MR. CLUFF, AT LEFT, holds up samples of water in two milk bottles. That at left was taken from the head ditch, that at right from a point 1,000 feet down the bermudagrass border strip. (Photo by Dr. Fred Turner, Jr.)

Water must be carefully saved, in this water-hungry Southwest. However, water saved in above-ground ponds is quickly lost through rapid evaporation. One answer is the recharge of ground water supplies. But surface water runoff from rains can be loaded with bits of soil, too muddy to pour back into recharge wells. Experiments at Safford, and reported here, are a unique test to learn if pasture grasses can help solve this problem. We know of no other similar tests being made anywhere, which makes this University of Arizona experiment of intense interest to all the water-scarce parts of the world.

Letting Grass Take the Mud Out of Water

L. G. Wilson and C. Brent Cluff

During artificial ground water recharge, removal of suspended sediment is necessary, if high intake rates are to be maintained.

Sediment may be reduced by using coagulating agents in conjunction with settling basins, but this method is expensive. A more economical method, which appears to be equally efficient, consists of passing muddy water intended for recharge purposes through grasses or legumes. The idea that this method might provide effective filtration occurred when observing how suspended sediment in Gila River water was reduced during irrigation of alfalfa near Safford.

Unique Trial At Safford

To get specific information on the efficiency of this method a 4½ acre plot is being used on the Safford Experiment Station. It is hoped that experiments will give us the following data:

1. **Filtration efficiency of various grasses and one variety of alfalfa at different stages of growth.**
2. **Length of run needed to remove sediment.**
3. **Effect of flow rates on filtration efficiency.**
4. **Effect of prolonged flooding on filtration efficiency.**
5. **Per cent of water moving over border strips.**
6. **Change in organic matter content of water as it passes through grasses.**
7. **Ability of various grasses and legumes to withstand prolonged periods of submergence.**
8. **Mechanisms responsible for sedimentation.**

Eight border strips, 25 feet wide and 1,000 feet long, were constructed, each separated by two-foot ridges. Seven of the border strips, for the filtration studies, were seeded as follows: Goars fescue, *Panicum* Coloratum, Blue Panic Grass, coastal Bermuda, common Bermuda, Vine Mesquite, and Lahontan alfalfa. The eighth border strip, for the submergence studies, was subdivided into smaller plots and seeded to a variety of grasses and legumes.

Water is applied and metered to the border strips by use of two-inch siphons. The relative degree of turbidity of water samples from the head ditch and the field is estimated by a Jackson candle turbidimeter. (This device is used to measure the length of light path necessary to cause the disappearance of the light from a standard candle, when viewed through a "roily" water sample in a glass tube.) The amount of organic matter in the water samples is also measured.

First Trial Showed Results

In a preliminary experiment in the summer of 1961, the turbidity of water was followed as the front moved through four border strips. In this test coastal Bermuda and common Bermuda were more effective than either *Panicum Coloratum* or Lahontan alfalfa in reducing sediment. For a flow rate of five gallons per minute per foot of width of plot, a length of 700 feet produced a water with a low enough sediment load to be safe for recharge purposes. Tests showed no increase in organic matter in the water.

The second experiment, a year later, was of 26-hour duration. Lessened turbidity was observed as the water moved through five border strips, and at various distances down the strips during submerged flow. This test showed that the two Bermuda grasses were more efficient than the two panic grasses or Goars fescue in removing sediment. Coastal Bermuda was slightly more efficient than common Bermuda. The photo on this page, showing samples of water — first from the head ditch then from 1,000 feet on down the coastal Bermuda strip — gives visual proof of the amount of sediment removed.A length of 700 feet was sufficient to reduce sediment to a safe level for recharge purposes.

During prolonged flooding, filtration efficiency gradually decreased. This was more noticeable in common Bermuda than in coastal Bermuda.

What is Flooding Tolerance?

Experiments at Safford have not yet tested the ability of the grasses to withstand flooding. California studies have shown that Bermuda grasses are quite tolerant of prolonged flooding.

We believe the two experiments reported here have shown that grasses may be used to reduce the sediment load of water to a safe level for recharge purposes, and that coastal Bermuda and common Bermuda are most effective for this use. Future studies will seek more answers to the eight objectives cited at the beginning of this article.

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