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COLLEGE ON SOIL PHYSICS
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"Soil Management Principles"

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Table 1 CHANGES IN SOIL PROPERTIES DUE TO FELLING AND BURNING FOREST TREES

Item of analysis	Surface soil		Comparison	Subsoil		Comparison
	Before felling	After burning		Before felling	After burning	
pH	6.2	7.2	**	5.4	6.1	**
% C	4.6	5.9	*	1.3	2.5	**
% N	0.32	0.40	**	0.11	0.20	**
C/N	14.3	14.8		11.8	12.2	
NH_4-N)	2.0	6.2	**	1.2	3.8	**
) mg/100 g						
NO_3-N)	0.5	0.8		0.3	0.7	**
Avail. P ppm	7.2	108.8	**	1.4	7.7	**
CEC meq/100 g	20.9	23.7	*	13.5	16.1	**
(Ca	17.0	36.3	**	6.3	10.6	**
(						
(Mg	5.6	7.5		2.4	3.6	
Extractable (						
me/100 g (K	0.4	1.9	*	0.2	0.4	**
(						
(Na	0.3	0.4	**	0.2	0.2	

* sig at 5% level

** sig at 1% level

Source: Thepparit Tulaphitak, Chaitat Pairintra and Kazutake Kyuma (1983).

Property	Before burning (February)	After burning (April)	After monsoon at harvest (November)
pH	6.2	7.7	6.4
Phosphorus (ppm)	4.0	32.5	18.5
Potassium (ppm)	208.0	296.0	177.0

From Zinke et al. (1978)

Table 3 MAIZE GRAIN YIELD ON AN ALFISOL AS AFFECTED BY LAND CLEARING METHODS

Clearing method	Maize grain yield (tons/ha)	
	First season Year one	First season Year two
Mechanical	4.67	2.88
Slash	4.81	3.67
Slash and burn	5.14	4.46
LSD (0.05)	0.69	0.98

CULTIVATED WATERSHEDS GROWING MAIZE AT IITA, IBADAN

(Observations made 5 years after clearing and cultivation)

Parameters	Traditional farming	Intensive land use
Bulk density (g/cm^3)	1.18 (1.1 – 1.4)	1.34
Porosity (%)	55.5	49.4
Infiltration rate	54.5 ± 15.1	12.4 ± 9.0
Penetrometer resistance (kg/cm^3)	1.04 (0.25–4.75)	3.2 (1.0–4.7)

Source: Lal (1986)

Table 5 SORGHUM YIELD IN RELATION TO TILLAGE DEPTH AND CROP RESIDUE (kg/ha)

Tillage depth (m)	1976/77		1977/78	
	No CR	CR	No CR	CR
0.10	1596	2218	768	1103
0.25	2297	2572	1859	1904

Source: Willcocks (1981).

(Okigbo and Lal 1979)

Treatment	pH-H_2O	Effective CEC me/100 g	Exchangeable cations, me/100 g Ca	Mg	K	Mn ppm
Bush fallow	6.5	4.94	3.34	0.89	0.42	3
Maize (without residue mulch)	5.3	3.95	3.01	0.46	0.13	28
Maize (with residue mulch)	6.0	6.38	4.58	0.92	0.68	11
Maize + cassava	6.2	5.24	3.92	0.67	0.39	10
LSD(005)	0.36	1.03	1.03	0.31	0.21	7

Table 7 SOIL LOSSES AND RUNFOFF UNDER SOLE CASSAVA AND CASSAVA INTERPLANTED WITH MAIZE
(Okigbo and Lal 1979)

Slope %	Soil losses (t/ha) Cassava	Cassava + maize	Runoff (% of rainfall) Cassava	Cassava + maize
1	3	3	18	24
5	87	50	43	33
10	125	86	20	18
15	221	137	30	19

Table 8 RESULTS (AVERAGE) FROM ANALYSES OF SOIL SAMPLES TAKEN AT THREE DIFFERENT SITES NEAR ACACIA ALBIDA TREES
(Charreau and Vidal 1965)

Determinations	Gross results			Relative results (C = 100)		
	A[1]	B[2]	C[3]	A	B	C
pH (water)	6.50	6.34	6.14	106	103	100
Total C	0.53	0.48	0.33	162	146	100
Total N	0.06	0.05	0.03	194	168	100
C/n ratio	8.9	9.2	10.6	84	87	100
Exchangeable cations (me/100 g)						
Ca	2.94	2.33	1.47	200	158	100
Mg	1.12	1.00	0.63	178	1158	100
K	0.10	0.08	0.07	143	114	100
Na	012	013	0.09	133	144	100
CEC	4.13	3.69	2.25	147	131	100
P_2O_5 ppm total	190	147	148	128	99	100
P_2O_5 ppm available	35	19	15	234	127	100

A[1] = near trunk B[2] = edge of canopy C[3] = outside canopy

Improvement and rates of increase are highest for nitrogen, available phosphorus, exchangeable calcium and CEC.

UPLAND RICE, CORN AND SOYABEANS WITH COMPLETE FERTILIZATION

Time	pH	Organic matter %	Exchangeable meq/100 cc				Al saturation (%)	Available (parts per million)				
			Al	Ca	Mg	K	EEC		P	Zn	Cu	Mn	Fe
Before clearing	4.0	2.13	2.27	0.26	0.15	0.10	2.78	82	5	1.5*	0.9*	5.3*	650*
Continuous Cropping**	5.7	1.55	0.06	4.98	0.35	0.11	5.51	1	39	3.5	5.2	1.5	389

* Thirty months after clearing.

** Ninety-four months after clearing.