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PROGRESS REPORT

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WATER HARVESTING

U.S. CENTRAL GREAT PLAINS FIELD STATION AKRON, COLORADO

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In semiarid areas of the Great Plains water for livestock on rangeland has frequently been limiting because of inadequate ground water supplies for pumping and extended drought periods. Natural rainfall is a source of water which could be harvested to provide extra water supplies for livestock. Various types of impervious materials and chemicals applied to the soil surface are being tested for water harvest purposes.

This study was initiated to determine the efficiency, durability, and economic feasibility of different materials on soil surface to harvest the precipitation. The materials under study are sheet metal, asphalt roofing, butyl rubber, bentonite incorporated in the soil covered with pea-gravel and a grass check. The materials were applied on plots 20 x 50 feet on 4 percent slopes. They were installed during the summer of 1968 and one year's data have been obtained.

Results on water harvested for the rainfall period of 6 months beginning in April of 1969 are summarized in Table 1. A total of 11.4 inches rainfall was received during the period (64 gallons per square yard). Plots with asphalt roofing and butly rubber gave the highest water yield with 40 gallons per square yard or 62 percent of the total precipitation. The sheet metal plot collected 36 gallons per square yard for a 56 percent efficiency. Bentonite plots increased water yield over the grass check by 10 gallons per square yard, but the treatment was only 25 percent efficient compared with 10 percent on the grass check.

Extra water can be harvested by intentionally trapping snow on the catchment over winter. A snowfence was installed around one butyl rubber plot in fall of 1968. Records on snowfall and snowmelt runoff was kept during the 5-month period beginning November 1, 1968. The results are given in Table 2.

Only 1.08 inches of snowfall was recorded for the period (6.2 gallons per square yard). But the water harvested from snowmelt off the catchment with snowfence was 14.2 gallons per square yard or more than 230 percent of the precipitation received for the period. The butyl rubber plot without snowfence harvested only 2.9 gallons per square yard or about 46 percent of the precipitation.

Efficiency of water harvest from the sheet-metal, butyl rubber and asphalt roofing, may appear low. Surface tension and evaporation account for most of water losses on the catchments, particularly when rainfall is of low intensity. The efficiency of water harvest increases with storm intensity. Other factors which influence the efficiency are degree of slope, size of plot, aspect and surface roughness.

All treatments remained in good condiion after 1½ years exposure. Factors affecting durability would be hail, wind, solar radiation and small animals. All have been known to cause varying degrees of damage.

Annual cost per hundred gallons of water harvested may vary from 15 to 20 cents depending on durability of the catchment, average annual rainfall and efficiency of the catchment. An extra cost of 5 to 25 cents per hundred gallons would have to be added to provide storage in ponds, rubber bags, and concrete or galvanized metal tanks.

Where dependable water supplies are limiting, water harvesting is a feasible method of furnishing water for livestock and domestic purposes.

Table 1 - Cost of materials, volume and efficiency of precipitation harvested from different surface treated plots.

Treatment	Material Cost $/Yd.^{2}	Rainfall Received Gal./Yd.^{2}	Water Harvested Gal./Yd.^{2}	Efficiency %
Galvanized sheet metal	$2.25	64	36	56
Asphalt roofing	.80	64	41	63
Butyl rubber	1.40	64	40	62
Bentonite	.20	64	16	25
Grass check	.00	64	6	10

Table 2 - Water harvested from snow trapped on butyl rubber catchments with and without snowfence.

	Precipitation Received Gal./Yd.^{2}	Water Harvested Gal./Yd.^{2}	Efficiency %
Plot with snowfence	6.2	14.2	231.7
Plot without snowfence	6.2	2.9	45.8

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