

obvious that 90-95 percent of the variability in soil temperature regime under bare, maize, cowpea and soybean covers can be explained by the first harmonic while 97-99 percent of the variability can be explained by the first 3 harmonics (Table 20). In general, the second and third harmonics represented 1.2-7 percent and 0.1-3.8 percent of the total variance, respectively. This implies that the first 2 harmonics alone can explain the diurnal fluctuation in soil temperature up to about a 30 cm depth. The third harmonic explains about 1 percent of the total variance.

Runoff and erosion under root crops. Table 21 shows the effects of canopy cover of tropical root crops at different growth stages on runoff and erosion. Cassava, although a closed canopy crop, takes a relatively longer time to provide a complete ground cover than maize or cowpea. Staked yams leave the ground surface exposed to raindrop impact even when the canopy is fully developed and, therefore, renders the soil more susceptible to erosion. Sweet potato, with quick and effective ground cover, is a soil-conserving cover since it results in minimal runoff and erosion compared to cassava and yam (Table 21). Mixed croppings of maize with cassava, cassava with melon and maize with yam resulted in a significant decrease in both runoff and erosion. Simultaneous measurements of canopy cover made at different growth stages will provide necessary information for computing "C" values that can be used in the "Universal Soil Loss Equation" for predictive purposes.

Weed control in no-tillage system

The effect of residue management and tillage on maize production using chemical weed control was investigated on a 1-year *Eupatorium odoratum* fallow. (Tables 22a and 22b). Maize yield was significantly lower in the no-tillage plot than conventional (plow and harrow) and reduced tillage (disc harrow) plot. Also, significantly more weeds grew at 4 weeks after planting where the residue was burnt off than where the residue was retained or raked off. The method of weed control affected grain yield but not lodging in maize. The maize yield was significantly lower in the unweeded than weeded plots (Table 23a). When plots were hand weeded, the crop yield was identical in the 3 tillage practices. However, when a preemergence herbicide was used for weed con-

Table 21. Effects of crop cover on runoff and erosion.

Crop cover	Runoff (mm)	Erosion (t/ha)
Maize with sweet potato	154	2.2
Cassava with melon	380	3.7
Yam with melon	314	4.0
Sweet potato	223	4.4
Maize	197	4.4
Melon	303	6.3
Weed fallow	251	4.4
Yam	186	2.0
Cassava with maize	457	9.2
Cassava	462	8.0

trol, the yield was significantly higher in conventional than no-tillage plots (Table 23b).

Weed control in conventional and no-tillage cassava was evaluated in an Alfisol in a subhumid climate. The vegetation was a 2-year fallow consisting of perennial grass, *Panicum maximum*; and broad leaves, *Eupatorium odoratum*, *Alchornia laxiflora* and *Ficus* spp. The fallow vegetation was first slashed in late February before the onset of rains, and its regrowth was then sprayed in April with 3.0 kg glyphosate/ha a.i. In the conventional-tillage section, the fallow vegetation was plowed under, and the cassava was planted at 1.0 m × 1.0 m spacing on the flat after harrowing. In the no-tillage section, the cassava was planted directly into sprayed regrowth. Cassava

Table 22a. Effect of residue management and tillage practices on maize yield and crop performance (Ikenne, 1980).

Management practice	Plant Ht. cm	Lodging %	Weed F.W. g/m ²	Grain Yield t/ha
Residue present	81.4	33 a	6.1	2.06 a
Residue removed	81.7	29 a	6.7	2.06 a
Residue burnt	87.9 a ¹	35 a	12.2 a	1.98 a
Plow and harrow	86.7 a	41 a	8.5 ab	2.12 a
Disc harrow	89.8 a	34 a	11.4 a	2.20 a
No tillage	74.5	22	5.0 b	1.78

¹ Means followed by the same letter in the same column are not significantly different at the 5% level of Duncan's New Multiple Range Test.

Table 22b. Effect of residue management and tillage practices on maize yield and crop performance (Ikenne, 1980)

Residue Management	Tillage Practice	Plant ht. cm.	Lodging %	Weed F.W. g/m ²	Grain Yield t/ha
Residue present	Plow and harrow	83.8 ab ¹	45 a	5.8 b	2.13 ab
	Disc harrow	88.7 ab	31 abc	7.2 b	2.20 ab
	No tillage	71.7 c	24 bc	5.2 b	1.84 ab
Residue removed	Plow and harrow	87.0 ab	38 ab	8.8 b	2.17 ab
	Disc harrow	86.3 ab	32 abc	7.0 b	2.34 a
	No tillage	71.9 c	18 c	4.2 b	1.68 b
Residue burnt	Plow and harrow	89.3 ab	41 ab	10.8 ab	2.07 ab
	Disc harrow	94.3 a	39 ab	20.2 a	2.05 ab
	No tillage	79.9 bc	25 bc	5.7 b	1.83 ab

¹ Means followed by the same letter in the same column are not significantly different at the 5% level of Duncan's New Multiple Range Test.