WATER REQUIREMENT OF IRRIGATED WHEAT—VARIETY KENPHAD

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STUDIES on the water requirements of crops are engaging the active attention of the workers at the Central Agricultural Meteorological Observatory, Poona, under the auspices of a scheme sanctioned by the Indian Council of Agricultural Research. The design of suitable experimental techniques for assessing the water lost by evapo-transpiration is now in progress. The present note is concerned with the results of a preliminary experiment conducted during November 1954 to March 1955, on the wheat crop. The experimental arrangements tried out, functioning somewhat similarly to those of Thornthwaite[1] are described briefly below:

A galvanised iron tank $5' \times 5' \times 2\frac{1}{2}'$ was buried in the field with 3" of its rim projecting over the surface of the soil. The tank was connected by means of an underground G.I. pipe line to a float mechanism, which in turn was connected to a supply reservoir through a needle valve so that a water-table could be maintained in the tank at a depth of 18" from the soil surface. The float mechanism had also an overflow arrangement to remove any excess water that tended to raise the water-table. Three such tank units were used and the tanks were filled with soil so that the level of soil in the tanks and the field were the same. The tanks and field were planted with winter wheat crop. When the plants were one-week-old, each tank was irrigated from the top with an excess of water sufficient to cause an overflow and the overflow was collected and removed. As water was lost by evapo-transpiration, water from each supply reservoir moved into the respective field tank and daily readings of this loss was made. After 3 weeks' time, when the field was also being irrigated, each tank was irrigated with a known quantity of water sufficient to cause an overflow and the overflow was collected and measured. Any rain and the overflow from such rain during the interval between the two top irrigations were also recorded. The water requirement was given by the amount of water added to tank as top irrigation and any rain *plus* the amount of water lost from the supply reservoir *minus* the amount collected as overflow. Water requirement was estimated for 3-week intervals till the period of ear-emergence. Afterwards top irrigation was given only at the time of harvest to find out the water requirement for the period between ear-emergence and harvest. The

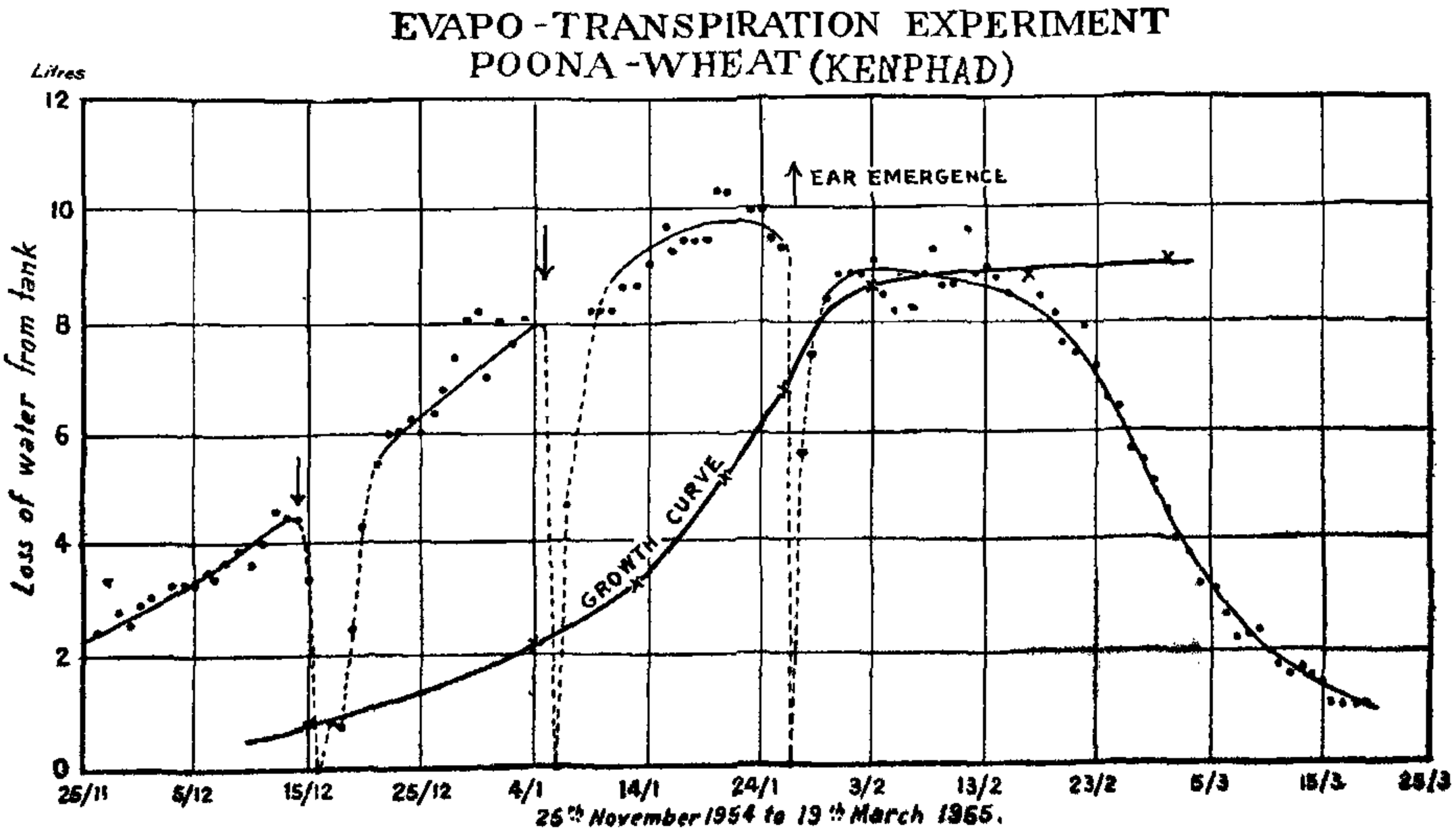

FIG. 1

water requirement is expressed in terms of acre inches. The results are presented in Table I.

TABLE I

Wheat sown on 13-11-1954; germination complete on 18-11-1954; crop harvested on 19-3-1954. The average yield from tanks was 860 lb./acre.

Period		Consumption of water*
II to IV week	..	1·7"
V to VII week	..	2·8"
VIII to X week	..	3·54"
XI week to harvest	..	6·80"
	Total	14·48"

* Total for the period, average of three tanks.

It can be seen from Table I that the total water need of a wheat crop irrigated at intervals only but otherwise drawing moisture from a water-table 18" below the soil surface is of the order of 15" during the entire growing season.

Fig. 1 gives the average daily loss of water from the supply reservoir. In this is also given the growth of wheat crop in the tanks. It will be seen from Fig. 1 that the loss of water from the supply reservoir is reduced when water is added to the tanks from above but it attains a steady state in about a week. The daily loss of water from the supply reservoir is about 3 litres in the beginning of December and increases uniformly to about 9·5 litres by middle of January, *i.e.*, about a week before ear-emergence (1 litre = 0·43 mm. of water). The period of maximum loss from tank corresponds with the period of maximum rate of elongation of the crop. The loss of water decreases after ear-emergence and particularly so after about 2 weeks.

These studies are being continued. The author is indebted to Dr. L. A. Ramdas and Shri S. P. Venkiteshwaran for their guidance in conducting this investigation.

1. Thornthwaite, C. W., "Report of the Committee on Transpiration and Evaporation," *Trans. Amer. Geophysical Union*, 1946, 27.

UTILIZATION OF WIND POWER IN INDIA

INDIA has considerable resources of wind energy which have not been utilized to any large extent so far With a view to developing these resources, the Council of Scientific and Industrial Research set up a Wind Power Sub-Committee in December 1952 with Dr P. Nilakantan as Convener. The Committee was charged with preliminary investigations on the available wind power in the country which could be put to practical use, and study of various important aspects of the economic utilization of wind energy.

The Wind Power Sub-Committee started work by studying in detail the available meteorological data on surface winds, a large amount of which have been collected and analysed by the India Meteorological Department. These have proved very useful in giving general indications of wind regimes. From anemograph records, velocity duration and power-duration curves have been prepared. On the basis of the velocity-power duration diagrams, it has now been possible to establish a correlation between the annual mean hourly wind velocity and the availability of power for specified speed ranges for various regions.

As the wind velocities recorded at meteorological observatories are generally lower than those prevailing in the most favourable sites in the region, the Wind Power Sub-Committee is now engaged in a programme of making more detailed surveys in order that a proper assessment of the availability of power under optimum conditions at favourable sites may be made.

The question of utilizing wind power for pumping water has been examined in some detail. As a result of preliminary surveys, the conclusion has been drawn that there are large untapped resources of wind power which could profitably be used in rural areas for such purposes as pumping water for drinking, sanitation, irrigation of small holdings, drainage, etc. Other possible uses of windmills in rural areas are for the processing of agricultural products, such as grinding corn, threshing and oil extraction.

Most regions in India have average wind velocities of less than 10 m.p.h. (16 km/hr.). Studies of windmill efficiency have indicated that economic utilization of windmills will be possible in these regions only by constructing fairly large size windmills at low cost using indigenous materials. A design project has been initiated by the Committee and a prototype windmill using wood and bamboo to a large extent has been developed and will be tested shortly. Several prototypes will be built and tested.