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# North east monsoon rainfall of Tamil Nadu - retrospective analysis

R. VEERAPUTHIRAN AND T.N. BALASUBRAMANIAN

*Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore - 3*

**Abstract :** Retrospective analysis of north east monsoon rainfall climatology in respect of Tamil Nadu indicated the following (1) Lesser than Tamil Nadu NEM average rainfall with higher CV's were recorded for North Arcot, Salem, Dharmapuri, Coimbatore, Periyar, Trichy, Pudukkottai and Madurai districts, whereas Chennai and Chengalput districts recorded above normal rainfall with lower CV values; (2) In all the districts of Tamil Nadu, 60-70% of years were under within ± one standard deviation (3) In 80% of El-Nino years, Thanjavur and Chengalput districts had shown above normal rainfall while Madurai, North Arcot, Dharmpuri and Coimbatore districts did exhibit such events in only 60% of El-Nino years. (*Key Words : NEM rainfall, Coefficient of variation, El-Nino, Tamil Nadu).*

Rainfall is the only source that meets all the water needs of living beings in the earth. Even though such importance is there, its oscillation in space and time within season and between the seasons results in social problems, indicating the need of rationale analysis of rainfall of an area.

India being a vast country, its agriculture is mainly dictated by monsoon rainfall. Among the two monsoons that is South West Monsoon (SWM) and North East Monsoon (NEM), the importance of SWM need not be emphasized since it is the only monsoon that provides rain water to 90 per cent of the geographical area of India. The IMD has done work on forecasting and distribution of SWM rainfall (De and Lele, 1992 and Subramanian, 1994). Such voluminous works were not done for NEM. However, it is the prime monsoon that contributes about 5.7 million $ha^{-m}$ of water for Tamil Nadu, while SWM contributes only 3.9 million $ha^{-m}$. Considering this, an attempt was made to study the NEM rainfall climatology of Tamil Nadu.

## Materials and Methods

The data on NEM rainfall of different districts of Tamil Nadu for 25 years from 1970-1994 (except Erode 15 years and Pudukkottai 19 years) were collected from the season and crop reports of Tamil Nadu. These data were analysed for their deviation from normal, through standard deviation. These rainfall data were analysed for their annual quantum distribution that is wet, excess, normal deficit and drought.

## Results and Discussion

The results are presented in Table 1. As reported by Sridharan and Muthusamy (1990), NEM had partial positive relationship with El-Nino. Hence the available data with respect to El-Nino years (1972, 1975, 1976, 1977 and 1982) were analysed to understand the effect of El-Nino on NEM rainfall of Tamil Nadu and the relevant data are presented in Table 2.

From the perusal of the data presented in Table 1, it is found out that the NEM rainfall average of Tamil Nadu is 439.2 mm with a coefficient of variation (CV) of 30.6 per cent. Coastal districts like Chennai (827 mm), Chengalput (693.4 mm) and Thanjavur (703.6 mm) had rainfall of about 88.3, 57.9 and 60.2 per cent respectively higher over Tamil Nadu average during NEM season.

Districts like North Arcot, Salem, Dharmapuri, Coimbatore, Trichy, Erode, Pudukkottai and Madurai recorded rainfall less than Tamil Nadu average with higher CV values. The districts like Chennai, Chengalput received higher than normal NEM rainfall of Tamil Nadu with lower CV values whereas South Arcot, Thanjavur, Ramnad, Tirunelveli, Kanyakumari and Nilgiris received higher rainfall than Tamil Nadu average with higher CV values.

The analysis on percentage of years within ± one standard deviation from the normal indicated that the district Pudukkottai had 73 per cent of years with ± one standard deviation (SD) whereas Chengalput, South Arcot, North Arcot and Thanjavur had 72 per cent of years within the one ± SD. Coimbatore and Kanyakumari had only 60 per cent of years within ± one SD from the mean.

With reference to number of years under wet, excess, normal, deficit and drought criteria, Chennai, Chengalput, North Arcot and Madurai districts did not show any one of the years under drought, but the deficit years were greater for these districts.

**Table 1.** NEM Rainfall of Tamil Nadu - Distribution and variability (1970-1994

| District / State | Mean Rainfall (mm) | CV (%) | No. of years | | | | | % of years within one SD |
|---|---|---|---|---|---|---|---|---|
| | | | Wet | Excess | Normal | Deficit | Drought | |
| Tamil Nadu (annual) | 893.2 | 19.1 | - | 2 | 18 | 5 | - | 64 |
| Tamil Nadu (NEM) | 439.2 | 30.6 | - | 5 | 13 | 6 | 1 | 72 |
| Chennai | 827.2 | 29.3 | - | 9 | 10 | 6 | - | 64 |
| Chengalput | 693.4 | 29.4 | - | 8 | 10 | 7 | - | 72 |
| South Arcot | 586.8 | 33.4 | - | 7 | 9 | 8 | 1 | 72 |
| North Arcot | 397.4 | 30.8 | 2 | 5 | 10 | 8 | - | 72 |
| Salem | 308.9 | 38.9 | 2 | 5 | 9 | 7 | 2 | 68 |
| Dharmapuri | 280.9 | 39.7 | 2 | 2 | 12 | 8 | 1 | 68 |
| Coimbatore | 324.0 | 44.4 | 3 | 4 | 8 | 8 | 2 | 60 |
| Trichy | 377.6 | 39.8 | 2 | 5 | 8 | 8 | 2 | 68 |
| Erode | 299.1 | 40.3 | - | 4 | 5 | 5 | 1 | 67 |
| Thanjavur | 703.6 | 32.6 | 1 | 7 | 10 | 6 | 1 | 72 |
| Pudukkottai | 400.0 | 38.7 | 2 | 2 | 10 | 4 | 1 | 73 |
| Madurai | 413.5 | 34.7 | 2 | 7 | 10 | 6 | - | 68 |
| Ramnad | 472 | 38.1 | 2 | 5 | 9 | 8 | 1 | 68 |
| Tirunelveli | 478.8 | 38.8 | 2 | 4 | 13 | 5 | 1 | 64 |
| Kanyakumari | 537.1 | 34.8 | 1 | 6 | 9 | 8 | 1 | 60 |
| Nilgiris | 509.6 | 35.3 | 1 | 4 | 12 | 7 | 1 | 68 |

**Table 2.** El-Nino and Al-Nino effects on NEM rainfall of Tamil Nadu (1970-94)

| District / State | % deviation from normal NEM rainfall | | | | | No. of El-Nino years | | | No. of Al-Nino years | |
|---|---|---|---|---|---|---|---|---|---|---|
| | El-Nino years | | | | | Above normal railfall | Below normal railfall | Within one SD | Below normal railfall | Above normal railfall |
| | 1972 | 1975 | 1976 | 1977 | 1982 | | | | | |
| Tamil Nadu (annual) | 49.0 | -9.4 | -0.5 | -18.8 | -29.7 | 2 | 3 | 4 | 13 | 7 |
| Tamil Nadu (NEM) | 35.1 | -24.4 | -2.1 | 51.7 | -21.5 | 2 | 3 | 5 | 10 | 10 |
| Chennai | 26.8 | 4.5 | 49.6 | 45.4 | -46.0 | 4 | 1 | 3 | 8 | 12 |
| Chengalput | 21.8 | 10.0 | 42.5 | 59.4 | 24.2 | 4 | 1 | 4 | 11 | 9 |
| South Arcot | 32.4 | -12.0 | -5.3 | -58.1 | -35.6 | 2 | 3 | 5 | 12 | 8 |
| North Arcot | 60.2 | -7.6 | 22.3 | 65.8 | -27.6 | 3 | 2 | 5 | 12 | 8 |
| Salem | 76.9 | -26.4 | -27.5 | 65.8 | -25.2 | 2 | 3 | 4 | 10 | 10 |
| Dharmapuri | 70.7 | 18.1 | -20.6 | 40.7 | -35.3 | 3 | 2 | 4 | 12 | 8 |
| Coimbatore | 43.2 | -50.9 | 1.4 | 67.4 | -13.1 | 3 | 2 | 3 | 13 | 7 |
| Trichy | 35.1 | -28.2 | -33.7 | 62.4 | -19.7 | 2 | 3 | 5 | 13 | 7 |
| Erode | - | - | - | - | -27.8 | 0 | 1 | 2 | 9 | 4 |
| Thanjavur | 33.1 | 2.8 | 15.1 | 51.2 | -19.3 | 4 | 1 | 5 | 9 | 11 |
| Pudukkottai | - | 4.1 | -5.7 | 102.3 | -27.9 | 2 | 2 | 4 | 9 | 6 |
| Madurai | 25.8 | -49.5 | -23.3 | 67.7 | 24.5 | 3 | 2 | 4 | 8 | 12 |
| Ramnad | 16.4 | -43.8 | -13.8 | 64.5 | -21.3 | 2 | 3 | 4 | 9 | 11 |
| Tirunelveli | 17.5 | -75.4 | -4.3 | 52.0 | -0.2 | 2 | 3 | 4 | 11 | 9 |
| Kanyakumari | 5.0 | -12.3 | 11.5 | 36.3 | -39.0 | 3 | 2 | 5 | 11 | 9 |
| Nilgiris | 48.8 | -34.9 | -14.6 | 46.9 | -19.9 | 2 | 3 | 4 | 11 | 9 |

The districts chennai, Chengalput, South Arcot and Erode did exhibit any wet years of the study period taken, while the other districts were with wet years from one to two.

Out of the five years of El-Nino (strength not indicated) the districts Chennai, Chengalput, and Thanjavur had rainfall more than normal in four years (or) in 80 per cent of El-Nino years, while in 40 per cent of El-Nino years of study the above normal rainfall was recorded in the districts of South Arcot, Salem, Trichy, Pudukkottai, Ramnad, Tirunelveli and Nilgiris. Madurai, North Arcot, Dharmapuri and Coimbatore districts fell under 60 per cent of El-Nino years with above normal rainfall category. In respect of La-Nino years the districts Chennai and Madurai did have NEM rainfall more than above normal in 12 years out of 20 La-Nino years of study. This was followed by Thanjavur and Ramnad. In 9 years out of 20 years of La-Nino years the districts Chengalput, Tirunelveli, Kanyakumari and Nilgiris had above normal rainfall. The least was with Erode and Pudukkottai districts. In the case of strong El-Nino year of 1982, except Madurai district, all district had shown negative departure from the NEM rainfall, which needs scientific probing.

## References

DE, U.S. and Lele, R.P. (1992). Summer monsoon 1989 and southern hemispheric equatorial trough. *Vayu mandal.* 22(1-2): 9-17.

Subramanian, S.K. (1994). How far the rainfall deficiency in June-July is made up during second half of the South West Monsoon Period? A subdivisional Analyhsis. *Vayu mandal.* **24** : (3-4) : 72-76.

Sridharan, S. and Muthusamy, A. (1990). North East monsoon rainfall in relation to El-Nino, QBO and Atlantic hurricane frequency. *Vayu mandal.* **20** : (3-4) : 108-111.

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# Accumulation and availability of Zn, Cu, Mn and Fe in soils polluted with paper mill waste water

MATLI SRINIVASCHARI, M.DHAKSHINAMOORTHY AND G.ARUNACHALAM
*Agricultural College & Research Institute, Killikulam, Vallanad - 628 252, Tamil Nadu.*

**Abstract** : Field experiments were conducted at M/s Sun Paper Mill Farms, Cheranmahadevi during Kar and Pishanam seasons, 1995-96. The treatments included three different irrigation sources and three soil amendments with rice ASD36 as test crop. Soils irrigated with paper mill waste water increased the pH and EC in both the seasons. Gypsum was better in lowering pH than rice husk ash whereas for EC the rice husk ash proved better. DTPA extractable Zn, Cu, Fe and Mn largely accumulated in the upper 15 cm soil depth and the extent of their accumulation was increased with increased time of application. Application of rice husk ash proved significant in preventing the micronutrients from reaching toxic levels in soils. (*Key Words : Paper mill waste water, Amendment, Gypsum, Rice husk ash, DTPA Micronutrients).*

Heavy metals tend to accumulate in soils and plant in undesirable amounts and proportions as a result of disposal of paper mill effluents on soils Some of these elements are useful in low concentrations, but inhibitory in high concentrations whereas others have an overall toxicity effect on plants. Paper mill waste waters are often used for irrigating crops on certain farms located near industries. Although in many instances, the use of paper mill waste water has favourably influenced crop production, its continuous application for a number of years resulted in enrichment of heavy metals in top layers of the soil. To lessen the deleterious effects of paper mill waste water application, the use of a suitable amendment, prior to its disposal, is generally recommended. However in India and in many developing countries, paper mill waste water is used as such for irrigation porposes. The practice is likely to result in an accumulation of even the essential micronutrients