

Fig. 16. Schematic diagram of delivery tubes for 2 head CDA sprayer.

flow in the 6 mm tubing would at times allow 1 head to take all the flow, leaving the other with no flow at all. This would happen normally when 1 head was higher than the other. This was mostly overcome by having a separate tube for each head coming from the spray bottle. The sprayer was set up with the spray heads 0.75 m apart to match the row width when working on standing maize stubble. This 2 head sprayer was used in conjunction with the 2-row planter with every other row of maize stover knocked down. The time required for using the 2 heads was approximately 0.6 of the single head. This increase in the rate of work would probably justify the extra expense of the 2 head machine, approximately 1.5 times the price of a single head machine.

## Management of Kaolinitic Alfisols

A long-term experiment established at IITA since 1972 shows that fallow remains a vital component in maintaining the soil productivity of the highly erosive kaolinitic Alfisols on a predominantly rolling topography in the forest/savanna transition zone of West Africa. This is, in part, demonstrated by the alarming decline of some chemical and physical properties of the soils after 8 years of continuous cropping compared to those under natural and planted fallow.

**Effect on soil chemical and physical properties.** Continuous cropping for 8 years with insufficient amounts of

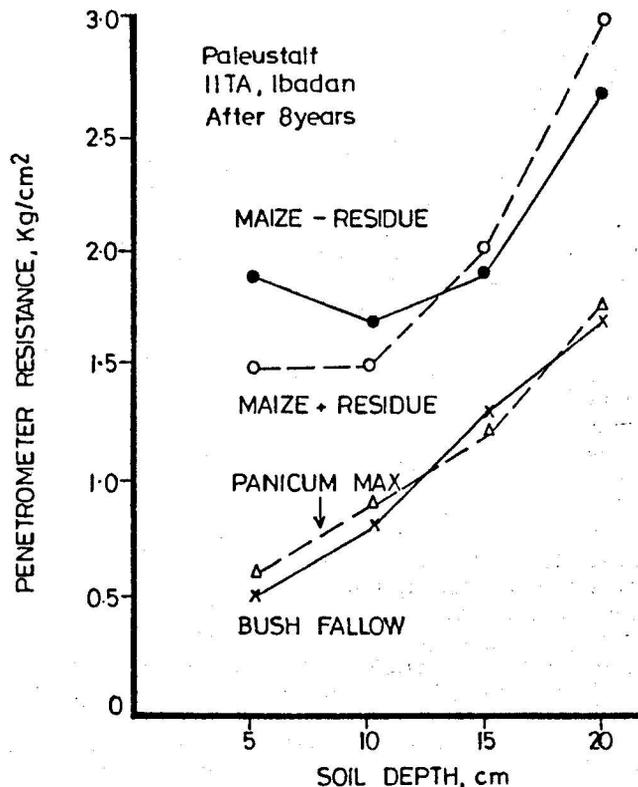


Fig. 17. Penetrometer readings of the surface layers of kaolinitic Alfisols under fallow and after 8 years of continuous cultivation.

crop residue return resulted in an increase in soil bulk density and acidity and a decrease in soil organic matter levels, and, consequently, a reduction in CEC and exchangeable Ca and Mg status in the soil (Table 30). Penetrometer readings of the cropped plots after 8 years indicated a severe compaction of the surface horizons compared to the soils under grass and bush fallow (Fig. 17).

Continuous no-tillage maize with crop residue returned as surface mulch twice a year was able to maintain soil organic matter (i.e., total N) levels comparable to that of bush fallow. But, the decline in soil pH, CEC, exchangeable Ca and Mg levels and the increases in soil bulk density and penetrometer readings were considerable

Table 30. Properties of surface soil (0-15 cm) under 8-year continuous cultivation and fallow after clearing of secondary forest (Oxic Paleustalf, Egbeda Series, IITA, 1980).

Treatment	pH (H <sub>2</sub> O)	Total N %	ECEC meq/100g	Exch. cations, meq/100g			Bulk density (Fine earth) g/cm <sup>3</sup> 0-5 cm
				Ca	Mg	K	
<i>Continuous cropping with minimum tillage</i>							
Maize, residue returned	5.0	0.18	3.23	2.19	0.41	0.35	1.20
Maize, residue removed	4.7	0.11	1.81	1.13	0.24	0.11	1.31
Maize/Cassava	5.6	0.15	3.40	2.04	0.42	0.32	1.25
Soybean, residue returned	5.0	0.11	3.05	1.65	0.42	0.28	1.23
<i>Natural and planted fallow</i>							
Natural regrowth	6.5	0.19	5.14	3.53	0.91	0.41	0.88
Guinea grass	6.7	0.26	7.69	4.75	1.28	0.91	1.01
Pigeon pea	6.0	0.23	3.42	2.18	0.64	0.32	1.10