portions of the standpipes, we didn’t feel the additional correction would be sufficient to justify the expense.

The long-time drift errors are due to changing of the elastic properties of the membrane with time. Preliminary tests showed that a regular rubber inner tube drifted badly with time. However, this drift was essentially eliminated when we replaced the inner tubes with bags made out of nylon-reinforced butyl rubber (Figure 2). If there were a long-time drift, the slope of the height-temperature line of Figure 2 would be different for the active standpipe which was subject to the drift, than it would be for the "dummy" standpipe. The data of Figure 2 show that slope of the two lines is very nearly the same.

The error due to temperature fluctuations could be almost eliminated by locating a suitable pressure-measuring device at the bottom of the lysimeters near the rubber bags. Tanner has used a differential mercury manometer with stable transducers in this manner. If measurements are desired over short time intervals, this procedure is probably necessary. However, where daily measurements are all that is desired, the method we have used is believed to give adequate accuracy.

The most important use of the lysimeter will be to measure changes in weight of the lysimeter due to evapotranspiration or precipitation. Moreover, the weight changes will be most conveniently expressed as an equivalent depth of water. The equation expressing this relation is

$$ ET = \frac{\Delta h \times A}{A_1} \frac{\rho_T}{\rho_w} $$

where $ET$ is evapotranspiration (or precipitation) in cm. of water, $\Delta h$ is change in height of fluid in standpipe, $A$ is the area over which the weight is distributed, $A_1$ is the area of the bottom of the lysimeter, $\rho_T$ is the density of fluid in the standpipe, and $\rho_w$ is the density of water.

In our lysimeter, shown in Figure 1, $A_1$ was slightly more than twice $A$, and $\rho_T$ (anti-freeze solution) was slightly more than $\rho_w$ which resulted in $ET = \Delta h/2$. By varying the ratio of $A$ to $A_1$, the ratio of $\Delta h$ to $ET$ can be varied. However, this change is limited by the total height of the standpipe that can be tolerated. If the standpipe is to project out of the ground about 5 feet (a 3-foot lysimeter), then the ratio of $A_1$ to $A$ will be about 2.

**EFFECT OF TEMPERATURE AND SOILS ON EMERGENCE OF SUMMER ANNUAL FORAGE GRASSES**

Richard H. Hart and Homer D. Wells

In recent years, many sorghum × sudangrass hybrids have been released. One of the claims made for these hybrids is that they will germinate and emerge more readily in cold soil than millet or sudangrass. It was decided to test this claim in the laboratory in order that results could be analyzed statistically.

Table 1 shows that lowering the temperature from 90° F. to 70° F. had no significant effect on emergence in sterilized soil, but significantly, lower than emergence in field soil. Emergence at 60° F. was further reduced, but significantly, lower than emergence at 70° F. However, emergence was similar under any of the 4 treatments at 90° F.

There were significant differences in emergence among varieties at all six soil-temperature combinations. The reduction in emergence from field soil at 60° F. was significantly lower in field soil than in sterilized soil. Emergence at 60° F. was significantly lower in field soil than at 90° F. but significantly, lower than emergence at 70° F. in sterilized soil, but much lower in field soil. One variety, Emergence at 70° F. averaged 94 and 98% in sterilized and field soil, respectively.

The conclusion was that the sorghum × sudangrass hybrids were no more likely to emerge from cold soils than millet or sudangrass.

The reduction in emergence from field soil seemed to be caused by pathogenic fungi as such, since emergence from sterile soil at 60° F. was nearly as good as at 90° F.

To determine the species of fungi present in the field soil, millet and sorghum seeds were planted in pans which were held at 60° F. for 3 days. The seeds were dusted with a mixture of 50% Captan wettable powder. The sorghum × sudan hybrids, which were obtained through commercial channels, had been treated by a different commercial seed firm. Fifty seeds of each variety were planted in each pan, in rows 1 inch apart and 12 inches long. Before planting, the seeds were surface-sterilized in 0.25% sodium hypochlorite solution for 30 seconds, and placed in sterile petri dishes containing 20% V-8 juice agar.

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