Glass Fiber Filters for Tile Drains

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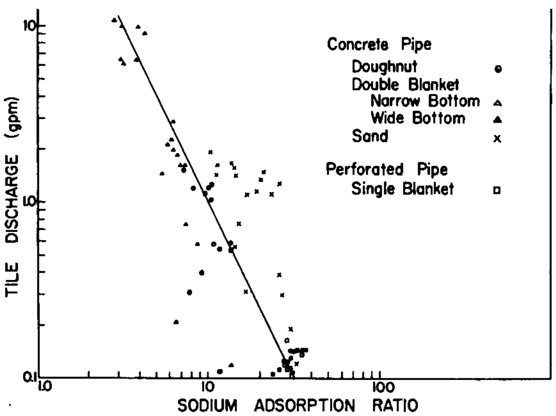


RELATION OF EFFLUENT DISCHARGE RATE TO SODIUM ADSORPTION RATIO OF THAT EFFLUENT.

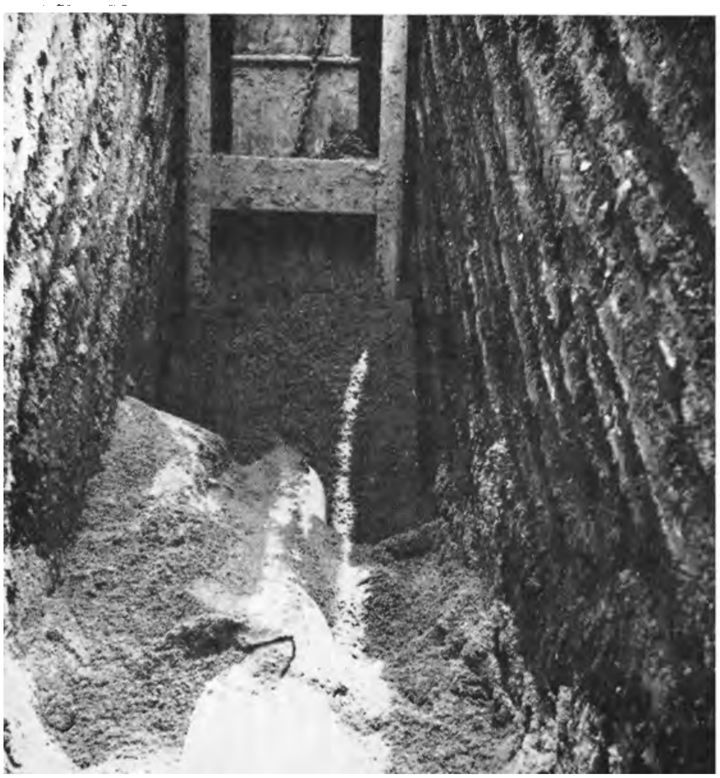
HYDROLOGIC EVIDENCE indicates the need for a great amount of agricultural tile drainage to accompany the San Luis and Feather River Projects which will import new waters to the west side of the San Joaquin Valley. Filters around tile lines in many irrigated areas of the west have shown considerable value in facilitating entry of water and in filtering out the fine sand and silt that might otherwise clog the tile. The usual graded sand and gravel filter works well, but is extremely costly where there are no deposits of suitable pit-run material close at hand. In tests reported here, several glass fiber materials that had looked promising in the laboratory were given a field trial.

All tile lines were 500 feet long, about 5 feet deep, and on a slope of 0.001. There were six standard tongue and groove concrete drain tile lines using three types of filters (as illustrated): (1) standard sand filter around the tile placed at a rate of 18 tons per 100 lineal feet, (2) glass fiber rings ("doughnuts") compressed between each two foot section of pipe, and (3) glass fiber blankets under and over the tile and lapped at the sides. Two lines were of 4 inch perforated bitumen impregnated fiber tile with a single 12 inch wide glass fiber blanket over the perforations (which were 22½ degrees off vertical from the centerline of the pipe).

All tile lines were instrumented to meter continuous rates of flow, and the effluent from each line was sampled weekly to obtain a record of the water quality. After "puddling-in" the tile lines, the entire area was ponded for leaching.

Unfortunately, it was not possible to install sufficient replications to get good statistical evidence comparing the several treatments. The inverse relationship between the quantity and quality of the tile effluent discharged from the lines in this experimental plot is illustrated on the graph. The sodium adsorption ratio is a measure of the sodium in the soil, and in this plot it is probably an indication of the hydraulic conductivity or the rate water will pass through the soil near each tile line. The filter materials cannot be

Standard installation of concrete drain tile with an envelope of filter sand. This is the usual installation in western Fresno County with 18 tons per 100 lineal feet of tile—about 4 to 5 times as much filter sand as customarily used in southern California.



Installation of concrete drain tile with 24" wide by 1" thick continuous glass fiber blankets underneath and over the tile. This design gave the best immediate performance, but the SAR (sodium adsorption ratio) of the effluent was lower than other treatments.

Field tests in western Fresno County have confirmed laboratory tests indicating that glass fiber filtering materials can be used to satisfactorily replace the sand filters which have been standard practice in drain tile installations, but which may be quite costly in some areas. No information is yet available on the life of glass fiber filters. It was hoped to obtain quantitative evaluation of the effectiveness of several types of glass fiber filters in comparison with sand filters, but comparisons were masked by extreme variation in the sodium status of the soil. Glass fiber filters generally filtered out more of the fines than did sand filters.

The leaching operation on the land following installation of the tile drains. Rice was planted in the spring of 1963, following leaching.

evaluated from the flow data due to the large sodium variations within the plot.

Although evaluation of significance is not now possible, the filters are compared in the table, using data showing the quantity of sediment that passed through the various filters and out of the tile lines in the effluent during an eight week period in which water was ponded over the entire plot. Sediment discharged in each case is quite small, and does not measure the quantity of sediment remaining in the tile lines. Fine sand particles ($>50\mu$) were found only in the effluent from the sand filtered lines and the double blanket line with the narrow blanket on the bottom. Information on how long any of the glass fiber installations will remain effective has not yet been developed.

SEDIMENT DISCHARGE COMPARISON FOR TILE DRAIN FILTERS

Filter treatment	Sediment discharged* (Lb./In.)
Doughnut Glass Fiber	67.4
Double Blanket Glass Fiber	
Bottom Blanket Narrow	77.4
Bottom Blanket Wide	12.3
Sand	118.6
Perforated Pipe—	
Single Blanket Glass Fiber	40.2

* Average quantity of aggregated and single grain particles discharged from each 500 ft. line.

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ıstallation with glass fiber rings as lters in the tongue and groove joints f the concrete drainage pipe. No ther filter was used.

The standard installation of bituminized fiber pipe with two rows of perforations 45° apart near the top of the pipe, and covered with a continuous blanket of glass fiber, 12" wide by 1" thick.

The effluent from each tile drain line was continuously measured with a slotted tube meter.