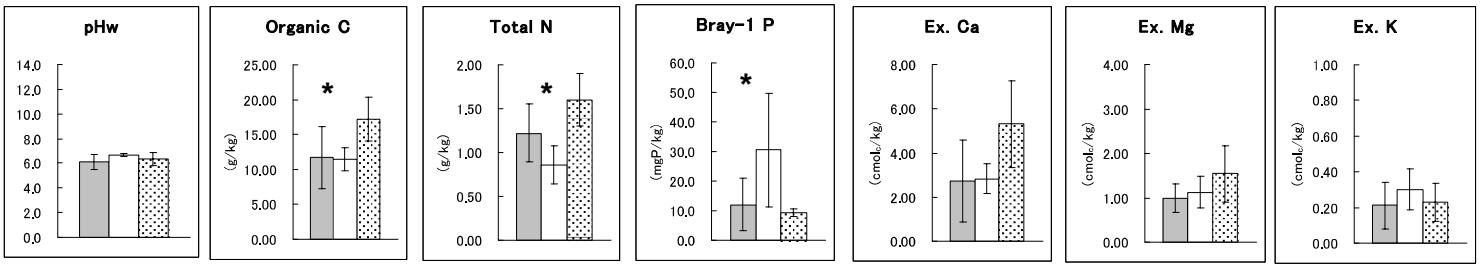
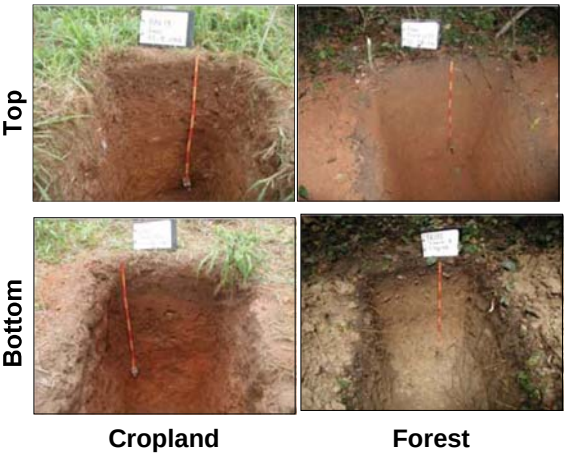


Figure **Chemical properties of surface soil of previous (n=4), cropland(n=5) and forest(n=5).**
:previous; :cropland; :forest. (* :P<0.05)

Table Subsoil chemical properties of previous, crodland and forest.

Landuse		pHw	Organic C (g/kg)	Total N (g/kg)	C/N	Bray-1 P (mgP/kg)	Exch. bases (cmolc/kg) Ca	Mg	K	Na
Depth 60-100cm										
Previous	Mean	6.08	2.71	0.34	8.26	2.92	2.08	0.67	0.14	0.11
(n=4)	(S.D.)	(0.22)	(1.69)	(0.21)	(1.73)	(2.98)	(1.14)	(0.22)	(0.12)	(0.06)
Cropland	Mean	6.64	2.01	0.24	8.45	0.73	2.30	0.93	0.17	0.05
(n=5)	(S.D.)	(0.28)	(0.61)	(0.08)	(0.81)	(0.55)	(0.42)	(0.35)	(0.09)	(0.06)
Forest	Mean	5.72	2.21	0.26	8.53	0.28	2.14	1.07	0.07	0.03
(n=5)	(S.D.)	(0.58)	(0.59)	(0.07)	(0.44)	(0.16)	(0.81)	(0.65)	(0.04)	(0.01)
nonparametric test		*	ns	ns	ns	*	ns	ns	ns	ns
Depth 100-150cm										
Previous	Mean	6.12	2.03	0.30	7.44	3.12	2.15	1.58	0.15	0.54
(n=4)	(S.D.)	(0.23)	(1.20)	(0.18)	(2.27)	(3.25)	(0.84)	(1.55)	(0.11)	(0.60)
Cropland	Mean	6.52	1.71	0.20	8.68	0.40	2.63	1.15	0.20	0.05
(n=5)	(S.D.)	(0.16)	(0.72)	(0.09)	(0.60)	(0.12)	(0.69)	(0.41)	(0.08)	(0.05)
Forest	Mean	5.80	1.35	0.16	8.61	0.23	2.19	1.12	0.05	0.03
(n=5)	(S.D.)	(0.45)	(0.40)	(0.06)	(0.74)	(0.13)	(1.04)	(0.86)	(0.03)	(0.02)
nonparametric test		*	ns	ns	ns	**	ns	ns	*	ns

The values of chmemical peoperties were used by a weighted average form each soil layer.



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