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ECO-CLIMATE OF MICHELIA CHAMPACA NEAR VISAKHAPATNAM

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ABSTRACT : Eco-climate of Michelia champaca was studied in Simhachalam area of Viskhapatnam District (A.P.) An analysis of climatic parameters of the area is presented. Flower yield per tree during 1968–1980 in relation to climatic factors and phenology of the crop is discussed. Michelia has three flowering seasons. Yield during each flowering depends on the available hours of sunshine at the time of initiation of the flowering as well as the availabilability of water. This paper attempts to establish crop weather relation based on data gathered from 200 acres of flower gardens in the up-hill, along the alopes and down-hill arcas.

INTRODUCTION

Michelia champaca is a leading commercial flower tree whose flowers are valuable for fragrance and appealing form. It has widespread use in cosmetics, medicine and other decorative uses. Being a tropical tree, climate plays a significant role in its growth and flowering. Present paper deals with the phenology of *Michelia* under the climatic conditions of Simhachalam area of Visakhapatnam district, Andhra Pradesh.

MATERIAL AND METHODS

The rainfall and temperature data for the study area over a period of 13 years from 1968 to 1980 were taken from the records of India Mateorological Department, Visakhapatnam. Mean sunshine data were obtained from India Meteorological Department, Pune. Annual flower yield data of *Michelia* were collected from the gardens spread over approximately 200 acres around Simhachalam.

Effective day and night temperature was calculated using formulae of Went (1969).

RESULTS AND DISCUSSION

Fig. 1 shows the mean monthly hours of bright sunshine. Maximum sunshine duration occurs during January and February and minimum is observed in June. The hours of bright sunshine decreases gradually from January to July and from August onwards it increases.

The effective day and night temperature curve (Fig. 2) reveals that from January to May, the day and night temperatures are increasing. During May they reach maximum values and from June onwards both decrease. The duration of sunshine increases from January to June and thereafter it gradually decreases. Mean monthly humidity values at Visakhapatnam at 0830 hrs are 77% and at 1730 hrs are 79%.

Fig. 3 shows the march of monthly water deficit. From the figure it is observed that during the period March to May water deficit is high, from June to September it decreases because of the monsoon season, again from September onwards it decreases.

Fig. 4 shows the annual flower yield/tree during different years and the moisture adequacy (ratio of actual evapotranspiration to potential evaportranspiration expressed as percentage) of the corresponding years. From the figure a general pattern of inverse correlation is observed between moisture adequacy and flower yield. Higher values of I_{ma} are generally observed when low yields are obtained and low values of I_{ma} are observed when there are high yields. 22.4 thousand flowers/annum are observed in 1970. 28.8 thousand flowers/annum are observed during 1980.

Crop weather diagram is presented in Fig. 5. It also shows the phenology of the Michelia. As the Michelia is a perennial

tree it is given in two parts. Sowing to transplantation is the germination phase, while the crop yield in different seasons is shown in flowering and fruiting phase. Climatic data at Visakhapatnam during the various crop-growth phases of *Michelia* is also shown in the upper half of the figure.

From the figure it is observed that the seeds were sown in the 13th standard week i.e., first week of April when mean maximum air temperature is 25.9°C, sunshine duration is 9.3 hrs. The germination period is one month. First leaves appear after one month during 18th week when normal maximum air temperature is 34.0°C, minimum air temperature is 27.8 C and sunshine duration is 8.9 hrs. Its growing period is very long as the seedlings grow slowly. After one month it grows upto one foot. In 34th week in the month of August, when monsoon rains are established rain fall is 132.2 mm, maximum air temperature is 32.0°C and minimum temperature is 26.0°C, it is ready for transplantation. This small plant can be directly transplanted into the field or it can be transplanted into a pot, and within a period of 2 years it will be necessary to transfer it into the field. It attains maturity after 5 years.

The flowering stages of Michelia during different seasons are shown in the figure. During the month of February, ploughing, irrigation, manure application is undertaken. Falling of leaves takes place during the month of April when normal maximum air temperature is 32.8°C and minimum air temperature is 25.9°C, buds appear along with new leaves. Flowering starts in the 20th week (middle of May) when maximum air temperature is 34.0°C and minimum air temperature is 27.8°C. Flowering continues upto July when maximum air temperature is 31.7°C, minimum air temperature is 26.0°C when flowering starts decreasing. At the same time the appearance of the new leaves and buds takes place indicating the commencement of the second flowering season. Second flowering starts in August when normal rainfall is 132.2 mm, maximum temperature is 32.0°C, minimum temperature is 26.0°C, it ends in Octpber. While third flowering starts in the first week of November and ends in January, when the rainfal is 90.6 mm, maximum air temperature is 29.3°C, minimum temperature is 21.2°C.

CONCLUSION

The optimum temperature and sunshine hours required to initiate the budding of *Michelia* are obtained during the period March and April. During this period the hours of sunshine range from 9.4 to 9.3 hrs., when the length of the day and nights are almost equal (12 hrs.) The day temperature range from 31°C to 33°C.

Flower initiation takes place during April Temperature, photoperiod and rainfall contribute much for the flowering of *Michelia*. Best yields are obtained during May to July.

Clay loam soils are best suited for the growth of *Michelia*.

Southwest monsoon contributes to the bulk of precipitation (May to September). The annual rainfall is 895.15 mm. *Michelia* needs regular supplemental irrigation. During the monsoon period it needs no irrigation, because stagnation of water is very dangerous leading to the death of the tree.

ACKNOWLEDGEMENTS

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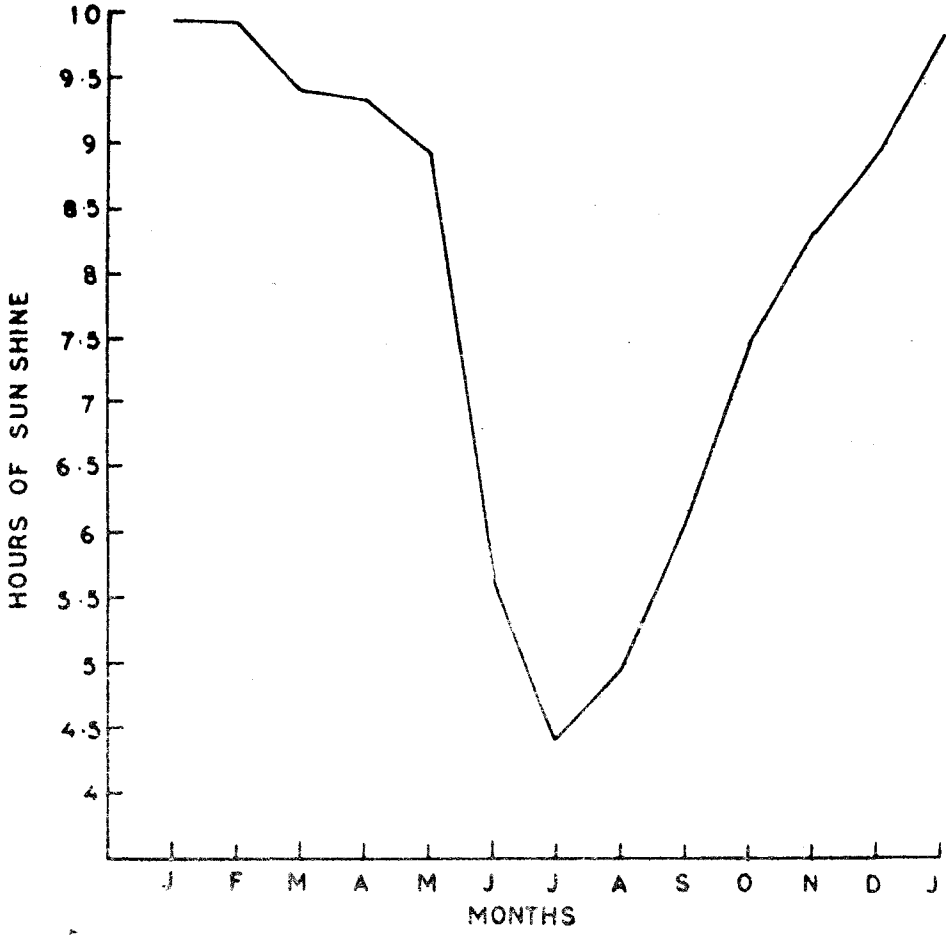
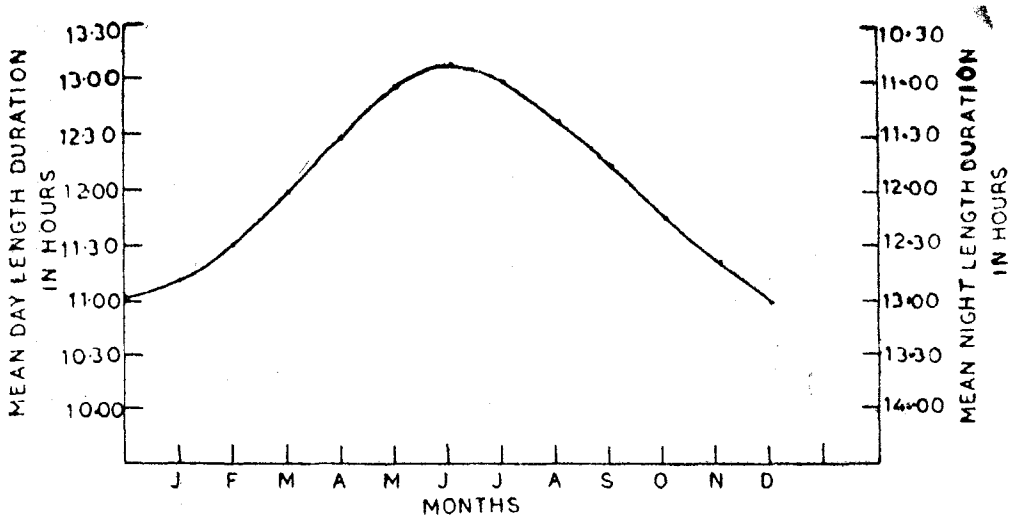


FIG.1 MEAN MONTHLY HOURS OF SUN SHINE AT VISAKHAPATNAM.



DAY AND NIGHT LENGTH HOURS AT VISAKHAPATNAM.

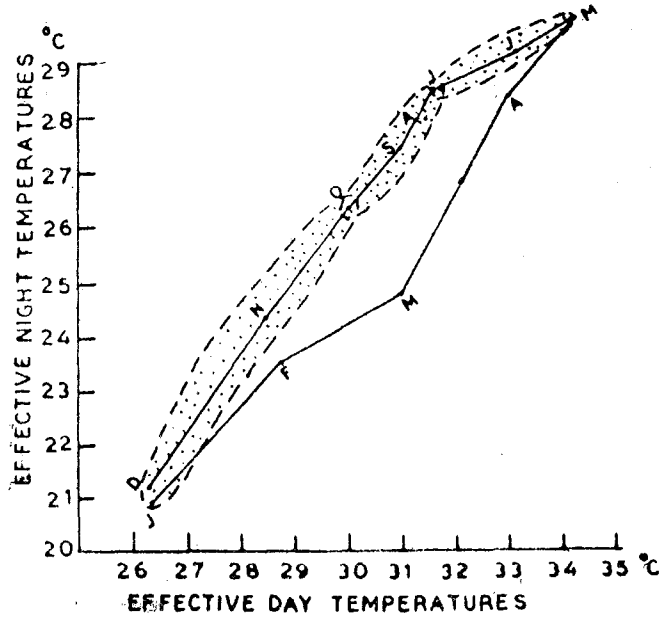


FIG.2 EFFECTIVE DAY AND NIGHT TEMPERATURE DURING FLOWERING SEASONS OF MICHELIA CHAMPACA AT VISAKHAPATNAM.

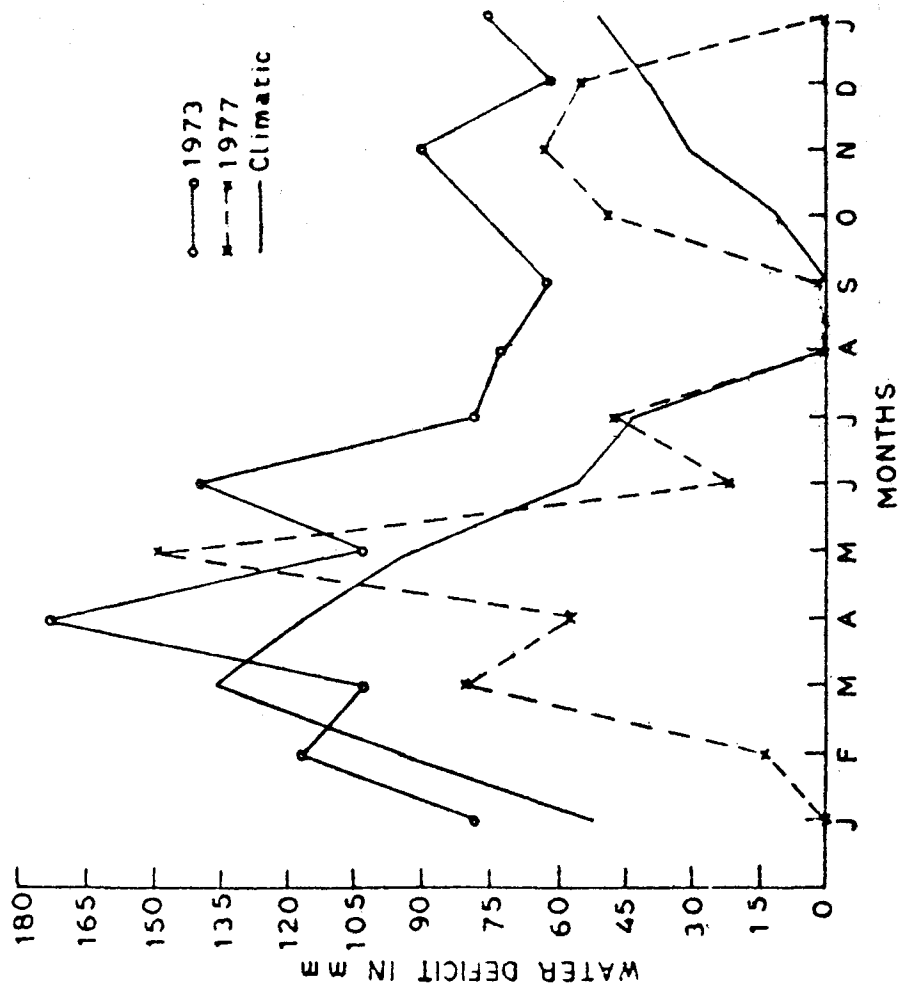


FIG.3 MONTHLY MARCH OF WATER DEFICIENCY AT VISAKHAPATNAM

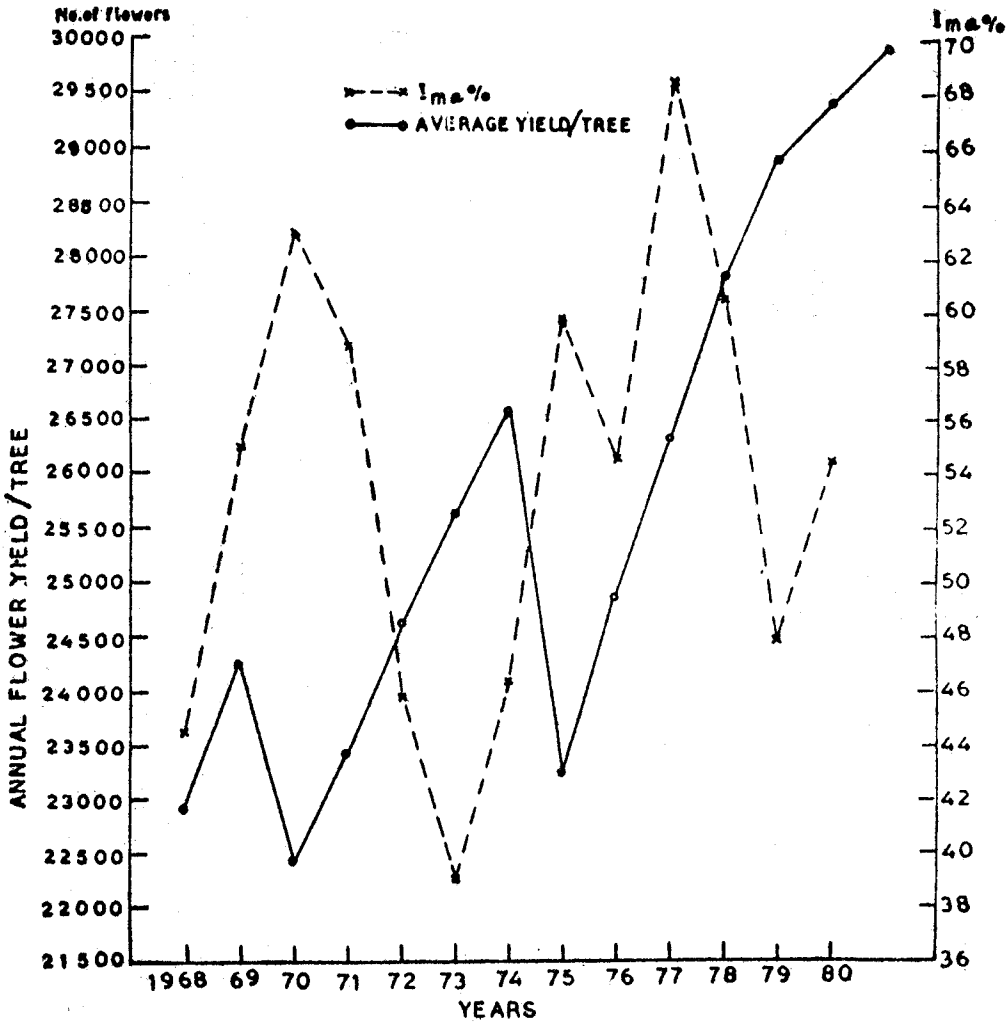


FIG.4 FLOWER YIELD OF MICHELIA CHAMPACA & MOISTURE ADEQUACY I_{ma}% DURING 1968-1980 AT SIMHACHALAM (VISAKHAPATNAM.)

WEATHER DATA	MONTHS	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
	DAILY MAX AIR TEMP °C	29·2	31·2	32·8	34·0	33·7	31·7	32·0	31·6	30·9	29·3	27·7	27·7
	DAILY MIN. AIR TEMP °C	19·2	22·6	25·9	27·8	27·4	26·0	26·0	24·5	24·5	21·2	18·3	17·5
	RELATIVE HUMIDITY %	75·0	72·5	76·5	79·0	81·5	83·0	82·5	82·5	78·5	70·5	72·0	72·5
	VAPOUR PRESSURE mb	25·35	27·9	33·5	36·7	36·75	34·05	34·45	33·5	30·5	24·3	22·2	23·35
	MONTHLY RAINFALL mm	14·9	8·7	12·7	53·5	87·8	121·9	132·2	167·3	259·3	90·6	17·5	7·2
	NUMBERS OF RAINY DAYS	0·6	0·6	1·0	2·5	6 1	7 2	7 2	9 6	9 0	3 2	0 9	0·6
	CLOUD AMOUNT Oktas of sky	1·9	2·15	3·5	4·55	6·3	6·95	6·45	6·1	4·85	3·6	2·6	2·0
	MEAN WIND SPEED Km ph	6·4	9 6	14·7	15·9	13·7	16·5	13·5	9·5	8·1	8·1	7·5	6·3
	MEAN SUNSHINE Hours	9 9	9·4	9·3	8·9	5·7	4·4	4·9	6·1	7·5	8·3	8·9	9·9

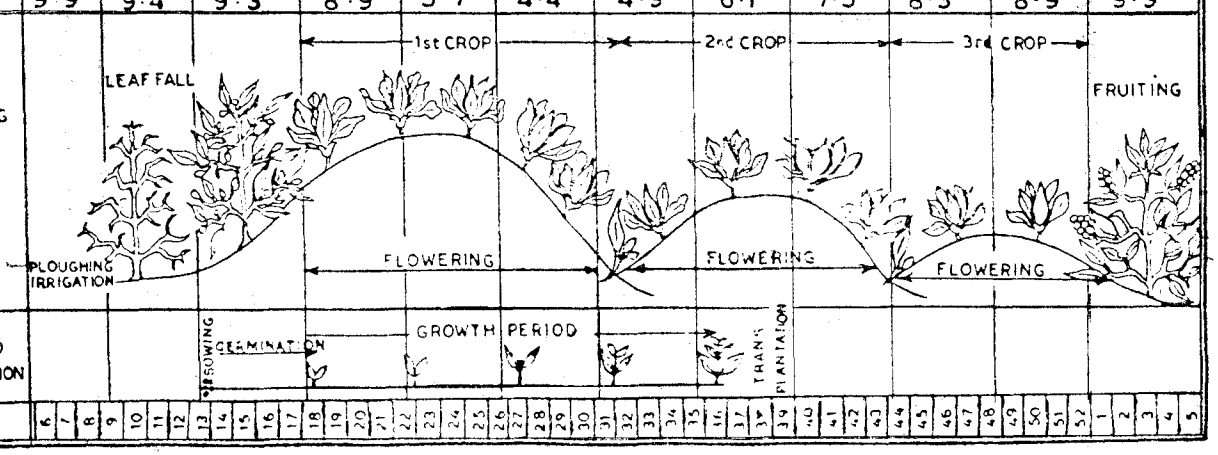


FIG. 5 —CLIMATE AND MICHELIA CHAMPACA AT SIMHACHALAM, VISAKHAPATNAM Dt(A.P.)INDIA.