

# BEHAVIOUR OF EVAPOTRANSPIRATION EVAPORATION RATIO AND LEAF AREA INDEX DURING DIFFERENT PHENOPHASE OF KHARIF GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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## ABSTRACT

The evapotranspiration rate and the corresponding ratio of evapotranspiration to evaporation during various phenological stages of the kharif groundnut (*Arachis hypogaea* L. Cv. JL-24) were studied during 1986 to 1988. The ET/E during 1986, 1987 and 1988 reached the peak values of 2.0, 1.79 and 1.36, respectively during peg formation stage of the crop and were established earlier than the leaf area index (LAI) attained during the pod formation stage of crop. The highest values of LAI observed during the year 1986, 1987 and 1988 were 9.3, 10.0 and 7.5, respectively. During flowering stage (up to 30 DAS) ET/E was found higher in 1988 than 1986 and 1987. But later on (from 30 to 65 DAS) ET/E was found progressively higher in 1986 and 1987 than 1988. During peg formation to pod development stage (from 65 to 90 DAS) of the crop, the ET/E was found higher in 1987 than 1986 and 1988, which had the highest pod yield.

## INTRODUCTION

Actual evapotranspiration for kharif groundnut ranges from 500-700 mm for Indian climatic conditions (Doorenbos and Pruitt 1977). Empirical methods have been proposed by different workers for determining potential evapotranspiration and its comparison with actual evapotranspiration for different crops. Present study analyses the actual evapotranspiration rate and their corresponding ratio ET/E during different phenological stages of kharif groundnut crop (variety JL-24) and its effect on crop yield during the year 1986 to 1988.

## MATERIAL AND METHODS

Lysimetric data generated through two weighing type lysimeters installed by Indian Meteorological Department at Anand have been taken into consideration. Field experiments were conducted during the years 1986, 1987 and 1988 by sowing JL-24 variety of groundnut on sandy loam soil at Anand in kharif season. The crop was sown on 6th June, 3rd July and 7th July during the years 1986, 1987 and 1988

respectively. Daily lysimetric and periodic agronomical observations were taken during the growing season of the crop. Daily Pan evaporation from the agromet observatory located very near to the site of the lysimeter field, soil moisture and leaf area measurements were made regularly. The crop was harvested on 10th October, 12th November and 19th November during the years 1986, 1987 and 1988, respectively.

## RESULTS AND DISCUSSION

The evapotranspiration and evaporation, rainfall, and irrigation water supplied, pod yield, dry matter production during crop growing periods for kharif seasons of the crop are presented in Table 1. The meteorological parameters recorded during the crop growing periods are presented in Table 2.

The variations in ET/E with the growth of the crop are shown in Fig 1. The ET/E was observed higher during flowering stage in 1988 than 1986 and 1987, but later on (from 30 to 65 DAS) the ET/E was found progressively higher in 1986 and 1987 than 1988. During peg formation to pod development stage (from 65 to 90 DAS) of the crop the ET/E remained higher in 1987 than 1986 and 1988, which had the highest pod yield. The value of LAI was increased up to 100 DAS in the year 1987 (Fig. 2) The period of initial peg formation to initial pod development of the crop was identified as one of the critical period of water requirement (Reddi et al. 1977; Maske et al. 1990) and this period was favourable as seen from ET/E, as well as increasing LAI for the good production of crop pod yield. Moisture stress during this stage resulted in the drastic reduction in the pod yield and qualities (Sharma and Sharma 1989). Characteristics of LAI and the march of ET/E (Fig. 1 and 2) indicate peak evapotranspiration and the corresponding ET/E shortly before the peak LAI.

Shah (1980) opined that if water can be supplied either by rain or by irrigation during the period between initial peg formation to pod formation stage and pod

Table 1. Total pod and dry matter production, crop duration, water supplied and accumulated ET and E under groundnut crop at Anand

Parameters	1986	1987	1988
Cumulative ET (mm)	572	766	466
Cumulative E (mm)	499	729	556
Total rainfall (mm)	241	283	894
Total irrigation (mm)	280	95	83
Pod yield (kg/ha)	1617	1784	1535
Dry matter (kg/ha)	4906	5437	5105
Crop duration (days)	120	130	131

Table 2. Rainfall/irrigation, mean temperature and mean relative humidity during different phenophase of groundnut crop.

Phenological Stages	1986			1987			1988		
	Rainfall/irrigation (mm)	Mean Temp (°C)	Mean R.H. (%)	Rainfall/irrigation (mm)	Mean Temp. (°C)	Mean R.H. (%)	Rainfall/irrigation (mm)	Mean Temp. (°C)	Mean R.H. (%)
Germination	71.0	30.3	83	65.2	30.9	74	105.9	29.1	85
First flowering	71.3	30.1	70	8.6	31.0	68	491.1	28.0	87
50% flowering	98.2	29.1	74	113.8	31.0	67	90.6	27.5	78
Initial peg formation	57.4	27.6	83	196.1	29.5	75	2.4	29.1	78
50% Peg formation	1.6	27.6	79	91.9	29.2	71	113.5	30.0	74
Initial pod formation	165.7	28.3	70	139.1	30.5	62	70.6	29.0	81
50% pod formation	114.0	29.6	65	—	30.7	57	—	27.9	73
Maturity	—	30.0	61	160.1	28.9	53	—	27.3	59

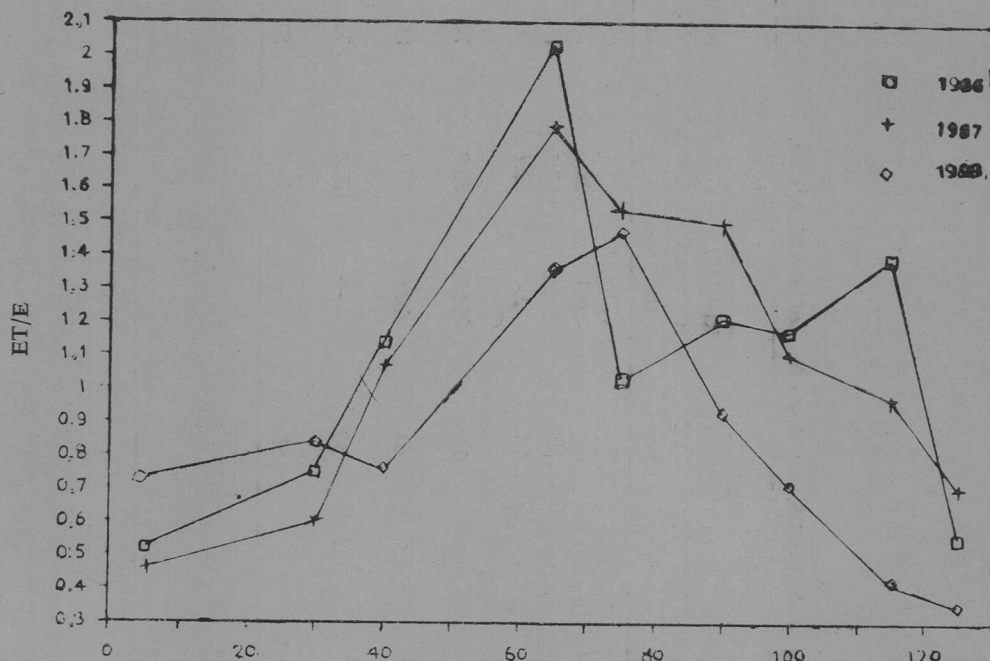


Fig. 1. Temporal profile of ET/E

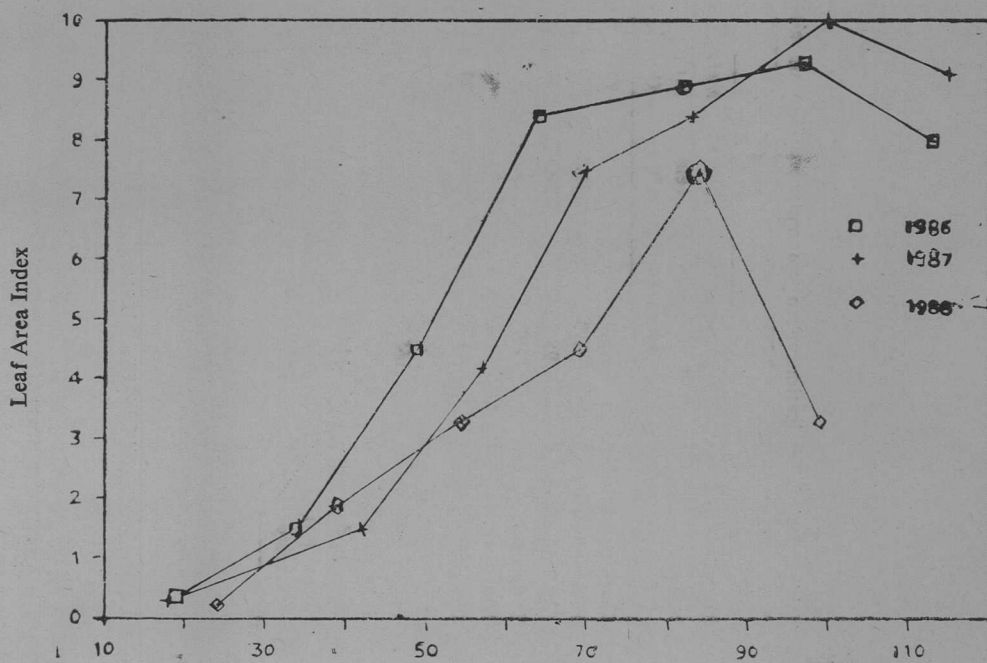


Fig. 2. Temporal profile of LAI

development stage to maturity stage of the crop, the groundnut yield can be increased by 500 to 800 kg/ha. This is also seen in the pod yields of the different years. The favourable weather conditions are important during the period of pegging to pod development stage since it coincides with the reproductive stage of groundnut crop. Due to continuous availability of sufficient soil moisture either due to rain or irrigation during pegging and pod developing stage of crop and prevalence of moderate daily temperature of 30°C, relative humidity around 70% and larger bright sunshine hours, higher pod yield was obtained during 1987. It was also reported by Patel and Mistry (1980).

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