

## SUPPLEMENTARY MEMORANDUM ON SOIL EROSION.

### EVIDENCE SUBMITTED TO THE SOIL EROSION COMMITTEE BY THE TEA RESEARCH INSTITUTE.

The publication, in the form of a lecture to the Dimbula Planters' Association by the Director of the Institute, of the evidence on Soil Erosion submitted by the Institute to the Soil Erosion Committee, has led, as was hoped, to some discussion of that evidence, and to a certain amount of criticism. In order to increase the usefulness of the Institute's Memorandum it is thought advisable to extend our evidence so as to deal with the specific points that have been raised. These may be briefly set out as follows:—

- (1) The calculated capacity of the Felsingers drains is held to have been greatly over-estimated. A figure of 0.35 in. of rain is suggested in place of our approximate figure of 1 in.
- (2) Exception is taken to the statement that the Felsingers system, along with others discussed, *prevents* soil erosion.
- (3) It is objected that the recommendation of a relatively clean weeded system, such as the Felsingers system, is at variance with that part of the evidence relating to the disadvantages of clean weeding and the benefit of cover crops.
- (4) The opinion has been expressed that the clearance above the bunds of the Felsingers drains is so small (about 3 in.) that in time of heavy rainfall the spills will not be able to deliver the volume of water likely to accumulate, with a consequent risk of overflow occurring over the side of the drain, and the production of a sheet of running water descending to the drain below.

We shall take up these points *seriatim*:—

(1) We append the basis of our calculations for the capacity of the Felsingers drains which will confirm our approximate figure of 1 in. In order to dissipate any doubts on the subject, we would point out that the contrary figure of 0.35 in. is based upon a misreading of the original article in the *Tropical Agriculturist* for 1928 (page 214) from which the following quotation is taken:—

“ If silt accumulates in each pocket to a height ranging from 1 to 11 inches, or an *average of 6 inches* or  $\frac{1}{2}$  a foot, and the width of the channel is  $1\frac{1}{2}$  ft., each pocket or drain will contain  $10\frac{1}{2}$  by  $1\frac{1}{2}$  by  $\frac{1}{2}$  ft., or about 8 cubic feet of silt. This works out at about 1,280 cubic feet to the acre.”

The italics are ours. We stress in our evidence that the “efficiency should be measured not in terms of total solids that the banded drains are capable of holding, but by the amount of water they can

retain without overflowing the spills." The height of the drains from the bottom to spill level is however not 6 in. but 15 in. which accounts for the greater part of the discrepancy between the two figures. The rest is due to the fact that by a rather more economical use of the land we fitted 175 drain pits to the acre as against 160 in the original article. Our figures accordingly stand uncorrected.

We may mention that our argument in this section aimed at showing the limitations of the Felsing system under heavy rain, and in order to make our point justly we took the conditions most favourable to the Felsing system, *i.e.*, the system at its maximum capacity. The system decreases in efficiency as the pits silt up. We would again refer to our evidence—"The periodical clearing of the drains and redigging of silt-pits . . . is fundamental to the success of the scheme."

(2) From a perusal of our evidence, it will be seen that we attach considerable importance to the effect of surface run-off. The answer to the question as to whether the Felsing system *prevents* erosion in contradistinction to collecting eroded soil is found in our description of the system. Referring to the staggered silt-pit formation, which is an integral part of the system, we say—"it arrests water before its velocity has been so accelerated that it produces a scouring effect." The term is relative, but it cannot seriously be maintained that scouring is greater under these circumstances than would be experienced on ordinarily drained land.

(3) Under this section it is only necessary to say that to quote our advocacy of good systems of drainage as contradictory to our recommendation of cover instead of being complementary to it, is to make use of a false antithesis, and to misconstrue certain passages of the evidence out of the context of the whole document.

(4) The fear that a lateral overflow will occur in the Felsing system can be tested by calculating the delivery of the spills. The velocity of the stream and hence its delivery is affected by the gradient, the area of contact between the water and its containing wall, and by the frictional resistance that containing wall offers. In calculating the wetted perimeter, we have assumed a maximum area, and we have also used the maximal frictional constant for rough earth channels, in order to be on the safe side. We have used Chezy's formula for flow, and Bazin's formula for coefficient of discharge, as being applicable to small channels, and we find that the delivery of rainfall from 1 acre of the Felsing system would have to exceed 11.4 inches per hour before the drains overflow laterally. The fear is therefore ungrounded,

## APPENDIX.

The capacity of the Felsing bunded drains.

	Dimensions quoted in original article	Dimensions used by T. R. I.
Length of lock	10½ ft. ...	10½ ft.
Length of bund	1½ ft. ...	1½ ft.
Bund at main drain	2 to 3 ft. ...	2 ft.
Width of drain	1½ ft. ...	1½ ft.
Height of bund	14 to 15½ in. ...	15 in.
Clearance above bund	2½ to 4 in. ...	3 in.
Distance apart of drains	15 to 25 ft. ...	20 ft.
Main drain	3 ft. ...	3 ft.

An area holding 50 pockets, 5 on each side of the main drain, occupies .285 of an acre according to the following dimensions:—

Locks	10 × 10·5	...	105·0
Bunds	8 × 1·5 + 2 × 2	...	16·0
Main drain		...	3·0
			124·0

Depth of 5 drain series  $5 \times 20 = 100$  ft.

Area 1,240 sq. ft. = .285 acres.

Volume of each lock =  $10 \cdot 5 \times 1 \cdot 5 \times 1 \cdot 25 = 19 \cdot 7$

20 cubic feet is taken as an approximation.

The total capacity for .285 acres is therefore 1,000 cub. ft.

Reduced to acres the cubic capacity is 3,510 cub. ft.

1 in. rain = 3,630 cub. ft.

The capacity in inches of rainfall is therefore 0·97 in.

(Signed) ROLAND V. NORRIS,  
*Director.*

T. EDEN,  
*Agricultural Chemist.*