CROP WEATHER CALENDAR FOR RUBBER IN THE N.E. INDIA

SASEENDRAN S.A., POTTY S.N., KRISHNAKUMAR A.K. & SETHURAJ M.R.
NORTH EASTERN RESEARCH COMPLEX RUBBER RESEARCH INSTITUTE OF INDIA.

ABSTRACT

Based on the meteorological data collected from 6 stations in the N.E. India and three in North Bengal, the climatic characteristics of the region were brought out and water availability per[illegible] were delineated. The res[illegible] were utilised in scheduling climate dependent agromix and cultural operations for rubber cultivation in the region, and are presented as "Crop-weather calendar for rubber".

INTRODUCTION

The para rubber three (Hevea brasiliensis) the principal source of natural rubber in the world is a native of Amazon tropical rain forests. The crop was introduced to the far east during the last part of the 19th century and the cultivation was confined to the tropical belt. In India, Kerala state accounts for about ninety per cent of [illegible]rea. The demand of natural ru[illegible] far exceeds its production and the gap between the production and consumption is on the increase. This warranting imports resulting in drain of foreign exchange. To tide over this it became necessary to increase the production of natural rubber in the country. The production can be increased by increasing the productivity and also by bringing more area under rubber. There is no scope of further expansion of the area under rubber in its traditional belt and hence the exploratory surveys of Rubber revealed that North Eastern states could be considered for the cultivation of rubber thought it does not fall under the tropics. However, the crop requires specific agro-management practices to mitigate various stress factors prevailing due to agroclimatic constraints. As a first approximation, a refinement of existing agromanagement practices is attempted by modifying the calendar of operations based on the climatic characteristics of the region.

AGROCLIMATIC REQUIREMENTS OF RUBBER

A detailed account of the agroclimatic requirement of rubber is provided by Pushpadas and Karthikakutty (1980). The crop requires a warm, humid and equable climate. It is adaptable to a wide range of soils ranging from the flooded lands to humid and semirigid regions (Dijkman, 1950). It has also been reported thrive well in marginal soils which do not permit successful growth of other crops. Nevertheless, it responds well to better soils and can stand a wide range of pH(from 3-8). However, a pH of around 4.5 to 6 is considered as the optimum for the growth of the crop.

IMPORTANT CLIMATIC FACTORS

In the north Eastern region the major constraints limiting the growth and yield of rubber is a low temperature coupled with a dry spell encountered during the winter season.

RAINFALL

The crop has been considered to perform well in areas having annual rainfull of the order of 200 to 400 cm with about 100-150 rainy days and having a dry spell of not more than one month duration. However, the crop is seen to be successfully grown in areas which widely deviate from the above range. The traditional rubber growing Kerala have continuous dry spells ranging from 4 to 5 months (Rao et al, 1985). In the North Eastern region of India also, dry spells range from 4 to 5 months (Saseendran etal, 1990).

TEMPERATURE

Most tropical crops have a base temperature of 10°C, an optimum around 33°C and maximum around 45°C. The mean temperature encountered in the rubber growing tracts of India was

around 28°C with a maximum and minimum around 38°C and 15°C respectively. Low temperature below 10°C causes cold damage to the rubber plants.

MATERIALS AND METHODS

Data - The daily and monthly data for periods ranging from 30 to 45 years, for 9 stations (Fig.1) located in and around the N.E. region were collected from the Tocklai Experiment Station, Tea Research Association, Jorhat.

Climatic Characteristics - Climograms were prepared for the Nine stations under study making use of the monthly data on rainfall, number of rainy days, maximum temperature, minimum temperature, relative humidity, bright sunshine hours and wind speed for bringing out the agroclimatic characteristics of the region. As the general agroclimatic features are not found to vary significantly from station to station the climogram for a single station Silcoorie only was presented for discussion (Fig.2) (crop weather calender has also been discussed only for this station).

Agro-climate in the region - Monthly distribution of agroclimatic parameters viz, rainfall, no. of rainy days, air temperature (maximum and minimum), relative humidity, hours of bright sunshine, wind speed and pan evaporation at the different stations were studied. The agro-climate at Silcoorie is presented (see fig.2) for reference.

Winter season (Dec. to Feb.) - About 2% of the annual rainfall is received during this season. Low temperatures associated with cold waves often dip the mercury to as low as 3°C in the rubber growing plain and mid lands of the region. January was observed to be the coldest month with minimum temperature of the order to 10°C. Mean seasonal temperature in the region are in the range 15°C to 22°C. Comparatively mild winds of the order of 20 to 100km/day were observed in this area during this season. Mean relative humidity observed were in the order of 60 to 70%.

Pre-monsoon (March to May) - About 20% (57 cm) of the annual rainfall is received during this season in about 30 to 40 rainy days. May is the hottest month with maximum temperature of the order of 35 to 40°C. Comparatively high winds were observed in this season with wind speeds of the order of 235 km/day. Relative humidity observed was of the order of 70 to 80%.

South West monsoon season (June to Sept.) - This is the rainiest season of the year, with a mean rainfall receipt of about 203 cm (72%) in about 60 rainy days. Mean maximum temperature recorded during this season were of the order of 20 to 28°C. Relative humidity observed range from m65 to 100%. Strong winds of the order of 240 km/day were observed during this season.

Post monsoon season (Oct. and Nov.)- The south west monsoon retreat from this region by the 1st week of October. Rainfall received in this season contribute to only about 8% of the annual rainfall in about 10 rainy days. Relatively low winds were observed. Mean temperature of the season was of the order of 25°C. Mean relative Humidity ranges from 65 to 80%.

DISCUSSIONS

The data on the climatic characteristics of the region collected from the various agromet stations points out that it differs from that of traditional region and hence a rescheduling of the existing calender of operations for rubber for traditional region is warranted. Based on the information available and also taking in to consideration the growth phase, the various agronomic operations are to be scheduled as indicated below:

Clearing, Burning and Fitting- Clearing operations for planting have to be commenced after the rain withdraws and dry spell commences. The ideal time for starting this operation can be January when the soil moisture is adequate to facilitate removal of roots etc. and the burning can commence from February. Pitting can be started when rains are received in early April to enable easy digging.

Planting- The schedule of planting should be fixed taking in to consideration the planting materials as well as the soil moisture status. Planting dates should be fixed in such a way as to make available the maximum period of soil moisture available.

The effective growth period of Hevea in the North Eastern region has been found to be from April to November. Taking in to consideration the onset of monsoon and distribution of rainfall the planting can commence from last part of April/first part of May. When the planting material used is budded stumps the planting should be completed by June. However, planting can be extended up to August/early September when polybag plants are used.

Manuring- Like planting this operation also requires good soil

Fig. 1 - Map of NE India showing stations used for the study.

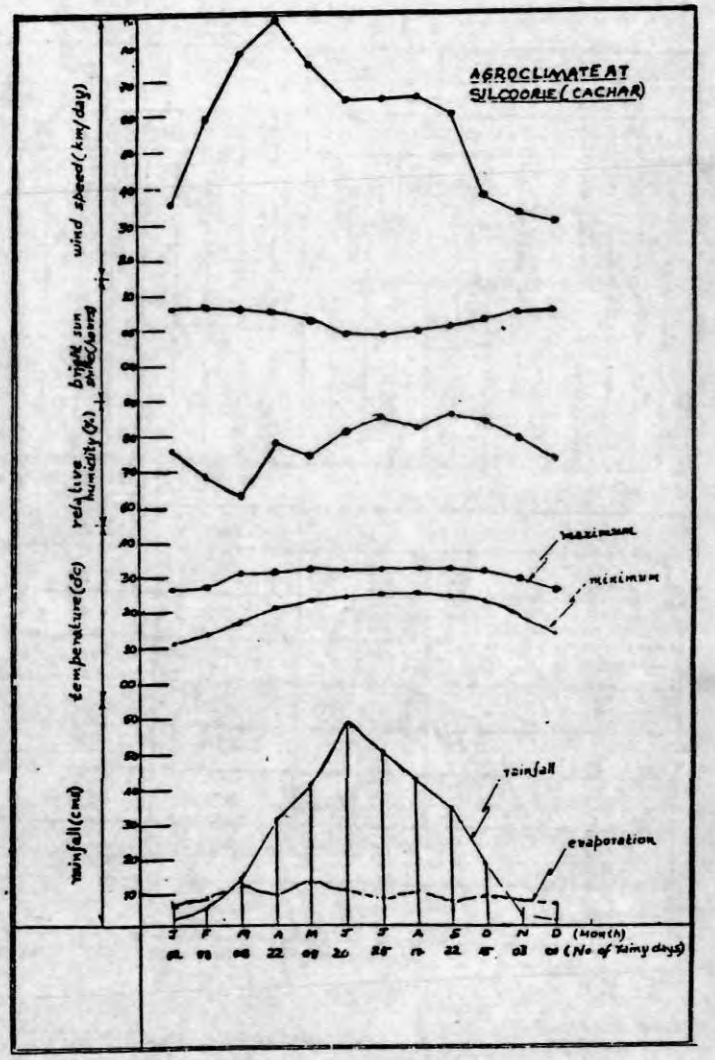

Fig. 2 - Agroclimate at silcoorie (Cachar)

CROP WEATHER CALENDAR

STATION: Silcoorie CROP: Rubber Plantations

Lat: 24°50'N Long: 92°43'E elevation : 39.6 m a msl.

Weather warnings to be issued.	Cold wave →											←
	← hail storm →											
Normal weather parameters: Water Surplus(mm)	..0	0.0	0.0	0.0	0.0	468.0	882.0	384.0	506.0	0.0	0.0	0.0
Water Deficit	19.0	30.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	15.0	19.0
Wind Speed km/hr	37	60	79	69	76	66	66	57	52	39	34	34
Evapo ration mm	5.9	8.1	12.1	9.0	13.0	9.3	8.3	9.5	7.0	8.9	6.6	5.5
Sunshine hrs.	8.0	8.2	8.1	7.5	6.3	4.7	4.4	5.1	5.7	6.8	7.9	8.0
Humidity %	76	68	63	78	74	91	95	82	86	84	90	76
Temp. Max./Min. °C	26/11	27/13	31/17	31/21	32/23	32/24	32/25	32/25	32/24	31/23	29/18	26/13
Rain/ Rainy-days	2/2	4/3	13/8	31/22	41/9	58/20	50/25	42/27	34/22	18/15	3/3	1/1
Agronomic/cultural operation	Clearing →											
	Burning →											
				← Pitting →								
					← Planting* →							
					← Manuring →							
		← Irrigation →										
										← Shading →		
					← Planting** →					*Budded stumps		
										*Polybag plants		
Weeks	1 2 3 4	5 6 7 8	9 10 11 12	13 14 15 16	17 18 19 20	21 22 23 24	25 26 27 28	29 30 31 32	33 34 35 36	37 38 39 40	41 42 43 44	45 46 47 48 49 50 51 52
Months	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC

Fig. 3

moisture content in the soil and rainfall. The rainfall should not be very heavy to wash off the applied fertilizer. The optimum time for this operation would be April to September when enough soil moisture is available in the soil and when rainfall is received regularly (see fig.2). The fertilizer application can be started in the month of April after sufficient rains have been received. The last dose of fertilizer should be given the end of September.

When the planting is done with conventional budded stumps and if the planting is completed by April, fertilizers can be applied in September. If the planting material is polybag plant and when the planting is done in April/May first round of application of fertilizer can be done two to three weeks after planting and a second dose during September. However, if the planting of polybags is completed only during August, one round of fertilizer application only need be undertaken in September (Krishna Kumar and Potty, 1989).

Shade- Providing shade (approximately 40 percent light cut) has been observed to favour growth in nurseries. about 30% increase in the number of buddable plants have been noticed in the seedling nurseries at the same time helping to reduce frequency of irrigation. (Irrigation can be limited to once on 10 - 12 days). Shading has to be provided during the last part of October / first part of November.

Crop weather calendar- Based on the discussions presented above (on clearing, burning and pitting, planting, manuring and shade) a crop weather calendar was prepared and presented in Fig.3. The different agronomic operation to be carried out are represented as time intervals, indicated by horizontal arrows, in the bottom of the calendar. In the middle of the calender the normal weather conditions experienced in the region are presented. The top portion of the calendar gives the nature of weather warnings to be issued.

CONCLUSIONS

The climatological data collected at five locations in the North Eastern region were processed and climograms were prepared. The study reveals that there is variation in agro-climate in this region when compared to traditional rubber growing region and thus warraning for specific crop weather calender. The crop weather calender prepared from the data on agro-climate is expected to cater the need of rubber growers, and plantation managers and also will help on the development and extension activities pertaining to rubber.

REFERENCES:

1. Dijkman, H.J. (1950) Hevea-thirty years of Research in the far, University of Miami Press, Florida.

2. Krishna Kumar A.K. and Potty S.N. (1989), a new fertiliser recommendation for rubber in North Eastern Region. Rubber Board Bulletin 24(4) P.5-8.

3. Penman, H.D. 1948. Natural evaporation from open water, bare soil and grass. Proc. Roy, Soc. London, 193, 120-145.

4. Pushpadas, M.V. and Kartika Kutty Amma M.(1980) Agro ecological requirements. In Hand Book of Natural Rubber Production in India. Ed. P.N. Radhakrishna Pillai, Rubber Research Institute of India, Kottayam. P. 154-184.

5. Rao. A.S., Varadhan, K.M. and Vamadevan, V.K. 1985. Evaporative index for Scheduling irrigation in plantation crops. Mausam, 36: 205-208.

6. Saseendran S.A. and Potty S.N. 1990. On the suitability of NE India for rubber cultivation a climatic analogue evaluation (Under Communication).

7. Thronthwaite, C.W. Mather, J.R. 1955. The water balance. Pbl. in Cli. lab. of climatology, Drexel Inst. or Tech. Vol - VIII, No.1.

8. Weiss A, et al. 1988. Comparison of within canopy microclimate and white mould disease development in dry edible beans as influenced by canopy structure and irrigation. Agri. & Forest Meteorol., Vol. 43, No. 3-4.

Rubber Wood

The Bureau of Indian Standards has included the rubber wood in the standard "Indian Timbers for Door and Window Shutters and Frames" (IS 12896 : 1990). The rubber wood shall be pressure / vaccum treated with suitable preservative conforming to IS : 401 of 1982. The details can be had from the above standards, sold by the Bureau of Indian Standards, Manak Bhavan, 9, Bahadur Shah Safar Marg, New Delhi - 110 002.