PRELIMINARY NOTES ON THE SOIL EROSION DEMONSTRATION AT THE COFFEE RESEARCH STATION, LYAMUNGU, MOSHI.*

The demonstration consists of a series of eight adjacent plots, each 100 feet (down the slope) by 14 feet 9 inches, or approximately one-thirtieth of an acre, on a uniform slope of 1 in 6. The land was in heavy (probably virgin) bush up to March, 1934.

The plots are separated along their length, and closed at the top by concrete blocks sunk into the soil and protruding 3 to 4 inches above the general soil surface. At the bottom of each plot there is a concrete tank, in which the eroded soil and run-off water are collected.

The treatments, which were commenced on 21st March, 1934 and may be considered to have been effective by 1st February, 1935, are as follows:—

Plot 1. Control.
,, 2. Contour hedge on bund.
,, 3. Control.
,, 4. Contour hedge on bund and procumbent cover crop
,, 5. Control.
,, 6. Cover crop (procumbent).
,, 7. Mixed cover crop (erect).
,, 8. Control.

All plots were planted with coffee at a spacing of 9 feet by 9 feet on 30th April, 1934. The controls were kept clean weeded, the weeds being left on the surface. Plot 2 was weeded when weeds reached flowering stage. The plots having contour hedges (2 and 4) had three hedges of *Crotalaria* species in each case; the hedges were on bunds 32 feet apart, the lowest being 2 feet above the concrete tank. The procumbent cover crop used was *Dolichos hosei*; the mixed cover crop consisted of *Crotalaria* species and *Canavalia ensiformis*, and was cut back twice during the period, the loppings being left on the surface.

* Reprinted from *The East African Agricultural Journal*, Vol I, (1935), p.236 *et. seq.*

The treatments received during the period February, 1934 to 30th May, 1935, were as follows:—

April, 1934.

19th.

(a) Each plot holed and dug over prior to planting.

21st

(b) Hedges and cover crops planted.

30th

(c) Coffee planted.

March, 1935.

3rd

(d) Each tree in each plot was envelope-forked to a radius of 2 feet.

3rd

(e) Control plots (1, 3, 5, 8) were jembe-forked from top to bottom once; similarly with the contour hedge plot, 2.

3rd

(f) Contour hedge and procumbent cover crop (4) and procumbent cover crop (6) and mixed cover crop (7) plots were envelope-forked over the whole of their area.

(g) The contour hedge plot (2) was weeded three times during the period 1-2-35 to 30-5-35.

The amount of soil in each tank prior to 1st February, 1935, was negligible. The figures obtained can therefore be considered to represent the degrees of erosion which have occurred during the period 1st February, 1935 to 30th May, 1935.

The results obtained are given in Table I. Those for run-off represent actual run-off, the volumes of water due to rainfall having been deducted.

The loss of soil per acre from the controls varies from 8·3 tons to 18·5 tons. It is possible that variation in soil conditions may be responsible for a portion of this difference, but from an examination of the individual plots it appears that the merging of individual furrows appears to have occurred more on plots 8 and 5 than on the other two; this would appear to be mainly responsible for the differences.

TABLE I.

EROSION DEMONSTRATION.

Corresponds to long rain period, February to May, 1935.

Slope 1 : 6.

Plot No.	Plot Each 1/30 acre	I Actual weight dry soil eroded during period 1-2-35—30-5-35	II Loss per acre	III Per cent by weight of top foot of soil	IV Expressed as inches of soil	V Weight of soil eroded during period 9 a.m. 7-5-35.—9 a.m. 8-5-35. Rainfall 56 mm.	VI Run-off during corresponding period	VII Run-off per acre; 9 a.m. 12-4-35—9 a.m. 13-4-35 Rainfall 104 mm.	VIII During period 9 a.m. 3-5-35 to 9 a.m. 7-5-35. Rainfall 142·6 mm.
		Tons.	Tons	Per cent	Inches		Gallons	Gallons	Gallons
1	Control	·425	10·902	0·75	0·09	—	—	1,560	6,420 corresponds to 6.9% of rainfall per per period
2	*Crotalaria* hedge (32 feet apart)	·028	0·856	0·059	0·007	—	—	1,560	3,420 (4% rainfall per period)
3	Control	·330	8·339	0·57	0·07	—	—	2,460	5,520
4	*Crotalaria* hedge and cover crop—*Dolichos hosei*	·003	0·08	0·0055	0·0007	—	—	1,440	—
5	Control	·574	14·103	0·967	0·12	476 lb. *i.e.*, 6.3 tons per acre	183 gals. =5,490 gals. per acre.	2,610	4,560
6	Cover crop procumbent *Dolichos hosei*	·006	0·174	0·0114	0·001	1 lb., *i.e.*, 30 lb. per acre	158 gals. =4,770 gals. per acre	1,740	1,320 (1·4% of rainfall)
7	Cover crop erect (*Crotalaria* and *Cannavallia*)	·006	0·174	0·0114	0·001	—	—	2,040	2,520
8	Control	·735	18·557	1·27	0·15	—	—	2,940	4,620

Plot 2, *Crotalaria* hedge, has a high figure compared with those of the other anti-erosion treatments. It is partially explained by two breaks through, due to gaps in the hedge, and also by the fact that the hedges became silted up to the extent of 2·3 inches and then an overflow occurred.

The quantities of eroded soil and run-off water on plots 5 (Control) and 6 (Cover Crop) for the twenty-four hours commencing 9 a.m. of 7-5-35, during which time there was a precipitation of 56 mm., are of interest (Columns V and VI of Table I). The rainfall up to that time had been 1,013·0 mm., and from 1st to 6th May 288·5 mm. had fallen; the quantities are not due therefore to a sudden downpour of 56 mm. on a dry, powdery soil. The quantity of run-off water in the case of Plot 5 is 183 gallons, and in that of Plot 6, 158 gallons, a ratio of 1·16 to 1; but the loss of soil in the respective instances is 476 lb. and 1 lb. in itself demonstration of the necessity of curtailing the speed and accumulation of water if erosion is to be prevented, and also of the effectiveness of a ground cover in preventing the accumulation of water.

The average run-off for the control plots for the period 3-5-35 to 7-5-35 was equivalent to 5,280 gallons per acre, while the average of the Plots, 2, 6 and 7 was equivalent to 2,630 gallons per acre, *i.e.*, half that of the controls. It remains to be proved whether any advantage as regards soil moisture has been accrued by the apparent increased absorption of water by the Plots 2, 6 and 7, and, should there be any such advantage over a long period, if it counterbalances any loss of moisture which may occur as a result of transpiration by the cover crop in Plots 2, 6 and 7.

It should be noted that the demonstration has been laid out on an actual slope of 1:6, and the accumulation of water on the slope above it is prevented from flowing over the demonstration. If the demonstration were to be extended to include this area, the rate of erosion per unit area will increase, due to increased accumulation and speed of water, with its consequent eroding power.

TABLE II.

Rainfall 1st February to 31st May, 1935.

Date	February mm.	March mm.	April mm.	May mm.
1	—	·47	—	30·0
2	—	—	30·4	69·7
3	—	8·9	20·4	39·4
4	0.1	7·6	0·25	7·8
5	17·2	—	0·3	21·6
6	1·2	0·5	13·6	120·0
7	0·5	—	0·5	33·7
8	3·4	21·7	2·3	74·0
9	—	4·5	9·3	21·5
10	3·25	6·6	0·6	53·0
11	—	6·8	—	35·7
12	0·75	5·5	5·5	9·0
13	2·8	12·9	*104·0	2·6
14	—	—	10·8	—
15	—	2·4	3·7	—
16	—	—	—	0·8
17	—	—	1·0	1·1
18	—	0·5	0·6	1·4
19	—	—	16·3	25·5
20	45·75	18·1	1·25	25·7
21	†87·0	3·6	—	2·0
22	1·5	—	—	24·1
23	—	—	—	18·3
24	31·0	0·5	1·5	22·8
25	32·0	2·2	0·3	7·8
26	0·5	5·5	10·2	70·8
27	6·9	—	47·3	10·0
28	—	—	34·5	0·4
29	—	—	2·8	—
30	—	0·5	29·0	1·6
31	—	—	—	0·5

* 76 mm. within one hour. † 42 mm. in one hour. Total rainfall 1424 mm. or 56 inches.