WIND EROSION has been a problem with soils in many areas of the world. One of the most effective stabilizing methods attempted is the establishment of a vegetative cover. However, water needed to get good plant establishment is usually scarce in areas where wind erosion is serious and alternate methods of soil stabilization are needed. Chemical materials for surface application to bind soil particles together were recently developed and have been tested for soil stabilization against water erosion.

The field test reported here was established on loose unconsolidated sand near Indio, California, where wind erosion is an acute problem, to learn more about the use of chemical spray materials for wind erosion control. The materials tested included WX-889, CR-239, Soil-Saver and Soil-Set. Each of the chemicals was supplied by the manufacturer in a concentrate solution or emulsion for dilution with water and was applied with conventional spray equipment. Varying application rates were set for use of each material in the tests by using more than, the same as, and less than the suppliers' recommended application rate. Each treatment was replicated three times on 10 × 10 foot plots and applications were made on November 20, 1962. The plots were subjected to intense wind storms during the winter and spring months.

Soil stabilization for wind erosion control is now possible by using chemical sprays. More tests are needed to determine the optimum dilution and application rates but the amount of spray to apply depends basically upon whether the stabilized surface must bear foot traffic. The economic feasibility of such wind erosion control methods depends upon the potential of the soil needing stabilization.

Results of the test were evaluated on June 7, 1963. Observations indicated that not all of the plots had been subjected to the same erosive action by the wind. Rather than evaluating the plots on the basis of sand eroded from each plot, the stabilized surface of each plot was examined. The factors considered in the evaluation were (1) whether the stabilized surface was still intact, (2) the thickness of the stabilized surface, and (3) strength of the surface to bear the weight of a man walking. The treatments were scored on a scale of 0 to 10. A score of 6 to 10 on the table indicates that no

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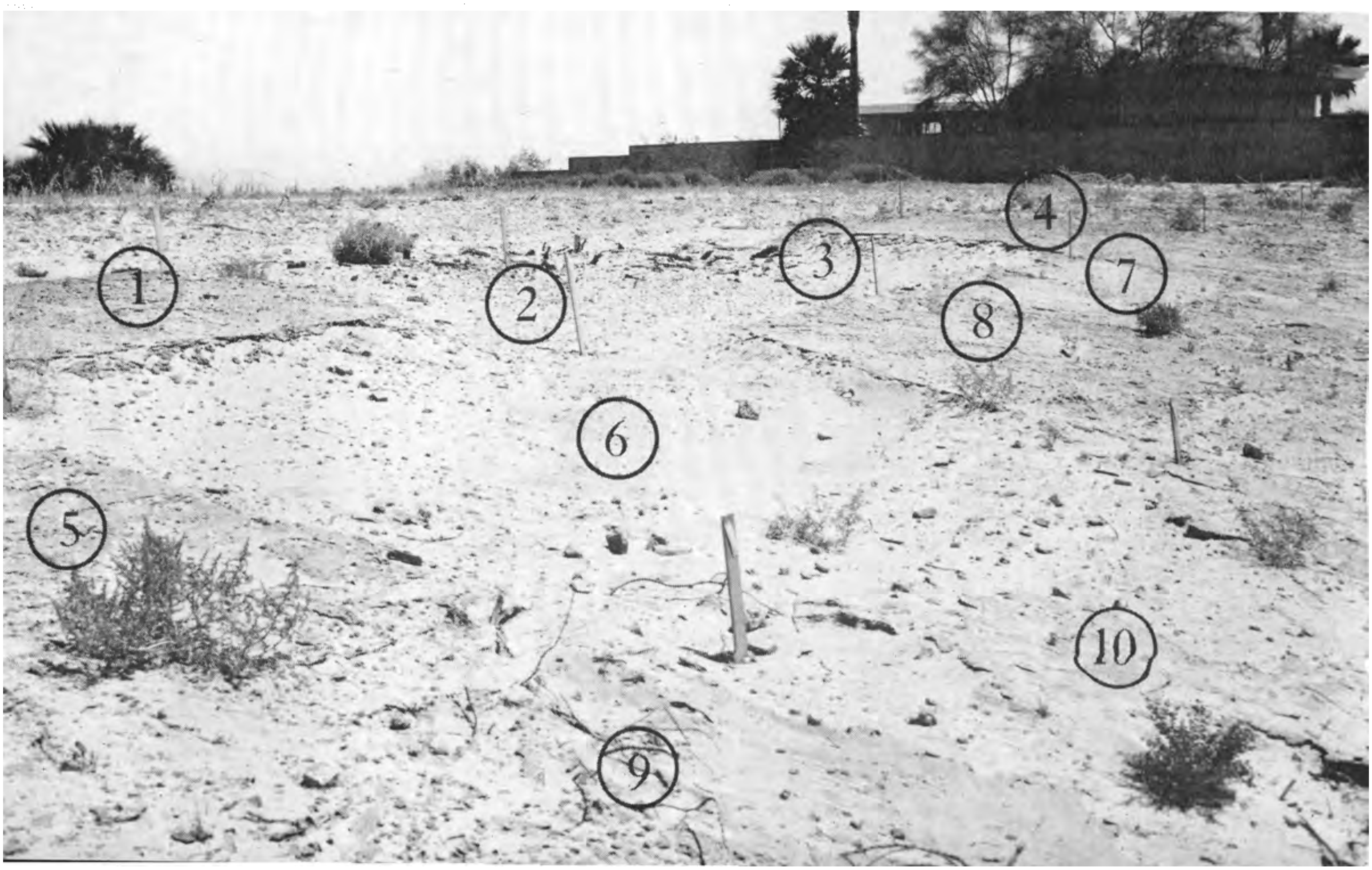
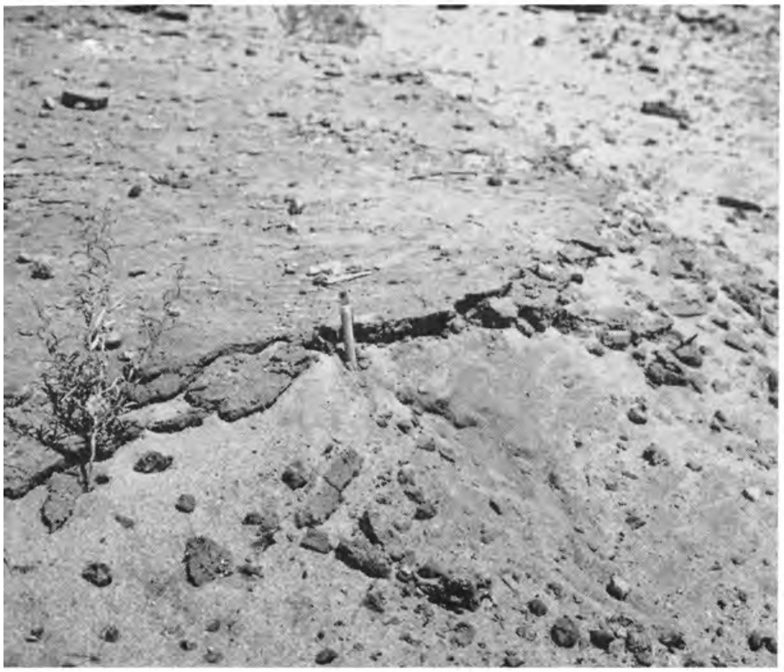
Wind Erosion Control with Chemical Sprays

Wind-eroded plots in the first picture were treated with (2) Soil-set which was found to decompose upon prolonged exposure, (3) CR-239 at the 1 to 59 dilution, and (6) no treatment. Plot (1) was treated with 5 gallons of CR-239 at 1 to 19 dilution and plot (2) with 2.5 gallons per plot. Plot 4 received 3.5 gallons of WX-889 at 1 to 8 dilution and plot 5, 2.3 gallons. Plot (7) received 2.0 gallons of Soil-Saver at 1 to 3 dilution, plot (9) had 2.5 gallons at 1 to 5 dilution, and plot (10) was treated with 2.5 gallons at 1 to 9 dilution. Despite some erosion, areas are visible on plot 10 which are still protected by the treatment. Light-colored areas on plots 5 to 9, appearing to indicate zones of film removal, are actually the result of sand being deposited on the surface from areas surrounding the plots. Treatments numbered in the photograph can be compared to the performance scoring presented in the table to illustrate what might be expected.





Close-up of plots 1 and 2, as located in photo on opposite page, shows undermining of the treated plot; however, the treated surface breaks off in rather large rigid blocks.

Plot above, sprayed with 1 to 3 dilution of Soil-Saver, shows untreated openings allowed the wind to remove sand from underneath the treated network, creating a bridged effect.

erosion or breakdown of cover occurred and differences are based upon strength of surface to withstand traffic. A score of 5 or less indicates some breakdown in cover. Some of the treatments that scored 5 or less could possibly reduce erosion, particularly if not subjected to foot traffic.

Soil-Set was omitted from the table. It had been formulated for temporary stabilization against water erosion while seeds are germinating and a vegetative cover is being established. In this wind erosion test, the surface film broke down and decomposed after six months.

The cost of some of these materials is rather indefinite at the present as some are still in the experimental stage. If there is a large demand for the chemical and large shipments are made regularly, suppliers pointed out that the price per gallon could be considerably lower than if occasional small orders are placed. The values presented in the table are based upon present approximate costs per gallon in 50-gallon-drum quantities.

All applications of WX-889 performed very well. The greatest dilution tested was 1 part of concentrate to 8 parts of water but greater dilutions would possibly have also been effective. As would be expected, the benefit of increasing the amount of application is in producing a thicker layer which adds to the strength and rigidity of the surface.

CR-239 was applied over a wide range of dilutions. Dilution at 1 part of concentrate to 39 of water was not effective in binding sand particles together. Dilution at 1 to 19 was very effective. Optimum dilution probably occurs somewhere between the 1 to 19 and 1 to 39 values. The higher application rates added to the surface strength. For both CR-239 and WX-889, application rates less than 2.3 gal/100 ft^2 could be tried.

The producers of Soil-Saver recommended lower application rates than were used on the other materials. Soil-Saver differed from WX-889 and CR-239 in that it produced a very thin, rigid film, partially accounted for by the lower application rates. However, even on comparable application rates, a thinner stabilized layer was formed by Soil-Saver. This shortcoming would be magnified where the treated area is subjected to foot traffic, but may not be as important where the stabilized surface does not need to bear traffic. Dilution at 1 part concentrate to 9 parts of water was insufficient to adequately bind sand particles. The higher concentrations could be effective, particularly if applied at higher application rates.

PERFORMANCE OF MATERIALS TESTED FOR WIND EROSION CONTROL

Product	Dilution	Application rate	Score*	Cost
		gal/100 ft^2		dollars/ 1000 ft^2
WX-889	1-4	2.3	9	8.03
	1-4	3.5	9	12.20
	1-4	4.6	10	16.07
	1-8	2.3	8	4.48
	1-8	3.5	9	6.82
	1-8	4.6	10	8.96
CR-239	1-9	2.5	9	8.72
	1-9	5.0	10	17.45
	1-19	2.5	9	4.36
	1-19	5.0	10	8.72
	1-39	2.5	1	2.18
	1-39	5.0	2	4.36
	1-59	5.0	0	2.91
	1-59	7.5	1	4.36
SOIL-SAVER	1-3	1.5	5	6.66
	1-3	2.0	8	8.90
	1-3	2.5	7	11.13
	1-5	1.5	3	4.45
	1-5	2.0	4	5.92
	1-5	2.5	6	7.39
	1-9	2.0	3	3.56
	1-9	2.5	3	4.45
	1-9	3.0	3	5.32

* 6–10 No breakdown or erosion. Difference is based on strength.
0–5 Some break in surface or erosion.

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The materials tested were WX-889, donated by the Velsicol Chemical Corporation, Chicago, Illinois; CR-239, donated by Catalin Chemical Corporation, Paramount, California; Soil-Saver, donated by George A. Arioto Co., Stockton, California; and Soil-Set, donated by Mico Corporation, Long Beach, California. Land for these tests was provided by William Carter and Sons.