

I have examined the chromosomes of the bluebell, *Endymion nonscriptus* (L.) Garcke, and have succeeded in identifying all of them<sup>1</sup>. This has made it possible to carry out the sort of studies in question<sup>2</sup>.

68 pollen grains were examined at pollen mitosis<sup>1</sup> and all the chromosomes in each such grain were identified.

One of the facts which emerged from this investigation was that some of the pollen grains were not pure but either contained all 3 of a particular chromosome (triplicates), or have missing all 3 of a particular chromosome (incomplete grains). The triplicates were more numerous than the complementary incomplete grains and this seems to support the genetical idea that duplications are not as deleterious as deletions. The satellitic chromosome was found to be always present in each pollen grain at least once, which may mean that the absence of this particular chromosome would otherwise be deleterious to the grain.

The presence of impure grains (that is, triplicates and incomplete grains) obviously decreases considerably the chances of proper fertilization since these can lead to the formation of tetrasomic or nullisomic triploids none of which was found among the triploids studied. This cytological analysis provides a more convincing explanation of the scale of sterility found in triploids than has been given by genetical evidence.

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<sup>1</sup> Wilson, J. Y., *Nature*, 178, 195 (1956).

<sup>2</sup> Wilson, J. Y., *Cytologia*, 24, 466 (1959).

## AGRICULTURE

### Measurement of Evapo-Transpiration from Large Tanks of Soil

THE direct measurement of evapo-transpiration on any sufficiently large scale requires very expensive equipment. In an attempt to find a cheaper method we have been experimenting with semi-enclosed hydraulic systems involving the use of water-filled, flexible bags on which large tanks can be readily supported (Fig. 1). The change in height of the balancing column of water measures changes in pressure on the system.

It is well known that the factors which determine the volume of water in the system and the height of the balancing column of liquid are pressure and temperature. Since pressure is equal on both sides of the balanced system, no complications arise due to changes in environmental atmospheric pressure; however, changes in temperature, by causing changes in volume of the liquid, affect readings of the water column. In our experiments the flotation bags will be used at depths of soil below 4 ft., where there is little diurnal or even annual change in temperature to affect a system of high specific heat. For example, we have floated a steel tank 8 ft. long by 4 ft. wide and 4 ft. deep, filled with water, and supported on three interconnected water-filled rubber bolsters, each some 9 ft. long and 18 in. wide (Fig. 1).

Evaporation from this tank was compared with evaporation from a series of evaporation pans in use at this station. The results are shown in Fig. 2, which illustrates the cumulative records over a sample 12-day period.

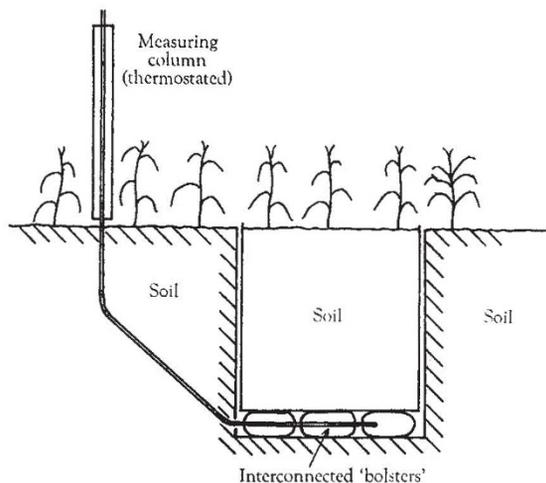


Fig. 1

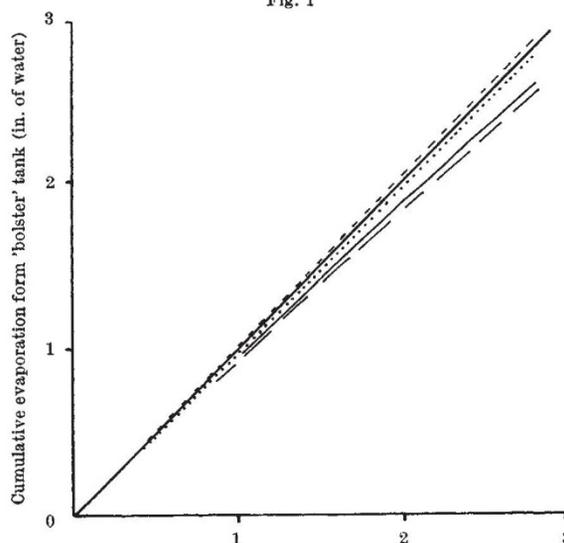


Fig. 2. Cumulative evaporation from Trumble tank (---), sunken pan (···), class A pan (—) and raised gridded tank (—). Closeness of agreement between the 'bolster' tank and any of the evaporation pans is shown by the nearness of the lines to the thick continuous line at 45° to the axes

Whereas evaporation on rain-free days from all these devices is of the same order, our tank gives results which are more closely correlated on a daily basis ( $r = 0.995$ ) with the Trumble tank and sunken pan than with the remainder. The Trumble tank is a water-insulated tank some 35 in. deep, while the sunken pan is air insulated and only 17 in. deep.

The experimental tank has now been filled with soil in place of the water, and the bolsters continue to support it and show changes which are believed to be due to loss in evaporation from the soil surface, since additional amounts of water appear to be accurately reflected by changes in height of the measuring column.

Further tests are to be carried out on a larger scale to study both potential and actual evapo-transpiration under a variety of local crops.

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