

## FEWER FLOODS AND MORE FOOD WITH SOIL CONSERVATION<sup>1</sup>

HARLEY A. DANIEL,<sup>2</sup> Guthrie

Fewer floods and more food can be obtained through a complete application of the findings of the soil- and water-conservation investigations in Oklahoma. Records of the Red Plains Conservation Experiment Station, Guthrie, Oklahoma, show that there has been an average of about two high-intensity rains annually, which have resulted in high soil and water losses. Severe erosion and floods resulting from such storms can be materially reduced, however, by wise land use and practical conservation measures.

During the last 14 years (Table I), the average annual water loss from grassland was 97 percent less than that from an adjacent bare hard fallow area at Guthrie. A simple crop rotation on cultivated land has also reduced the runoff 24 percent annually. Terraces and contour cultivation reduced the annual water losses through runoff 40 percent the last two years on deep fertile wheat land at Cherokee. This water was stored in the soil for plant use and did not contribute to the flood waters of the rivers of the state. The water that did leave these fields moved slowly and carried only small quantities of soil. Raging flood water, however, carries large amounts of soil. Results from the Oklahoma Agricultural Experiment Station show that flood water near Stillwater contains an average of 0.67 percent suspended matter. The maximum amount was 2.68 percent.

The most effective method of controlling erosion and runoff was with thick-growing vegetation and of this, grass was the best protective cover. But the burning of forest litter and other vegetation increased the amount of annual runoff 97 percent. Although terraces, crop rotation, and proper soil treatments reduce runoff and erosion (Table II) it is difficult even under the best combinations of conservation practices to avoid soil losses on cultivated land. This is a very important item, owing to the fact that badly eroded land lost soil 1.6 times faster than virgin land and the average annual runoff from the former was 57 percent greater than that from the latter.

In addition to conserving soil and water, conservation and better land-use practices increase crop yields. The simple crop rotation of cotton, wheat, and sweet clover increased the yield of cotton 58 percent last year at Guthrie. Winter cover crops of vetch have increased the average annual yield of cotton 31 percent, while wheat increased it 17 percent during the last 12 years. The yield of crops was also increased slightly by contour cultivation and strip cropping. Terraces have increased the production of wheat and milo an average of 3.1 bushels per acre per year or 36 percent during a 10-year period at Goodwell, Oklahoma. Abandoned and formerly unused, shallow, rolling scrubby-oak land was successfully converted into pastures for livestock production at Guthrie. The amount of beef obtained compared favorably to that produced on the range land of the area.

In view of these important research findings, it is fair to assume that if complete conservation and land-use practices are applied to the entire watershed of the rivers of Oklahoma, they will be most effective in the control of floods. As the floods are being controlled, these watershed-treatment practices will pay good dividends in increased production now, to say nothing of the potential saving of soil resources for future generations.

<sup>1</sup> Contribution from the Oklahoma Agricultural Experiment Station and the Soil Conservation Service of the U. S. Department of Agriculture.

<sup>2</sup> Project Supervisor, Red Plains Conservation Experiment Station, Guthrie, Oklahoma.

TABLE I

*Effect of soil- and water-conservation practices on flood control*

Soil condition, cover, or treatment	Annual rainfall inches	Runoff	
		Percent	Difference in percent
Soil cover 1930-42 Guthrie, Oklahoma			
Bare hard fallow	31.45	27.47	
Grass	31.45	0.89	97
Crop rotation 1930-42 Guthrie, Oklahoma			
Continuous cotton Rotation	31.45	11.71	
Cotton	31.45	10.45	
Wheat	31.45	10.80	
Sweet clover	31.45	5.45	
Average	31.45	8.90	24
Strip cropping 1942 Guthrie, Oklahoma			
Continuous cotton	34.73	11.45	
Strip—cotton & grass	34.73	9.48	17
Direction of cultivation and terraces 1942-43 (crop year) Cherokee, Oklahoma			
With slope cultivation	25.2	10.3	
Contour cultivation	25.2	8.7	15
Terraces & contour cultivation	25.2	6.2	40
Burning of vegetation 1930-42 Guthrie, Oklahoma			
Unburned woodland	32.11	0.12	
Burned woodland	32.11	3.58	97
Virgin and eroded soil 1930-42 Guthrie, Oklahoma			
Virgin soil, continuous cotton	31.45	11.71	
<sup>a</sup> Eroded soil, continuous cotton	31.45	27.13	57

<sup>a</sup> About 12 inches of top soil removed before the experiment was started in 1929.

TABLE II

*Rate of erosion, 1930-38, Guthrie, Oklahoma*

Soil condition, cover, and/or treatment	Estimated time required to lose 1 inch of topsoil by erosion (years)
Unterraced—bare hard fallow	8
Unterraced—grass	8750
Unterraced—continuous cotton	11
Unterraced—rotation—cotton, wheat, sweet clover	47
Terraced and crops rotated	132