



Research Article

ONSET AND WITHDRAWAL DATES OF NORTHEAST MONSOON FOR WESTERN ZONE OF TAMIL NADU

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Received: February 03, 2020; Revised: February 25, 2020; Accepted: February 26, 2020; Published: February 28, 2020

Abstract: South peninsular India experiences a large portion of the annual rainfall during the North East Monsoon (NEM) season from October to December. An analytical study was carried out to identify the onset and withdrawal of NEM rainfall for Western Agro Climatic Zone (ACZ) of Tamil Nadu at block level. Block level daily rainfall data from 1981-2010 has been obtained from Agro Climatic Research Centre and Aphrodite's gridded set data was utilized for missing places. To determine the onset and withdrawal of NEM, the procedure given by India Meteorological Department (1943) was adopted. In this method, the date of onset and withdrawal of monsoon rainfall were arrived on the basis of mean of five days total rainfall. Initial probability analysis was taken up to find out the onset and withdrawal date of NEM at 50 percent probability level. The normal onset date for Coimbatore and Erode ranged from 3rd October to 18th October, while for Tiruppur date ranged from 3rd October to 22nd October. Cessation date for Coimbatore ranged from 6th December to 3rd January, for Erode 17th December to 1st January and for Tiruppur 6th December to 27th December and duration of the monsoon period rained from 54 to 85 days for all places.

Keywords: North East Monsoon, Western Agro Climatic Zone, Onset and Withdrawal

Citation: Franklin S., et al., (2020) Onset and Withdrawal Dates of Northeast Monsoon for Western Zone of Tamil Nadu. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 12, Issue 4, pp.- 9556-9558.

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Academic Editor / Reviewer: Dr R. S. Umakanth, Monpara B A, Basu Shrabani

Introduction

Increasing trend of rainfall is noticed from south to north in eastern coastal districts of Tamil Nadu during NEM [1]. Raj (1992) [2] defined the onset of northeast monsoon over southern peninsular India based on the synoptic features [3]. Charlotte et al. (2012) [4] defined the onset of NE monsoon as the first occurrence of broad scale wet conditions with a minimum sustenance of 3-4 days in conjunction with easterly wind conditions. NE monsoon shows greater impact on agricultural production due to its higher quantum of rainfall compared to that of southwest monsoon rain in Tamil Nadu. For Tamil Nadu, the north east monsoon is the major contributor of rainfall which accounts for 48 per cent of annual rainfall [5]. Farmers depend on monsoon rainfall for irrigation of their fields and follow rain fed agricultural system. Hence, the onset and seasonal variability of north east monsoon rainfall has distinct social and economic consequences [6]. Present study aims to identify the dates of onset and withdrawal of northeast monsoon over western agro climatic zone of Tamil Nadu [7].

Materials and method

Study area and Collection of rainfall data

The block level observed daily rainfall data for the Western ACZ of Tamil Nadu was collected from Agro Climate Research Centre, Tamil Nadu Agricultural University and Aphrodite's gridded data sets utilized to fill the gaps over a period of 30 years from 1981 to 2010.

Determination of onset and withdrawal date- IMD Method (1943)

The five days period in which there is a sudden spurt in total rainfall compared to earliest five days with sustained rainfall thereafter is taken as the onset wherein the middle date of the above five days total is taken as the date of normal monsoon onset.

Similarly, the middle date of five days period in which there is a marked decrease in rainfall is taken as the normal withdrawal of NEM season rainfall.

The mean five days potential evapotranspiration corresponding to the five days rainfall was also taken into consideration for the purpose of more precised assessment.

Initial Probability

Initial probability was calculated as per the procedure given by Veeraputhiran et al. (2003) [5]

$IP = N \times P / 100$

IP = Initial probability (%)

N = Sample size

P = Probability required in percentage

For computing initial probability, each data set were arranged in descending order.

Results

Onset and withdrawal dates of North east Monsoon

The dates of northeast monsoon onset and withdrawal for thirty years period (1981-2010) at 50 per cent probability level for the Western ACZ were analysed and presented in the following sections.

Onset and withdrawal date of Coimbatore district

The date of Onset (OD), withdrawal (WD), duration and total rainfall received at all blocks of Coimbatore district were given in [Table-1]. In Northern part of Coimbatore district, the onset of monsoon was foremost at Annur and Periyakanpalayam block (3rd October) followed by that on Karamadai and Mettupalayam block (13th October) and finally at Anaikati, Sultanpet, Sulur and Anaimalai on 18th October.

Table-1 Onset and withdrawal date of northeast monsoon for Coimbatore district at block level

SN	Blocks	IMD Method			
		Julian day/Onset Date	Julian day/Withdrawal date	Duration	Total Rainfall(mm)
1	Anamalai (South)	291 (18 October)	361 (27 December)	70	450
2	Karamadai (North)	287 (13 October)	356 (22 December)	70	291
3	Pollachi North	281 (8 October)	346 (12 December)	65	300
4	Sulur (East)	291 (18 October)	346 (12 December)	55	291
5	Annur (North)	275 (3 October)	340 (6 December)	64	254
6	Mettupalayam (North)	286 (13 October)	340 (6 December)	64	354
7	P N palayam (North)	307 (3 October)	361 (27 December)	85	412
8	Pollachi South	281 (8 October)	356 (12 December)	65	290
9	Sulthanpet (East)	291 (18 October)	346 (12 December)	54	272
10	Anakatti (West)	291 (18 October)	3 (3 January)	76	545

Table-2 Onset and withdrawal date of northeast monsoon for Tirupur district at block level

SN	Blocks	IMD Method			
		Julian day/ Onset date	Julian day/ Withdrawal date	Duration	Total rainfall (mm)
1	Uthukulli (North)	307 (22 October)	356 (22 December)	61	296
2	Vallakoil (East)	276 (3 October)	351 (17 December)	75	288
3	Mandhakulam (South)	281 (8 October)	356 (22 December)	75	251
4	Avinashi (North)	295 (22 October)	346 (12 December)	51	256
5	Palladam (North west)	281 (8 October)	356 (22 December)	65	287
6	Dharapuram (Southeast)	291 (18 October)	346 (12 December)	55	281
7	Pogallur (North)	281 (8 October)	356 (22 December)	75	288
8	Gudimangalam (West)	295 (22 October)	346 (17 December)	51	281
9	Udumelpet (Southwest)	281 (8 October)	356 (22 December)	75	256
10	Thiruppur (North)	276 (3 October)	361 (27 December)	85	302
11	Kangayam (Northeast)	276 (3 October)	340 (6 December)	64	295

Table-3 Onset and withdrawal date of northeast monsoon for Erode district at block level

SN	Blocks	IMD			
		Julian day Onset date	Julian day/Withdrawal date	Duration	Total rainfall(mm)
1	Erode (East)	291 (18 October)	1 (1 January)	75	270.6
2	Modakurichi (East)	276 (3 October)	361 (27 December)	85	244
3	Kodumudi (South)	276 (3 October)	356 (22 December)	53	233
4	Perunthurai (North west)	291 (18 October)	351 (17 December)	60	321
5	Chennimalai (south)	276 (3 October)	356 (22 December)	80	233
6	Ammappettai (North)	291 (8 October)	361 (27 December)	70	278.3
7	Anthiyur (North)	281 (8 October)	295 (22 December)	75	233
8	Bhavanai (East)	281 (8 October)	351 (17 December)	70	239.2
9	Gobi (South East)	281 (8 October)	356 (22 December)	65	315.6
10	Nambiyur (South)	281 (8 October)	351 (17 December)	70	260.5
11	Sathyamangalam (West)	281 (18 October)	356 (22 December)	65	235.3
12	Bhavanisagar (West)	281 (18 October)	356 (22 December)	65	265
13	Thalavadi (West)	295 (18 October)	361 (27 December)	66	287.2

The first withdrawal of monsoon was occurred at Mettupalayam and Annur block (6th December) followed by that on 15th December at Pollachi north and North, Sulur and Sultanpet. Total amount of rainfall received during that period was maximum at Anaikatti (545 mm) followed by Anaimalai (450 mm), PN Palayam (412 mm) and Mettupalayam (354 mm), respectively. Minimum quantity of rainfall was received in Annur (254 mm), Sultanpet (272 mm), and Pollachi south (290 mm). The date of Onset (OD) and Withdrawal (WD) and quantum rainfall received in a duration of 65 to 75 days in Southern part of Coimbatore viz, Anaimalai (OD-18th October / WD-27th December & 449.5 mm). North Pollachi (OD-18th October / WD-12th December & 254.5mm). South Pollachi (OD 18th October / WD-12th December & 290 mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 55 days in Eastern part of Coimbatore viz, Sulur (OD 18th October / WD 12th December & 291.5mm) and Sulthanpet (OD 18th October / WD 12th December & 272.1mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 76 days in Western part of Coimbatore viz, Anaikatti (OD 18th October / WD 3rd Jan 546mm). More quantity of rainfall was realized in the western part of Coimbatore since the region lies on the Western Ghats. The onset date for all the blocks of Coimbatore were found between 3rd October to 22nd October and the date of withdrawal was found between 6th December and 3rd January duration of NEM season ranges between 55 to 85 days. The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 65 to 85 days in Northern part of Tirupur viz, Uthukuli (OD 22nd October / WD 22nd December & 296.5 mm), Avinashi (OD 22nd October / WD

12th December & 256.5 mm), Tirupur (OD 3rd October / WD 27th December & 302 mm), Pogallur (OD 8th October / WD 22nd December & 287.7 mm), Palladam (OD 8th October / WD 22nd December & 287.4 mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 55 to 85 days in Southern part of Tirupur viz, Dharapuram (OD 18th October / WD 22nd December & 280 mm), Udumelpet (OD 8th October / WD 22nd December & 256.6 mm), Kangayam (OD 3rd October / WD 6th December & 295.5 mm), Madathukulam (OD 8th October / WD 22nd December & 250.9 mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 74 days in Eastern part of Thiruppur viz, Vellakovil (OD 3rd October / WD 17th December & 288mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 51 days in Western part of Tirupur viz, Gudimangalam (OD 22nd October / WD 17th December & 280.9mm). Presented in [Table-2]. The onset date for the all the blocks of Tiruppur were found between 3rd October to 22nd October and the date of withdrawal was found between 6th December and 27th December duration of NEM season ranges between 51 to 85 days.

Onset and withdrawal of Erode

The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 70 to 75 days in North part of Erode viz, Ammapettai (OD 8th October / WD 27th December & 278.3mm), Anthiyur (OD 8th October / WD 22nd December & 233mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 50 to 80 days in Southern part of Erode viz, Perundurai

(OD 18th October / WD 17th December & 321mm), Chennimalai (OD 3rd October/WD 22nd December & 233mm), Kodumudi (OD 3rd October/WD 22nd December & 233.5mm), Nambiyur (OD 8th October/WD 17th December & 260.5mm). The date onset (OD) and withdrawal (WD) and quantum rainfall received in a duration of 70 to 75 days in Eastern part of Erode viz, Erode (OD 18th October/WD 1st Jan & 270.6mm), Bhavani (OD 18th October/WD 17nd December & 239.2mm) presented [Table-3]. 18th October similar onset date was found in coastal Tamil Nadu as reported by a (Geetha and Raj 2015) [8].

Onset and withdrawal date of Tiruppur

The date onset (OD) and withdrawal (WD) and quantum rainfall received in duration of 65 to 66 days in Western part of Erode viz., Gobichettipalayam (OD 8th October/ WD 22nd December & 315.6mm), Sathyamanagalam (OD 18th October/ WD 22nd December & 235.3 mm), Bhavanisagar (OD 18th October / WD 22nd December & 265 mm), Thalavadi (OD 18th October / WD 22nd December & 287.2 mm) presented in [Table-3]. The onset date for all the blocks Erode were found between 3rd October to 13th October and the date of withdrawal were found between 6th December and 27th December duration of NEM season ranges between 53 to 85 days.

Conclusion

The onset date for all the blocks of Coimbatore were found between 3rd October to 22nd October and the date of withdrawal was found between 6th December and 3rd January duration of NEM season ranges between 55 to 85 days. Tiruppur blocks were found between 3rd October to 22nd October and the date of withdrawal was found between 6th December and 27th December duration of NEM season ranges between 51 to 85 days. Erode blocks were found between 3rd October to 13th October and the date of withdrawal was found between 6th December and 27th December duration of NEM season ranges between 53 to 85 days.

Application of research: The study focuses mainly on onset and withdrawal dates of northeast monsoon for western zone of Tamil Nadu through IMD method and Raman method

Research Category: Agrometeorology

Abbreviations: OD: Onset date, WD: Withdrawal date, IMD: India Meteorological Department, ACZ: Agro Climatic Zone, NEM: North East Monsoon.

Acknowledgement / Funding: Authors are thankful to Agro Climate Research Centre, Tamil Nadu Agricultural University, Coimbatore, 641003, Tamil Nadu, India.

*** Research Guide or Chairperson of research:** Dr S. Kokilavani

University: Tamil Nadu Agricultural University, Coimbatore, 641003, India

Research project name or number: MSc. Thesis

Author Contributions: All authors equally contributed

Author statement: All authors read, reviewed, agreed and approved the final manuscript. Note-All authors agreed that- Written informed consent was obtained from all participants prior to publish / enrolment

Study area / Sample Collection: Western Agro Climatic Zone of Tamil Nadu.

Cultivar / Variety / Breed name: Nil

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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