this technology which saves the time needed for soaking and wet grinding on one hand and shortens the fermentation period on the other hand, is best suited for housewives, who can prepare dry mix batter during the previous night to prepare delicious idlies in the next morning.

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(Received : July 1998 ; Revised : July 1999)

Madras Agric. J., 87(1-3): 126 - 133 January - March 2000
https://doi.org/10.29321/MAJ.10.A00436

Study on the spatial variability of rainfall in Tamil Nadu Agricultural University campus

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Abstract : The monthly, seasonal and annual rainfall of two locations in Coimbatore viz., New Area (NA) and Eastern Block (EB) have been statistically analysed based on the data of seven years (1992-1998). It is seen that higher annual rainfall was recorded at the NA than EB in all the seven years. The highest amount of rainfall was received in the year 1998 with less number of rain days in both the locations. The variations of rainfall amount was less in NEM season between the locations. (*Key Words : Rainfall, Coimbatore, Variability*)

The analysis of rainfall over a place assumes greater importance for micro level planning. Many literature speak on the variability of Indian rainfall with reference to space and time. In agricultural planning, rainfall variability analysis aids for taking decisions on the time of sowing, inter culture operations, fertilizer application, scheduling of irrigation, time of harvesting, etc. and also useful for designing farm ponds, tanks / irrigation projects.

Several studies have been reported the trends and periodicties of Indian rainfall. Blanford (1886) was the first meteorologist who made extensive studies on Indian rainfall variability, taking the whole country as one unit. Analysis of average rainfall of India as one unit had been subsequently done by Parthasarathy and Dhar (1976), Parthasarathy and Mooley (1978) and Mooley and Parthasarathy (1979) by using the data from different raingauge locations of the country. Bhukan Lal and Dharampal Gupta (1991) studied the rainfall variability of Delhi and found the lowest co-efficient of variation (34 per cent) for annual rainfall and highest (343 per cent) for November rainfall. In this paper, an attempt was made to statistically analyse the monthly, seasonal and annual variability

of rainfall between two raingauge locations of TNAU.

Materials and Methods

Daily rainfall data of seven years (1992-1998) were collected from raingauge locations of TNAU viz., New Area (NA) and Eastern Block (EB) and used for this study. Eventhough daily rainfall data are available from 1901 for NA, the study has been limited to seven years based on the availability of data for EB. The data were aggregated to monthly, seasonal and annual totals. The seasons are cold weather period (CWP-January to February), Hot weather period (HWP-March to May), South West Monsoon (SWM-June to September) and North East Monsoon (NEM-October to December).

The two locations used in this study are situated in TNAU, Coimbatore, one is in New Area (Extreme North West) and another one is in Eastern Block (North) of the main campus. The New Area is thickly covered with vegetation like eucalyptus and caesarian whereas the Eastern Block is partially covered with coconut trees. The two locations are free from any physical barriers and properly fenced. The rainfall measurements were taken by the staff of Department of Agricultural Meterology, TNAU, Coimbatore- 3 were utilised for the study. The distance between New Area and Eastern Block raingauge locations is 2.5 km.

The seven years rainfall of two rainguage locations were analysed statistically for the average and variability, and trends.

Results and Discussion

Average and Variability

The data in Table 1 give information on average, standard deviation, coefficient of variation (CV) and test of significance of the New Area and Eastern Block rainguage locations. The New Area received an annual average rainfall of 778.96 mm of which 2.29 per cent is received in CWP, 18 per cent in HWP, 25.76 per cent in SWM and 53.94 per cent in NEM, while the mean annual rainfall was 746.93 for Eastern Block of which 1.08 per cent, 16.4 per cent, 26.3 per cent and 56.22 per cent was recorded in CWP, HWP, SWM and NEM seasons respectively. The NEM rainfall showed no variation between these locations.

The coefficient of variation (CV) of NA and EB was highest (242.41 per cent and 213.89 per cent respectively) for January and it was lowest for annual rainfall. It indicated that occurrence of assured annual rainfall in both the raingauge locations and uncertainity of rainfall during CWP. Out of 12 months, the highest rainfall was received during the month of November (214.66 mm) in NA and 213.16 in EB which was 27.56 and 28.5 per cent of annual rainfall, respectively.

The data on the test of significance of the difference of monthly rainfall received between these two locations have been given in Table 1. The maximum (15.58 mm) and minimum (0.51 mm) mean difference was found in the month of April and October respectively. This might be due to the rainfall processes that occurred during different seasons. Convective rainfall processes that occured during different seasons.

Convective rainfall process is dominant in HWP, while it is low pressure system in NEM season. For annual series, the maximum mean difference was 32.03, while the lowest difference was noted in NEM rainfall (0.22). The t-value from the Table 1 indicated that there was no significant difference in the rainfall values between the two locations across the monthly and seasonal series of rainfall data.

Trends

The annual rainfall and seasonwise rainfall for 1992-'98 in respect of NA and EB are shown in Fig. 1 and Fig. 2. The highest amount of rainfall and the differnece between the locations were greater during the year 1998 over the period of seven years. The difference was also greater in the same year between the two locations. In respect of seasonal rainfall, the highest amount of rainfall was recorded in NA then EB under all cases except SWM of 1992, Summer '94 and NEM 97 and 98. The greater difference of CWP rainfall was noticed in the year 1994. The rainfall of SWM of 1992 was greater than NEM of 1992 for both the locations during the study periods (1992-'98).

Number of rain days

The number of rain days (including rainy days and rain days) per year at two locations is shown in the Fig.3. The number of rain days were different for both the locations for all the years of study except 1996. The highest difference occurred in 1992. The number of rain days was minimum during 1998 irrespective of the locations studied. The equal number of raindays was evident in the year 1996 for both the locations.

Intercorrelation between different rainfall series of the two locations

The data on correlation coefficient (CC) between the seasonal and annual rainfall series and

Table 1. Statistical parameters for two raingauge stations

Month	New Area			Eastern Block			Mean difference	Standard error	t-value
	Mean (mm)	SD	CV (%)	Mean (mm)	SD	CV (%)			
January	11.2	27.15	242.41	4.39	9.39	213.59	6.81	10.86	0.629
February	6.64	11.82	178.01	3.67	6.56	178.75	2.97	5.11	0.581
March	8.02	14.56	181.55	8.76	12.29	140.29	0.74	7.19	0.101
April	80.69	63.61	78.83	65.11	58.07	90.11	15.58	32.55	0.478
May	51.54	37.19	72.19	48.03	35.72	74.37	3.51	19.49	0.180
June	34.13	20.27	59.39	31.13	18.58	59.69	3.00	10.39	0.289
July	69.83	39.37	56.38	65.89	42.02	63.77	3.94	21.76	0.181
August	25.91	14.83	57.24	21.54	10.27	47.68	4.37	6.82	0.641
September	70.81	64.19	90.65	77.90	66.47	85.33	7.09	34.93	0.203
October	154.97	87.76	56.63	154.46	86.59	56.06	0.51	46.59	0.0011
November	214.46	100.82	47.01	213.16	109.45	57.35	1.30	56.24	0.0023
December	52.33	66.35	126.79	50.73	63.43	125.04	1.60	73.07	0.438
Annual	778.96	137.99	17.72	746.93	135.40	18.13	9.80	15.29	0.641
CWP	17.86	37.49	209.91	8.06	15.41	188.71	17.79	32.76	0.543
HWP	140.26	63.15	45.02	122.47	59.38	48.47	4.23	42.27	0.100
SWM	200.69	77.13	38.43	196.46	80.99	41.22	0.22	64.50	0.00033
NEM	420.16	117.70	28.01	419.94	125.58	29.43	32.03	73.07	0.438

Table 2. Correlation study between the New Area and Eastern Block rainfall series

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec.
Jan	0.997**	0.832**	0.322	0.581	-0.142	-0.216	0.650	-0.830*	-0.150	0.435	-0.217	-0.401
Feb	0.804*	1.000**	0.762*	0.261	-0.216	-0.300	0.274	-0.636	-0.299	0.374	-0.065	0.068
Mar	-0.088	0.468	0.916**	-0.573	-0.108	-0.351	-0.343	0.168	-0.466	0.201	0.286	0.661
Apr	0.408	0.105	-0.370	0.964	-0.019	0.136	0.124	-0.117	-0.177	0.169	-0.800*	-0.177
May	-0.197	-0.037	0.225	-0.458	0.834*	-0.782*	-0.444	0.573	-0.356	-0.159	0.020	0.090
Jun	-0.240	-0.270	-0.457	0.250	-0.548	0.846*	-0.133	-0.200	0.695	-0.514	0.107	0.236
July	0.642	0.344	0.123	0.171	-0.262	-0.087	0.984**	-0.726	-0.073	0.613	0.225	0.554
Aug	-0.645	-0.615	-0.319	-0.096	0.509	-0.177	-0.665	0.947**	-0.319	-0.167	-0.427	0.209
Sep	-0.222	-0.315	-0.526	-0.099	-0.088	0.575	-0.090	-0.295	-0.940**	-0.819*	0.462	0.002
Oct	0.530	0.475	0.468	0.031	-0.426	-0.124	0.624	-0.287	-0.652	0.977	-0.261	-0.913
Nov	-0.220	-0.092	0.164	-0.753	0.014	-0.066	0.174	-0.263	0.423	-0.309	0.997**	0.142
Dec	-0.402	-0.400	-0.361	0.208	-0.125	0.371	-0.256	0.167	0.194	-0.371	0.063	0.554

* - Significant at 5 per cent level ** - Significant at 1per cent level

between 12 monthly rainfall series of NA and EB have been presented in Tables 2 and 3.

The data on inter correlation coefficient between the monthly rainfall series and annual and seasonal series of NA and EB are given in Table 2 and 3. Significant and positive correlation was noted in January rainfall of NA with January and February rainfall of EB and significant and negative correlation with August rainfall of EB. February rainfall of NA was significant and positively correlated with Jan, February and March rainfall of EB. The months viz., May, June, July, August, October and November rainfall series of NA were significantly and positively correlated with the same months rainfall of EB, whereas September month rainfall of NA was negatively correlated with September, month rainfall of EB significantly. It is evident that in both NA and EB, the correlation between months did not exhibit any significance.

Table 3. Correlation study of seasonwise rainfall series between New Area and Eastern Block

		Eastern Block				
		Winter	Summer	SWM	NEM	Annual
New Area	CWP	0.998*	0.272	-0.037	-0.061	0.259
	HWP	0.234	0.933**	-0.480	-0.553	-0.357
	SWM	-0.147	-0.215	0.918**	0.244	0.661
	NEM	0.020	-0.457	0.199	0.983**	0.818
	Annual	0.314	0.056	0.453	0.705	0.974**

* - Significant at 5 per cent level ** - Significant at 1per cent level

Table 4. Regression equation drawn between the New Area and Eastern Block

	Regression Equation	R^2	SE of co-efficient	t value
Daily	$Y = 0.5081 + 0.907 X^1$	0.856	0.015	58.77
January	$Y = 0.5 + 0.3 X^1$	0.990**	0.013	27.07**
February	$Y = 0.02 + 1.0 X^1$	0.999**	0.004	153.89**
March	$Y = 2.5 + 1.0 X^1$	0.810**	0.151	5.12**
April	$Y = -5.9 + 1.0 X^1$	0.910**	0.109	8.10**
May	$Y = 6.2 + 1.0 X^1$	0.640*	0.216	3.38*
June	$Y = 4.7 + 1.0 X^1$	0.660*	0.219	3.55*
July	$Y = 7.4 + 1.0 X^1$	0.96**	0.086	12.26**
August	$Y = 4.5 + 1.0 X^1$	0.88**	0.099	6.58**
September	$Y = 9.0 + 1.0 X^1$	0.86**	0.158	6.16**
October	$Y = -14.1 + 1.0 X^1$	0.87**	0.064	7.47**
November	$Y = -19.0 + 1.0 X^1$	0.99**	0.038	28.44**
December	$Y = 41.1 + 1.0 X^1$	0.17	0.566	1.49
Annual	$Y = 2.5 + 1.0 X^1$	0.94**	0.099	9.61**
CWP	$Y = 0.8 + 0.4 X^1$	0.99**	0.114	35.49**
HWP	$Y = -0.5 + 1.0 X^1$	0.84**	0.152	5.78**
SWM	$Y = 3.0 + 1.0 X^1$	0.81**	0.187	5.17**
NEM	$Y = -13.8 + 1.0 X^1$	0.96**	0.086	12.06*

* - Significant at 5 per cent level
** - Significant at 1per cent level
Y - rainfall at Eastern Block
X^1 - rainfall at New Area

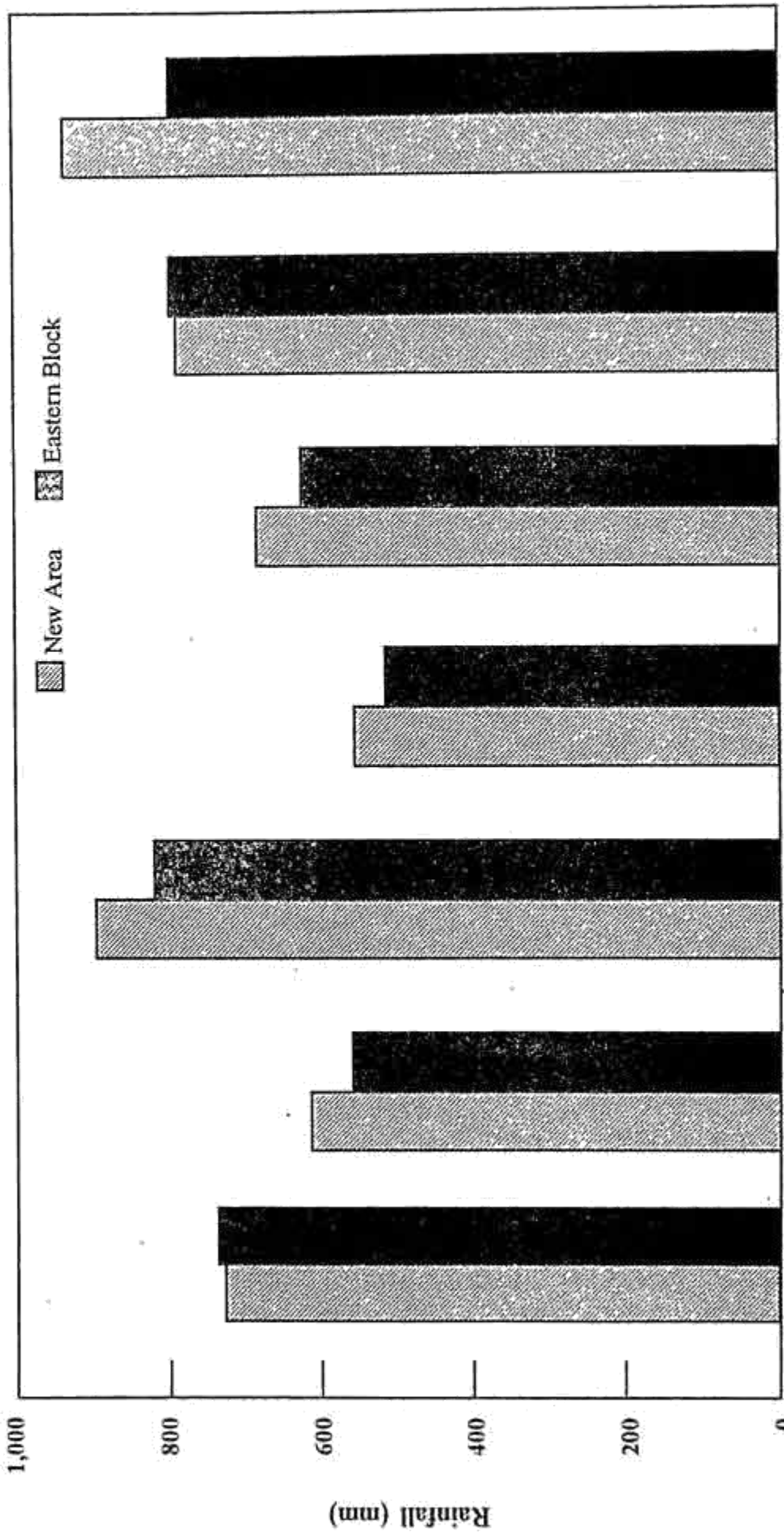
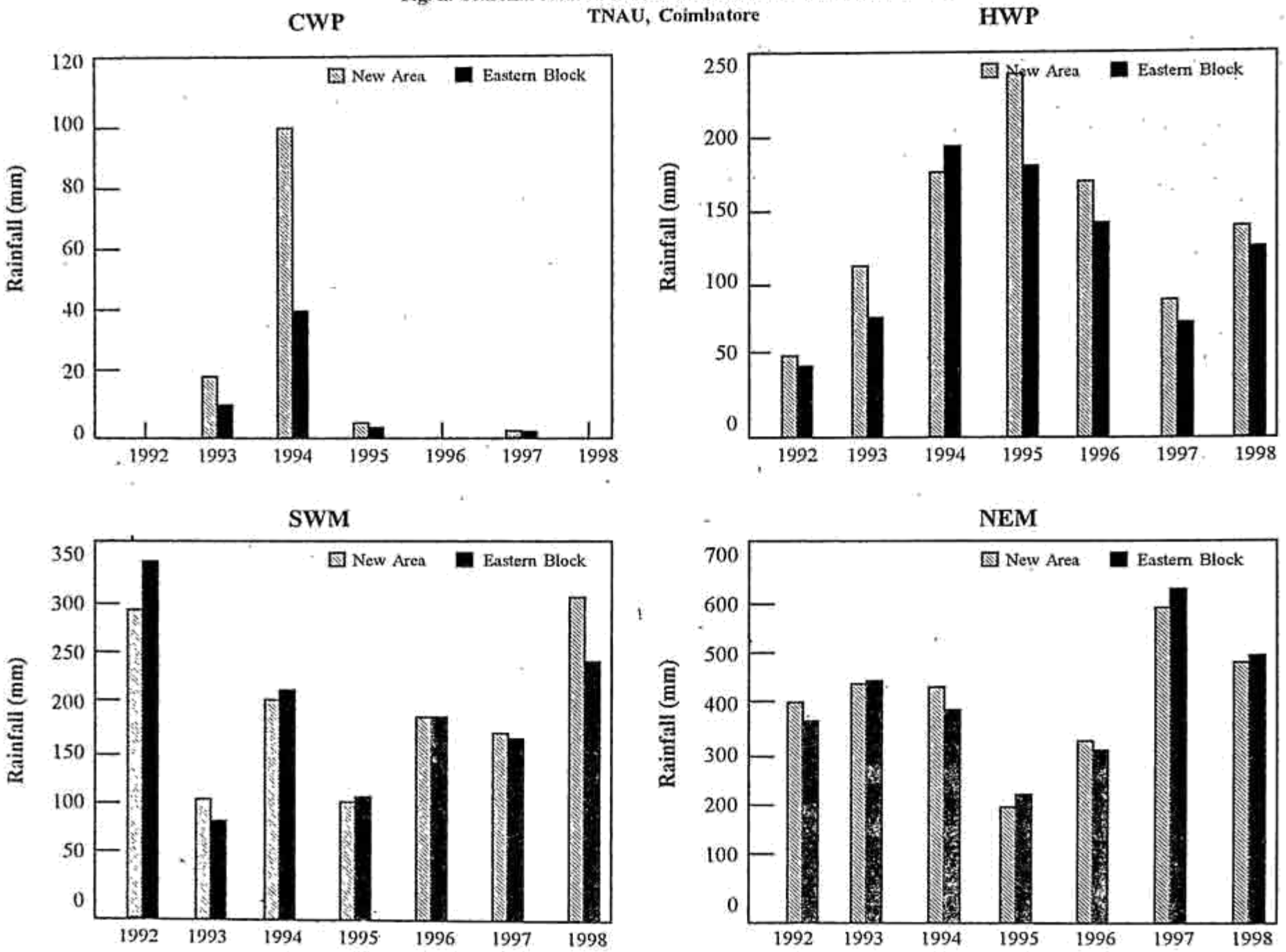


Fig-1. Annual rainfall 1992 - '98 of the two locations of the TNAU, Coimbatore

Fig. 2. Seasonal rainfall for 1992 - 98 of the two locations of the TNAU, Coimbatore



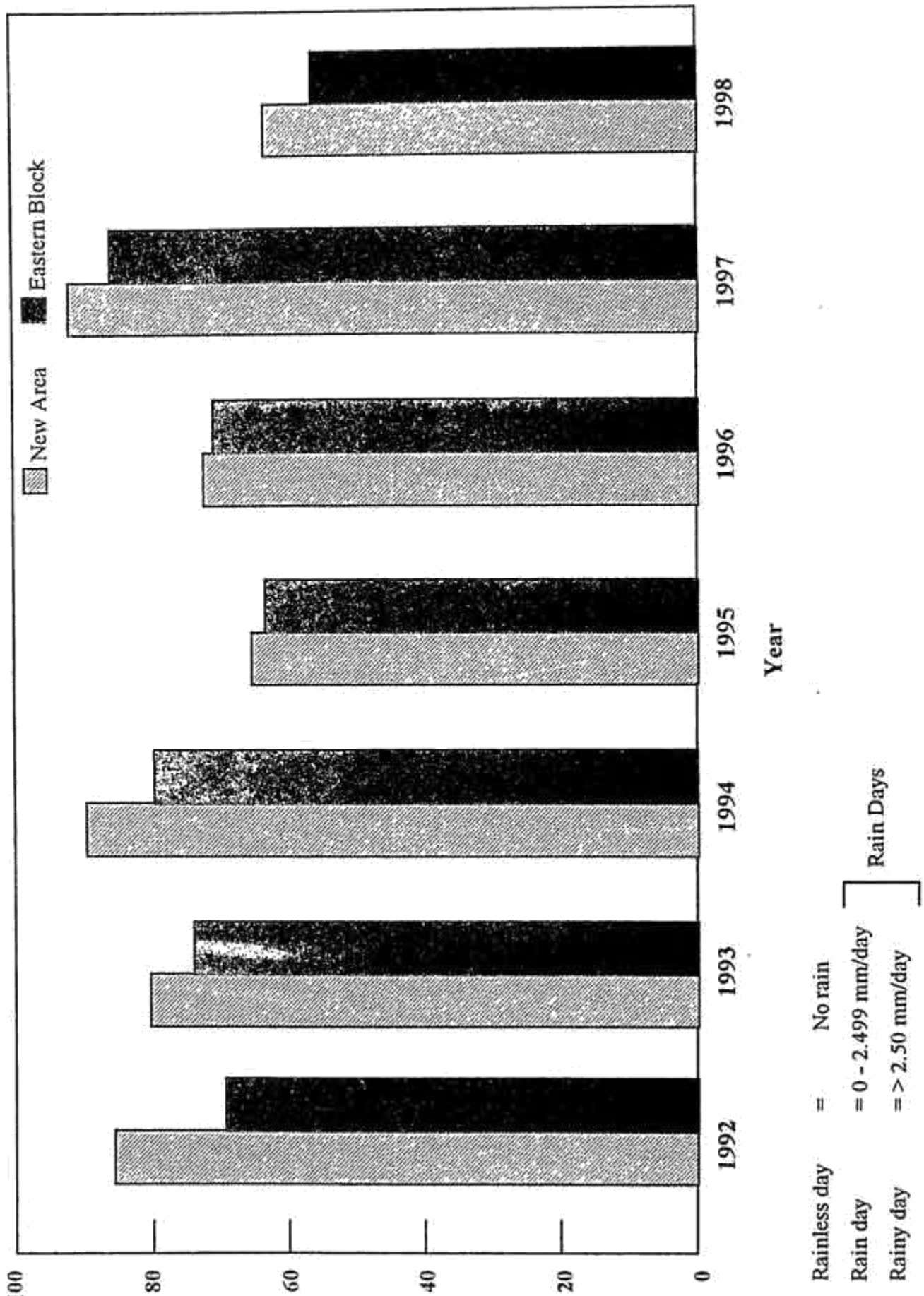


Fig-3. Number of rain days per year for the two locations of the TNAU, Coimbatore.

The annual rainfall with NEM has significantly positive correlation of 76 per cent at both the locations.

Significant and positive correlation existed between the same seasons of NA and EB. The NEM rainfall of NA was significantly and positively correlated (81.8%) with annual rainfall of EB.

Regression Equation

The daily, monthly, seasonal and annual rainfall of NA were regressed over respective rainfall series of EB and the regression equations are presented in Table 4. The R^2 values were significant for all the months except the daily series and December month rainfall.

From the results presented, it is concluded that higher average annual rainfall was recorded at the NA than EB in all the seven years and the mean difference between the locations was 32 mm.. The highest seasonwise rainfall was received in NA than EB in all the cases except summer rainfall of '94, SWM of 92 and NEM of 97 and 98. The year 1994 received the rainfall in all the months at both locations with greater number of rain days. Highest amount of rainfall was received in the year '98 with less number of rain-days at both the locations. Peak rainfall was received during the month of November in both the locations. The variation of rainfall amount was less in NEM season between the locations. The NEM rainfall of NA had significant and positive correlation with annual rainfall of EB.

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(Received : February 1999 ; Revised : September 2000)

Madras Agric. J., 87(1-3): 133 - 137 January - March 2000

Farmers brand and dealer loyality to pesticides in Coimbatore district

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Abstract : This study was carried out in Coimbatore district with 120 sample farmers to analyse the factors responsible for brand and dealer loyalty towards pesticides. The results showed that price of the preferred brand (x_1) and efficiency of the preferred brand (x_2) were significant at one per cent level for brand loyalty. The factor advertisement also influenced the brand loyalty at five per cent level. With regard to dealer loyalty, factors such as credit availability (x_1) and quality of product (x_2) were significant at one per cent level. The study showed that farmers are loyal to pesticide brands and also to pesticide dealers. *(Key Words : Brand, dealer, loyalty, regression)*

The use of pesticides as a mean to prevent loses by pests and diseases in agriculture commenced in India around 1948-49. Originally, pesticides such as DDT and BHC were imported in the formulated form into our country for mosquito control. Slowly, farmers started using these pesticides for agricultural purposes as well. The first unit for the manufacture of technical BHC and its formulation was established in the country in 1952, followed by another unit in 1955 for the manufacture of DDT (Jalan, 1987). The annual demand of these pesticides at present is as high as 1,25,000 tonnes (including 41,000 tonnes used in public health programmes) and predicted that the demand may be around 2,00,000 tonnes by the turn of this century. At present, around 71,000 tonnes of pesticides are being manufactured in India and rest of them are being imported. The average consumption of pesticides in India is one of the lowest in the World with 327 gms/ha compared to 10 kgs/ha in Japan (Narasimhamurthy, 1993).