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CONTROL OF SOIL EVAPORATION

The control of evaporation by the application of monomolecular films to the water surface is well established. Roberts (1961) obtained a reduction of transpiration from corn plants up to about 40 per cent by the application of a mixture of hexadecanol and octadecanol into the soil. In this communication, results of an experiment to control the loss of water by evaporation from wet soil, by the application of hexadecanol in the soil, are described.

For this experiment, soil evaporimeter described by Mallik (1942) was used. Four such evaporimeters with soil column 22·5 cm, resting on a water table, were used for this study. The four instruments were filled with air dry black soil of Poona. Special care was taken to see that the packing of the soil was uniform in all the four instruments. The instruments were weighed daily at 0830 hrs, replenished with water up to a reference mark on a glass side tube of the instrument and weighed again. The difference between the weight after adding water on one day and the weight before adding water the next day is the actual loss of water by evaporation from the surface of the soil column in the instrument. The evaporation is then expressed in mm by using a conversion factor. To obtain uniformity of exposure, the four soil evaporimeters were set up on suitable wooden platforms so that the tops of all the instruments were at the same level, at 120 cm above ground.

The experiment was started on 11 January 1962. The data for the period 11 to 19 January were not considered as it took a few days for a steady state to be attained in all the four instruments. Thereafter, the evaporation from each of the four instruments were recorded every day (except on 26 January when the instruments were kept covered because of threatening sky and light drizzles). After recording the weights on 23 January 1962, 0·5 gm of hexadecanol was introduced at the centre of soil column at a depth of

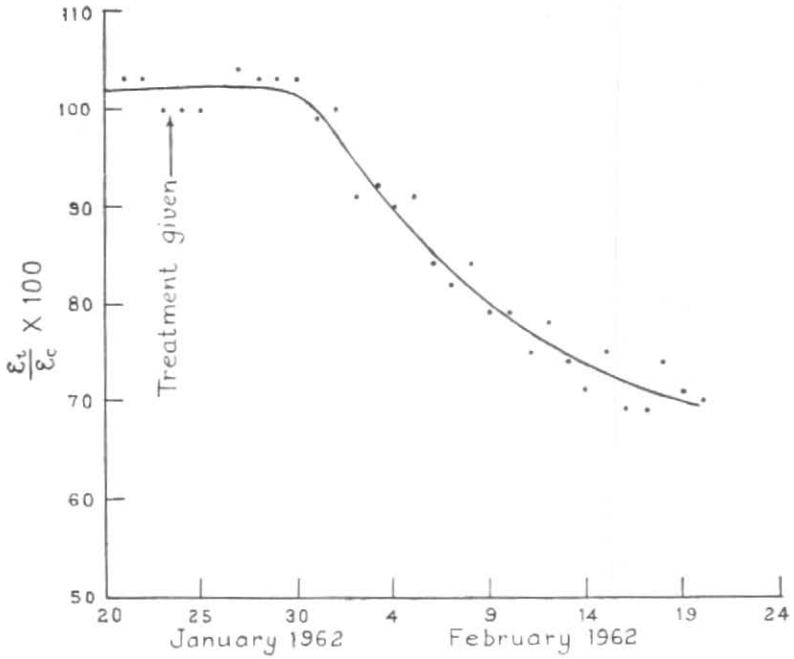

Fig. 1

TABLE 1

Period	Total evaporation (mm) from Instrument No. 1	2	3	4	USA Standard Open Pan Evaporimeter
19-1-62 to 1-2-62	117	107	104	116	73
2-2-62 to 20-2-62	144	138	183	174	131

7·5 cm, in each of two of the four instruments (Nos. 1 and 2), the other two (Nos. 3 and 4) being continued as control. The data recorded from 20 January to 20 February 1962 are presented and discussed below.

For estimating the reduction of evaporation, the daily total evaporation (E_t) from the two instruments which received treatment, *i.e.*, Nos. 1 and 2, was expressed as a percentage of the daily total evaporation (E_c) from the two untreated instruments, *i.e.*, Nos. 3 and 4 ($E_t/E_c \times 100$). This was done for all days beginning with 19 January although the treatment was applied on 23 January. These values are plotted and a smooth curve drawn through the points in Fig. 1. The date of application of the treatment is indicated in Fig. 1 by an arrow.

It will be seen from Fig. 1 that

(*a*) Upto 1 February, the ratio of evaporation from instrument Nos. 1 and 2 to that from instrument Nos. 3 and 4 remained more or less constant. This indicates that the evaporation from the four instruments were practically the same during this period;

(*b*) Although hexadecanol was incorporated in the soil on 23 January, the effect became noticeable only by 2 February, *i.e.*, 10 days after the treatment was applied; and

(*c*) A reduction of evaporation by about 30 per cent has been achieved by the treatment at the time of writing, *i.e.*, about a month from the date of treatment.

The total evaporation from each of the four instruments separately for the periods 19 January to 1 February (before treatment effect became noticeable) and 2 to 20 February (after treatment effect became noticeable) are given in Table 1, along with the evaporation for the corresponding periods from the USA Standard Open Pan evaporimeter.

The figures, given there, show a conservation of approximately 40 mm of water, in about a month's time from the addition of hexadecanol to the soil.

It is thus seen that by the application of fatty alcohols to soil, it is possible to control the loss of water by transpiration from plants as shown by Roberts (1961) as well as evaporation from wet soil (as shown above). It would, therefore, be worth exploring the possibilities of reducing the loss of water by evapotranspiration from cropped fields by the application of fatty alcohols like hexadecanol and octadecanol to soil.

The experiment is continuing and further results will be discussed at greater length in a later communication.

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