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Letters to the Editor

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EVAPOTRANSPIRATION OF KHARIF RAGI UNDER NO MOISTURE STRESS CONDITIONS DURING DAY AND NIGHT

Observations on the daily evapotranspiration of a transplanted, long duration kharif ragi by a gravimetric lysimeter system (Venkataraman *et al.* 1976) and concurrent meteorological data had been recorded at the research farm of the University of Agricultural Sciences, Bangalore in the favourable rainfall year of 1978. In this trial, ragi variety HR-23 A had been sown on 26 June 1978 in the nursery. The seedlings were transplanted in the lysimeter and the surrounding field on 21 July 1978 with a spacing of 23 cm between the rows and 15 cm between the seedlings in the row.

There was little rainfall in the month prior to sowing. However, in the period from sowing to transplantation the rainfall was 170 mm leading to a moisture accretion of 90 mm. This has largely come from a fall of 101 mm of rain on 19th preceded by one of 19 mm on 17th. The crop was lightly irrigated on 24 July, 10 Aug and 31 Aug. Subsequently, no irrigation was given till the harvest of the crop on 13 November '78. The following were the significant amounts of rain in the crop period, *viz.*, 24 and 31 mm respectively on 19 and 24 Aug, 32, 33 and 40 mm respectively on 12, 27 and 30 September, 49 mm on 18 Oct and 22 mm on 5 November.

2. From basic data, cumulative ET, rainfall (R) or irrigation (I) in the periods between irrigation and days of significant rain and between dates of significant rains were worked out. These are given in Table 1. Observations on ET and EP have been recorded at 0730 and 1730 IST. The aim was to have an idea of the fractional contribution to total ET and EP during the night hours. The ratios of ET and EP during the day time periods of 0730 to 1730 hours to the total for the day as a whole was worked out. The values for periods in the crop stage from ground shading to harvest are given in Table 2.

3. It is seen from Table 1 that cumulative ET in the periods of moisture availability had been small and about 20-30 mm upto end August and that light irrigations or rainfall had been sufficient to meet these needs. The irrigation on 31 Aug together with the

TABLE 1

Soil moisture stress in relation to irrigation, rainfall and cumulative ET

Period (1978)	Irrigation (mm)	Rain (mm)	Total ET (mm)	Soil moisture storage* (mm)
26 July-10 Aug	12	22	33	+1
11 Aug-18 Aug	—	11	26	−14
19 Aug-24 Aug	—	78	14	+50
25 Aug-30 Aug	—	1	22	+29
31 Aug-11 Sep	37	1	66	+1
12 Sep-27 Sep	—	88	61	+28
18 Sep-18 Oct	—	111	90	+49
19 Oct-5 Nov	—	34	58	+25
6 Nov-13 Nov	—	7	27	+5

*+ve indicates addition and −ve withdrawal from soil moisture storage.

TABLE 2

Daytime ET and EP expressed as a percentage of ET and EP for 24 hours

Period	ET day (0730-1730 hr)	EP day (0730-1730 hr)
(1978)	ET 24 hours (%)	EP 24 hours (%)
27 Jan-30 Jul	76	62
31 Jul-7 Aug	75	59
8 Aug-13 Aug	77	52
14 Aug-19 Aug	—	—
20 Aug-25 Aug	67	63
26 Aug-31 Aug	74	60
1 Sep-6 Sep	81	64
7 Sep-13 Sep	81	57
14 Sep-19 Sep	82	67
20 Sep-25 Sep	85	67
1 Oct-6 Oct	88	67
7 Oct-12 Oct	94	68
13 Oct-20 Oct	81	59
21 Oct-26 Oct	89	67
27 Oct-2 Nov	83	65

rainfall excess of about 40 mm in the preceding rainy period was sufficient to meet the ET needs. From 13 September onwards the rainfall has matched the cumulative ET needs. Thus, there was no necessity for irrigation in September. The irrigation on 31 Aug could have even been delayed by a week. The above exercise *vide* Table 1 had been gone through to emphasize the lack of any moisture stress for the kharif ragi despite no supplementary irrigations in September-November.

4. It is seen from Table 2 that while 80-85% of total daily ET occurred during day time, the contribution of daytime EP was only 2/3 of total daily EP. This finding is in conformity with the diurnal variations in ET and EP noted at Anakapalle for summer ragi (Venkataraman *et al.* 1980) and at Hyderabad for rabi groundnut (Venkataraman *et al.* 1981). The implication of this finding is that day time values of RET would be about 1.5 times the value of RET for the day as a whole. Thus, in studies on meteorological estimation of ET, it would be rational to compute ET values for day time and take account of only evaporation from soil surface.

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References

Venkataraman, S., Subba Rao, K. and Raghava Rao, P., 1976, A Preliminary Lysimetric study on the Evapotranspiration of the Sugarcane Crop at Anakapalle, India Met. Dep., Pre-Publ. Sci. Rep. No. 76/13.

Venkataraman, S., Subba Rao, K. and Raghava Rao, P., 1980, The water needs of Transplanted Summer Ragi at Anakapalle. A Lysimetric Study. *The Andhra Agric. J.*, **27** (5 & 6), 302-305.

Venkataraman, S., Subba Rao, K. and Abhyankar, R.S., 1981, Some Preliminary Observations on the Evapotranspiration of Rabi Groundnut at Hyderabad, *The Andhra Agric. J.*, **28** (1 & 2), 12-17.

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