

Chemical sprays for controlling soil erosion

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INTRODUCTION

Cover crops and mulching are two of the most effective and widely used methods for controlling soil erosion. But there are times and circumstances when a chemical spray which binds the soil aggregates would be helpful, either as a supplement to cover crops and mulching, or instead of them. For example, in tea land between pruning and the establishment of new growth, or in highland cultivation with annual crops, between seeding and the establishment of a vegetal cover, the soil is exposed to erosive forces, and the establishment of cover crops for a short period, or mulching may not be entirely feasible.

A sample of a proprietary product called "Curasol", (kindly supplied by Messrs. Hoechst (Ceylon) Company Ltd.), was tested in a preliminary experiment to assess its influence on splash erosion.

MATERIALS AND METHODS

Curasol is a white, viscous liquid which can be readily mixed with water for spraying at any desired concentration. In the test, Curasol was sprayed at the rate of 10 grams per square foot, which is equivalent to 900 lb./acre, while the spray dilution used was equivalent to 440 gallons spray fluid per acre. The test plots were 10' $\times$ 10' and in each plot were four "splash samplers" for measuring splash erosion. There were two sprayed plots and two unsprayed control plots. The splash sampler consisted of a wide mouthed plastic bottle with a metallic vane placed vertically in the bottle. The bottle was placed in a cavity made with a soil auger, so that the lip of the bottle was level with the soil surface, (Fig. 1).

During rain storms, the splash erosion which takes place causes some of the splash in the vicinity of each sampler to be thrown up against the vane, and falling rain washes the soil into the bottle. After each

rainstorm the splash samplers were brought into the laboratory. The amount of soil collected in each bottle, was filtered, dried and weighed.

The experiment was commenced on February 15th 1969 and continued till the end of April. During this period the splash from 12 rainstorms was measured. The soil splash due to some rains occurred between the 5th and 20th April could not be measured due to the disorganization of work due to unavoidable circumstances.

RESULTS AND DISCUSSION

In Table 1 are given the detailed results of soil splash for the 12 rainstorms, while in Table 2 is given a summary of the results for comparing the soil splash from the first six rainstorms and the last six rainstorms.

From Table 1 it will be seen that the variation of soil loss between the sub-samples from a plot is sufficiently small to consider the technique of assessment of soil splash, satisfactory for the purpose.

From Table 2 it is seen that for the first six rains (i.e. before February 25—March 29th) the soil splash in the treated plots was less than half that in the untreated plots, while for the last six rainstorms the treated plots had about 3/4 the soil splash of the untreated plots. For the full period of 12 rainstorms, the treated plots had about one-third the splash erosion of the controls.

It is clear that Curasol reduces splash erosion considerably for several weeks after application.

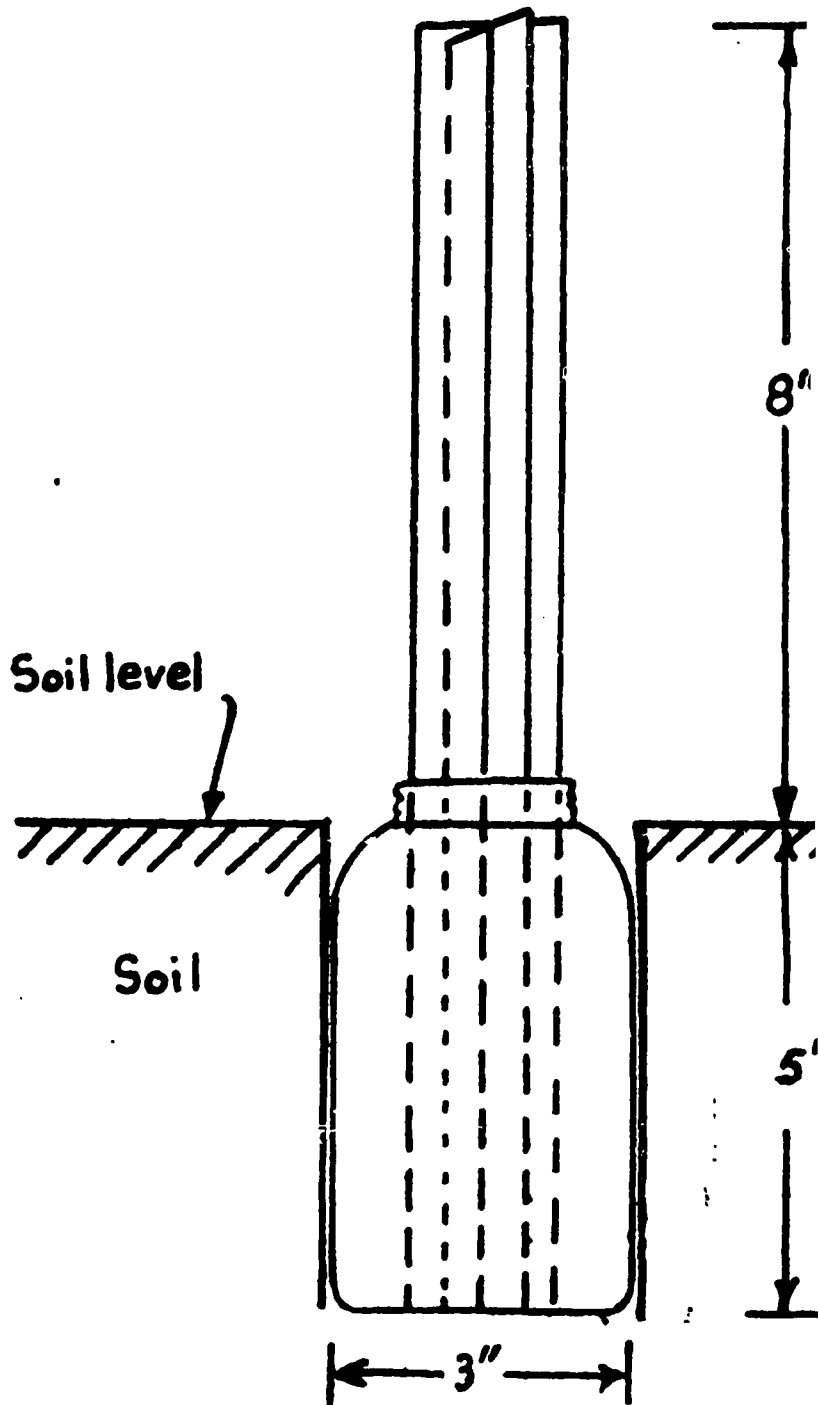
It must be mentioned that this is only an assessment of splash erosion. Whether Curasol influences flow erosion in any way must be assessed in a subsequent investigation. It is claimed that Curasol does not reduce the infiltration properties of soil, because it is not that, "Curasol is not so much like a plastic foil, as similar to a three dimensional network, anchored to a certain depth into the soil. If this is the case, then flow erosion would not increase in a Curasol treated soil surface, and may in fact be less than on bare untreated soil. Visually, the Curasol treated plots showed a distinct persistence of the soil aggregates on the surface, while in the control plots there was a marked "surface sealing" effect as a result of the breakdown of aggregates by splash erosion and subsequent rearrangement to form a less pervious condition.

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CONCLUSION

The practical usefulness of Curasol and similar materials would of course depend on cost. Cost data is not yet available. But it should be mentioned that the Rubber Research Institute of Ceylon has kindly made available a sample of modified rubber latex for assessment of its usefulness as an erosion control spray. This is being done. If rubber latex proves to be beneficial in this respect, then the feasibility of using erosion control sprays in Ceylon is materially increased, with a concomitant decrease in the soil erosion problem, which is one of Ceylon's biggest agricultural problems.

Fig.1 Sketch of Splash Sampler



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TABLE 2.—Average Soils Splash in Grams per Sampler

		<i>From Six Rainstorms between Feb. 25 and March 29</i>		<i>From Six Rainstorm between March 30 and April 25</i>		<i>From All 12 Rainstorms</i>
Curasol Treated Plots	..	19.0	..	24.0	..	43.1
Normal Untreated Plots	..	40.3	..	31.7	..	72.1
		59.3		55.7		

TABLE 1a.—Grams of Soil collected in Curasol Treated Plots

Date	Feb. 25.	Feb. 26	Feb. 28	Mar. 4	Mar. 26	Mar. 29	Mar. 30	April 1	April 4	April 21	April 25	April 28
Rainfall in Inches	.. 1.21 ..	.. 0.40 ..	.. 0.6 ..	.. 0.58 ..	.. 1.38 ..	.. 1.62 ..	.. 1.21 ..	.. 0.70 ..	.. 2.30 ..	.. 0.58 ..	.. 0.91 ..	.. 1.75
Approximate Duration of Rain in Hours	.. 1 hr.	.. ½ hr. ..	.. 1 hr. ..	.. 1 hr. ..	.. ½ hr. ..	.. 1½ hrs ..	.. 2 hrs. ..	.. 1 hr. ..	.. 2½ hrs. ..	.. ¾ hr. ..	.. 1½ hrs. ..	.. 2½ hrs.
Plot I	1.96 ..	2.21 ..	0.91 ..	1.82 ..	2.82 ..	3.01 ..	1.37 ..	1.24 ..	4.09 ..	2.47 ..	1.38 ..	3.40
	2.54 ..	1.07 ..	1.02 ..	0.49 ..	3.92 ..	3.45 ..	1.67 ..	2.00 ..	4.05 ..	1.24 ..	1.46 ..	1.46
	4.39 ..	1.76 ..	1.44 ..	0.40 ..	2.70 ..	2.88 ..	1.90 ..	1.31 ..	2.02 ..	0.16 ..	2.62 ..	2.67
	1.76 ..	1.71 ..	1.35 ..	0.31 ..	2.61 ..	1.50 ..	0.87 ..	0.94 ..	3.20 ..	0.29 ..	3.57 ..	1.29
Average	.. 2.71 ..	.. 1.68 ..	.. 1.18 ..	.. 0.75 ..	.. 3.01 ..	.. 2.71 ..	.. 1.45 ..	.. 1.38 ..	.. 3.45 ..	.. 1.04 ..	.. 2.25 ..	.. 2.11
Plot B	1.86 ..	3.48 ..	0.52 ..	0.25 ..	1.51 ..	1.66 ..	0.93 ..	0.93 ..	4.05 ..	2.00 ..	2.61 ..	1.02
	0.80 ..	1.76 ..	0.56 ..	0.28 ..	2.14 ..	1.59 ..	1.16 ..	0.91 ..	3.16 ..	3.78 ..	3.93 ..	2.37
	1.01 ..	1.74 ..	0.55 ..	0.10 ..	1.64 ..	1.48 ..	1.24 ..	0.91 ..	5.59 ..	1.97 ..	1.87 ..	2.00
	1.48 ..	1.67 ..	0.41 ..	0.12 ..	1.44 ..	N.R. ..	N. R. ..	1.02 ..	2.64 ..	2.03 ..	1.81 ..	0.97
Average	.. 1.28 ..	.. 2.16 ..	.. 0.51 ..	.. 0.18 ..	.. 1.68 ..	.. 1.18 ..	.. 1.07 ..	.. 0.94 ..	.. 3.86 ..	.. 2.44 ..	.. 2.55 ..	.. 1.54

N. R. = No Reading taken because sampler was toppled over

TABLE 1 (b).—Grams of Soil Collected in Normal Untreated Plots

Date	Feb. 25	Feb. 26	Feb. 28	Mar. 4	Mar. 26	Mar. 29	Mar. 30	April 1	April 4	April 21	April 25	April 28
Plot C	6.22 ..	5.42 ..	1.84 ..	1.26 ..	3.94 ..	5.36 ..	2.67 ..	2.45 ..	5.19 ..	1.58 ..	2.64 ..	2.17
	6.24 ..	3.99 ..	2.34 ..	2.14 ..	4.59 ..	7.32 ..	1.25 ..	0.87 ..	4.95 ..	2.53 ..	3.57 ..	1.61
	6.31 ..	4.07 ..	2.57 ..	1.30 ..	6.89 ..	0.90 ..	3.22 ..	2.71 ..	3.34 ..	3.49 ..	3.31 ..	3.39
	7.10 ..	4.50 ..	1.34 ..	1.39 ..	5.94 ..	2.81 ..	0.55 ..	0.95 ..	2.56 ..	2.92 ..	1.84 ..	1.18
Average	.. 6.46 ..	.. 4.49 ..	.. 2.02 ..	.. 1.51 ..	.. 5.34 ..	.. 4.09 ..	.. 1.92 ..	.. 1.74 ..	.. 4.01 ..	.. 2.63 ..	.. 2.84 ..	.. 2.08
Plot D	5.82 ..	3.81 ..	2.50 ..	1.45 ..	4.16 ..	1.99 ..	1.23 ..	0.98 ..	5.39 ..	1.76 ..	3.19 ..	4.57
	3.49 ..	4.11 ..	1.82 ..	0.88 ..	6.19 ..	5.22 ..	3.40 ..	2.18 ..	2.89 ..	2.67 ..	2.30 ..	0.93
	4.87 ..	3.19 ..	1.60 ..	1.24 ..	5.95 ..	2.23 ..	1.03 ..	1.82 ..	5.95 ..	3.64 ..	4.86 ..	1.66
	4.45 ..	4.69 ..	2.02 ..	1.43 ..	4.68 ..	4.33 ..	2.71 ..	2.21 ..	3.57 ..	2.03 ..	1.85 ..	3.30
Average	.. 4.45 ..	.. 3.95 ..	.. 1.98 ..	.. 1.25 ..	.. 5.24 ..	.. 3.44 ..	.. 2.09 ..	.. 1.79 ..	.. 4.45 ..	.. 2.52 ..	.. 3.05 ..	.. 2.61

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