



TAMIL NADU AGRICULTURAL UNIVERSITY
&
INDIA METEOROLOGICAL DEPARTMENT



FASAL - TN - WESTERN ZONE - COIMBATORE

ANNUAL REPORT
2018 - 2019



Dr. V. Geethalakshmi
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Agro Climate Research Centre
Directorate of Crop Management
Tamil Nadu Agricultural University
Coimbatore - 641 003



TNAU & IMD



Tamil Nadu Agricultural University
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I. GENERAL

1. Project Details

1.	Title of the project	:	Forecasting Agricultural output using Space, Agrometeorology and Land based observation (FASAL) Yield Forecasting for Rice, Maize and Groundnut in western zone of Tamil Nadu using Space, Agro meteorology and Land based observations
2.	Funding and Nodal agency	:	GOI – Ministry of Earth Science India Meteorological Department, New Delhi
3.	IMD Sanction order for 2018 -19	:	No. ASC/FASAL/TN-19/04/HQ-2010 dt. 09.01.2019, from the O/o. DGM, IMD, New Delhi.
4.	University ASO for the year 2018 -19	:	No. DR/P7/ACRC,CBE/GoI-IMD(MoES)/FASAL/ASO/2019 dt. 04.02.2019, O/o Director of Research, TNAU, Coimbatore –003
5.	Year of start & End	:	2011 - 2020
6.	Agro Climatic Zone	:	Western Zone of Tamil Nadu
7.	FASAL Unit	:	Agro Climate Research Centre, TNAU, Coimbatore -3.
8.	Project Period	:	01.04.2018 – 31.03.2019
9.	Principal Investigator	:	Dr. V. Geethalakshmi Ph.D., Director of Crop Management, TNAU, Coimbatore – 641 003 Mobile: 99944 33479; Email: geetha@tnau.ac.in
10.	Co-PI	:	Dr. Ga. Dheebakaran Ph.D., Assistant Professor (Agronomy) Agro Climate Research Centre, TNAU, Coimbatore – 641 003. Mobile: +91 94439 35107; Email: gadheebakaran@tnau.ac.in

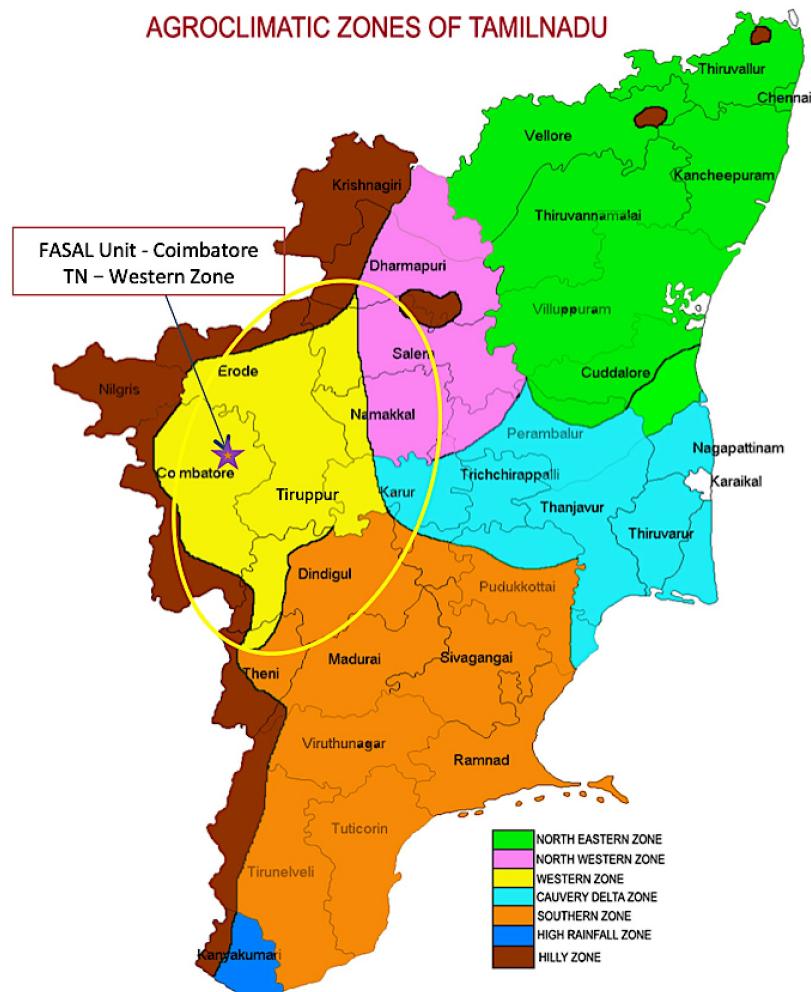


Fig. 1 FASAL – TN – Western Zone - Coimbatore Unit

2. About project area

The FASAL unit of Western Zone is geographically situated at 11°N latitude, 77°E longitude with an altitude of 426.7 m above MSL and covers three district of Western Zone viz., Coimbatore, Erode and Tiruppur districts in western zone of Tamil Nadu (Fig. 1). The latitude range is between 10° and 12° North and longitudinal range is between 76° 30' and 80°. It has been grouped under Western Agro Climatic Zone of Tamil Nadu and the climatologically classified as Semi-Arid. The land Use Classification of AAS western zone districts is depicted in Table 1. The weather normal and actual weather prevailed during Mar. 2018 to Feb. 2019 are detailed in Table 2 & 3 and depicted in Fig. 2 to11. The irrigation sources, area under irrigation and general cropping pattern of Western zone districts are detailed in Table 4 and 5.

Table 1 Land Use Classification of AAS Western Zone (ha)

Particulars	Coimbatore	Tiruppur	Erode
Total Geographical area	367098	519559	572264
Forest	6647	48168	1425
Barren & uncultivable area	4798	2542	6269
Land under non agricultural purpose	76643	51531	53353
Cultural Waste	8357	3936	1731
Permanent pastures& other grazing lands	77	126	101
Misc. tree crops & not incl.in net area sown	3462	1768	952
Current Fallow	30013	98292	58711
Other fallow	63502	102623	47072
Net Area Sown (ha)	172409	175156	179460
Gross Area Sown (ha)	176811	183248	181463

Table 2 Desired cropping pattern of Western Zone

Canal/Tank irrigated	Well irrigated	Rainfed
<ul style="list-style-type: none"> • Rice – Pulses / Groundnut / Gingelly Turmeric • Sugarcane - Ratoon Sugar-Cane 	<ul style="list-style-type: none"> • Tapioca / Turmeric Cotton / Groundnut - Vegetables - Pulses / Gingelly / Sunflower. • Rice – Rice. Banana / Sugarcane 	<ul style="list-style-type: none"> • Tapioca / Groundnut - Horsegram • Sorghum -Maize / Pulses

Table 3. Seasonwise normal and actual rainfall quantity (mm) and rainy days (nos.) of Western zone during 2018 -19

Rainfall mm	District	Coimbatore (Incl.Valparai)		Coimbatore (Excl. Valparai)		Erode		Tiruppur	
Season	Criteria	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual
Summer 2018	Rain days	50	27	25	10	40	7	32	
	Rainy days	39	11	19	9	22	6	21	
	Quantity	184	338	150	323	159	247	130	258
SWM 2018	Rain days	104	69	45	19	45	8	42	
	Rainy days	72	21	32	14	20	7	10	
	Quantity	618	1297	193	367	253	286	187	84
NEM 2018	Rain days	49	43	19	20	37	18	36	
	Rainy days	30	21	16	15	26	16	21	
	Quantity	365	327	327	161	348	228	296	211
Winter 2019	Rain days	5	5	0	2	1	1	0	
	Rainy days	0	2	0	1	0	1	0	
	Quantity	28	2	26	0	11	2	13	0
Total	Rain days	208	144	89	51	123	33	110	
	Rainy days	141	54	67	39	68	30	52	
	Quantity	119		696		771		626	
		5	1874		840		763		533

Table 4 Seasonwise Normal and actual weather of Western Zone during 2018 -19

Season	Criteria	Max. temp (°C)	Min. temp (°C)	Cloud (octa)	RH 0830 (%)	RH 1730 (%)	Wind Speed (kmph)	Wind direction (Degree)
Summer 2017	Lower	29	20	1	30	15	3	20
	Higher	39	27	7	90	95	25	360
	Average	35	24	5	73	45	12	165
SWM 2017	Lower	25	21	3	54	38	3	50
	Higher	36	27	8	96	95	27	320
	Average	32	23	6	80	66	18	198
NEM 2017	Lower	25	19	1	52	30	0	0
	Higher	34	24	8	96	95	15	360
	Average	31	22	5	81	53	8	95
Winter 2018	Lower	29	16	0	50	18	0	20
	Higher	37	24	7	91	83	17	200
	Average	33	20	4	77	34	10	96
Total	Lower	25	16	0	30	15	0	0
	Higher	39	27	8	96	95	27	360
	Average	33	22	5	78	52	12	147
Normal	Average	32	22	5	75	55	12	

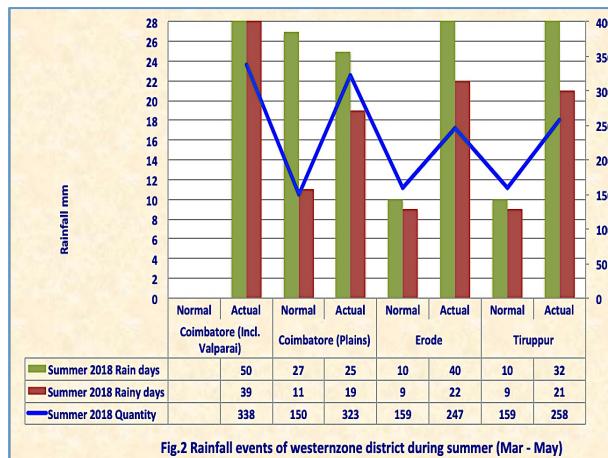


Fig.2 Rainfall events of westernzone district during summer (Mar - May)

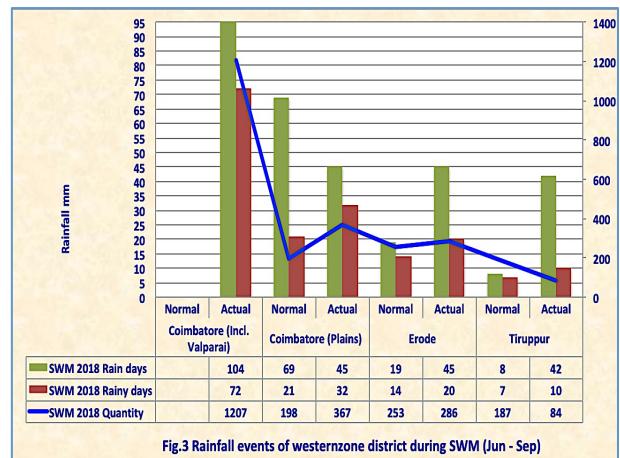


Fig.3 Rainfall events of westernzone district during SWM (Jun - Sep)

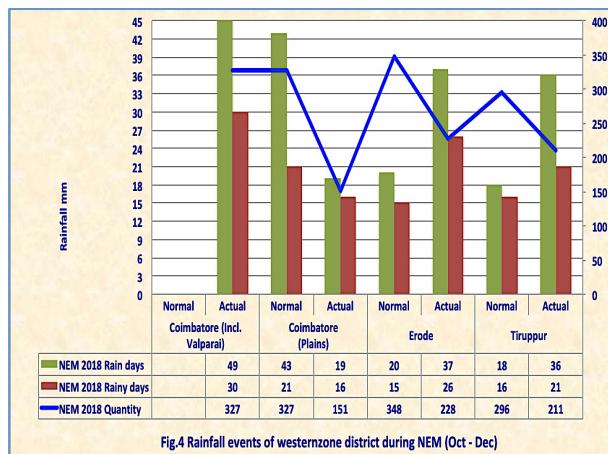


Fig.4 Rainfall events of westernzone district during NEM (Oct - Dec)

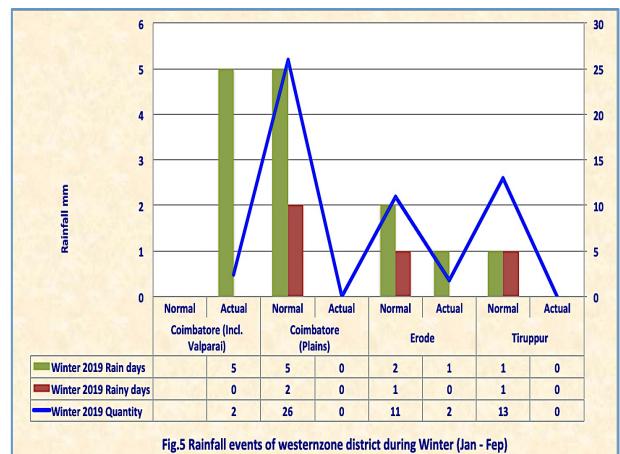


Fig.5 Rainfall events of westernzone district during Winter (Jan - Feb)

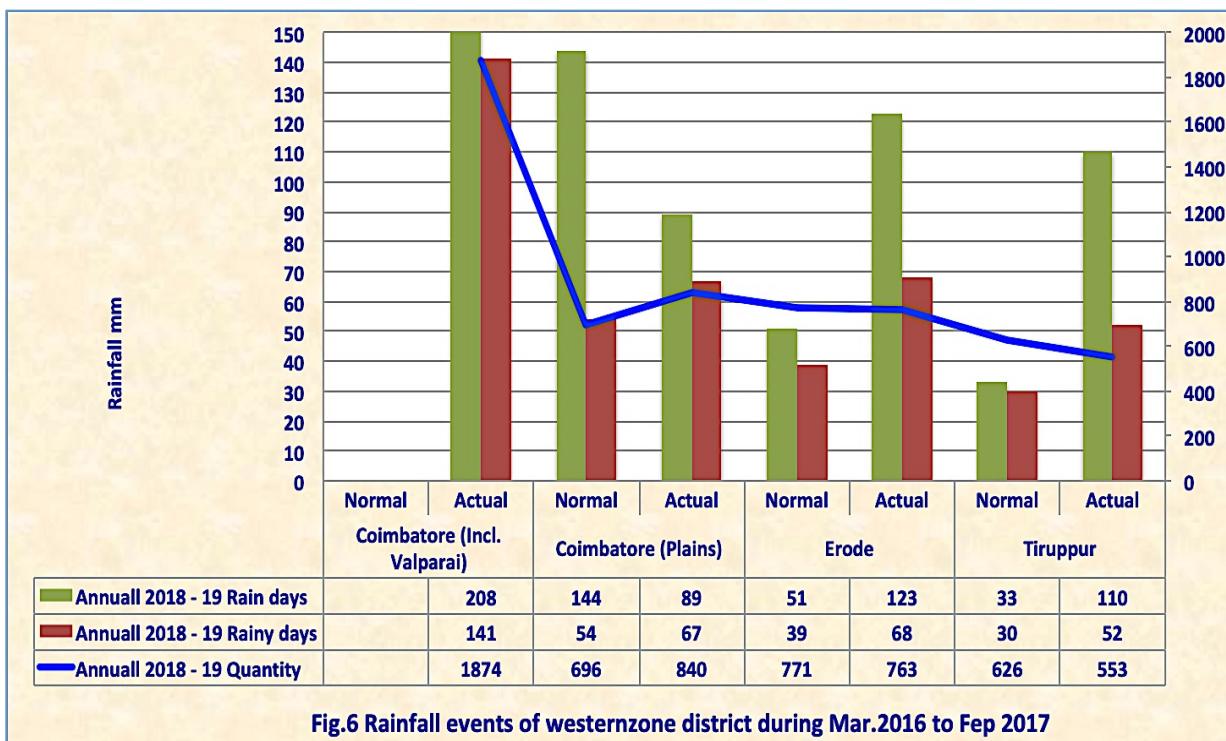


Fig.6 Rainfall events of westernzone district during Mar.2016 to Fep 2017

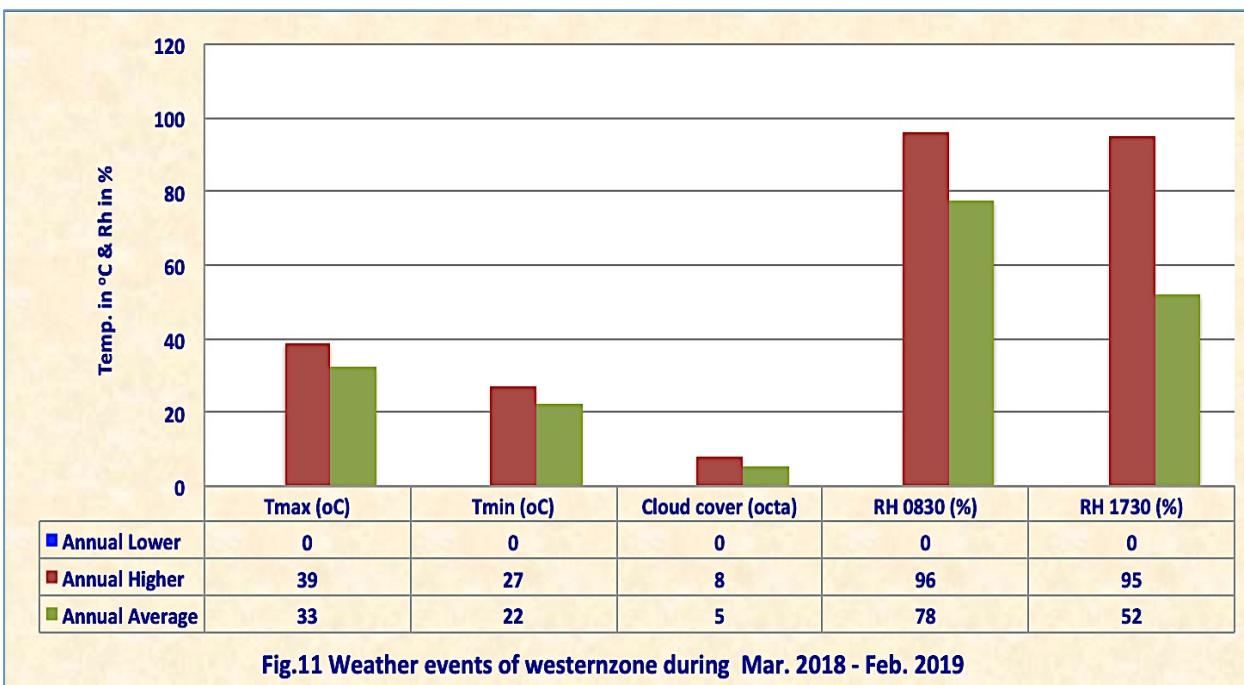
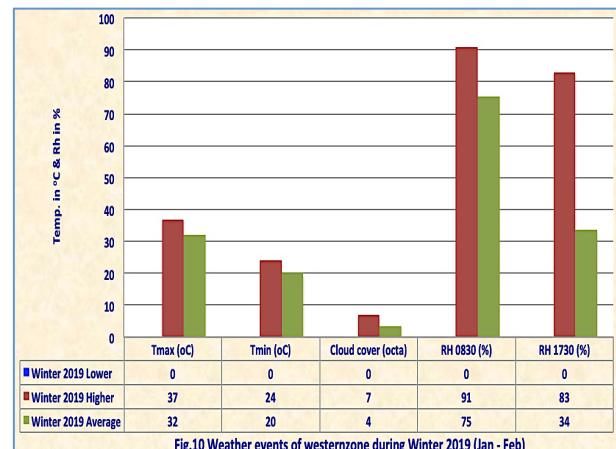
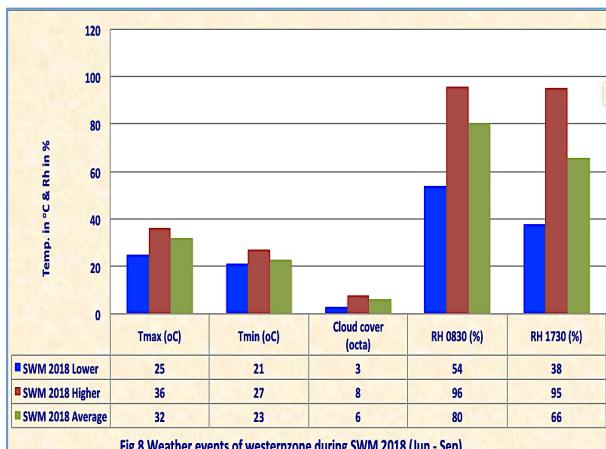
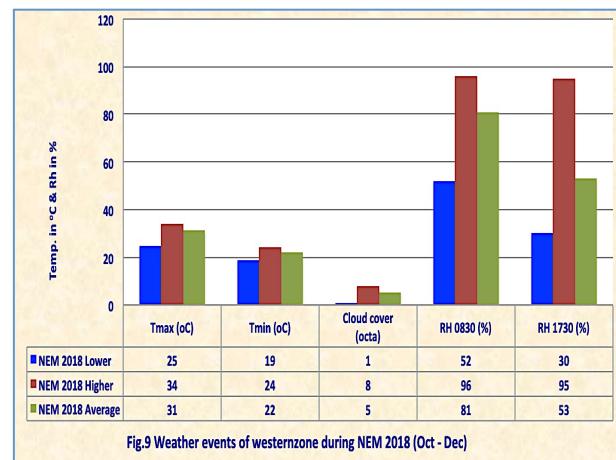
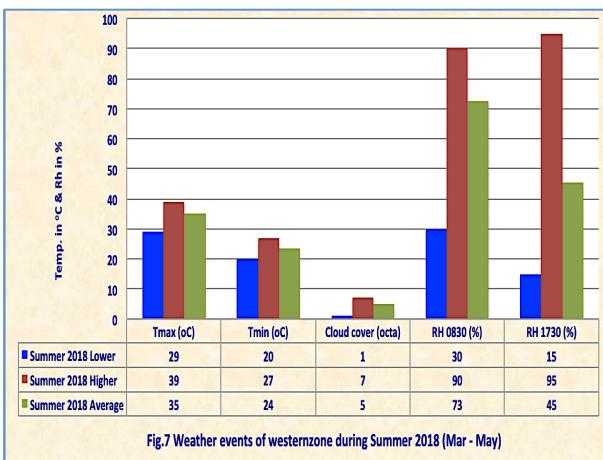


Table 5 Irrigation sources and area irrigated of AAS Western Zone (ha)

Particulars	Coimbatore	Erode	Tiruppur
Canal numbers (Nos.)	29	10	18
Canal length (km)	245	690	364
Tube / other wells (Nos.)	20426	9908	14986
Open wells (Nos.)	49637	75459	79230
Reservoirs (Nos.)	7	7	5
Tanks (Nos.)	48	698	42
Net Area irrigated by different sources (ha)			
Canal	15597	36337	26530
Tank	0	42	900
Tube wells	28658	29762	15176
Open wells	70739	54176	69453
Other sources	0	767	0
Total Net Area irrigated (ha)	114994	121084	112059
Gross Area irrigated (ha)	116849	129020	113667

Source: Department of Economics and Statistics, Chennai-600 006

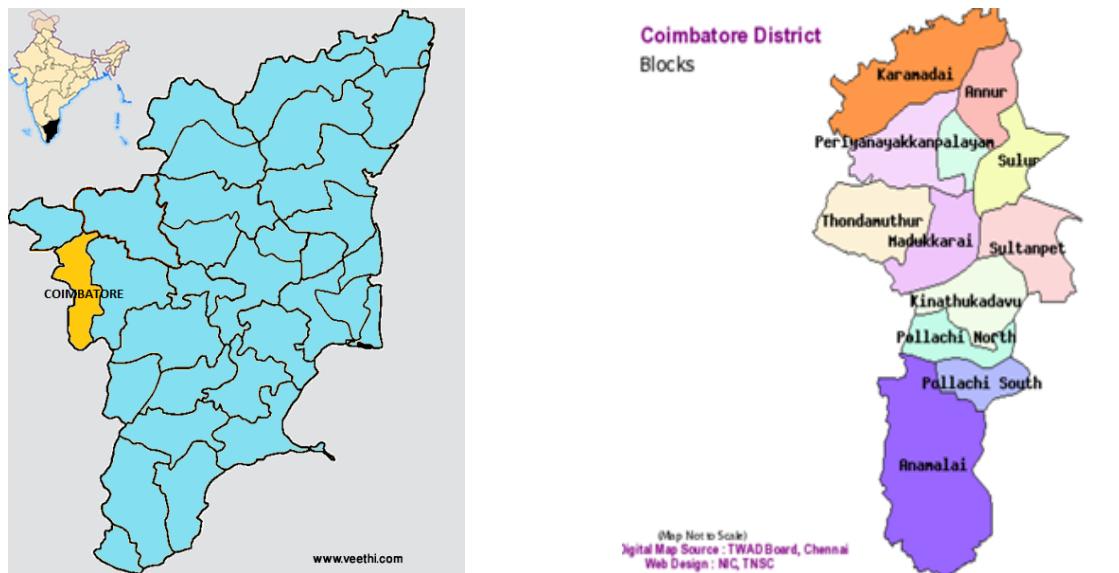


Fig. 12 Coimbatore District Block map

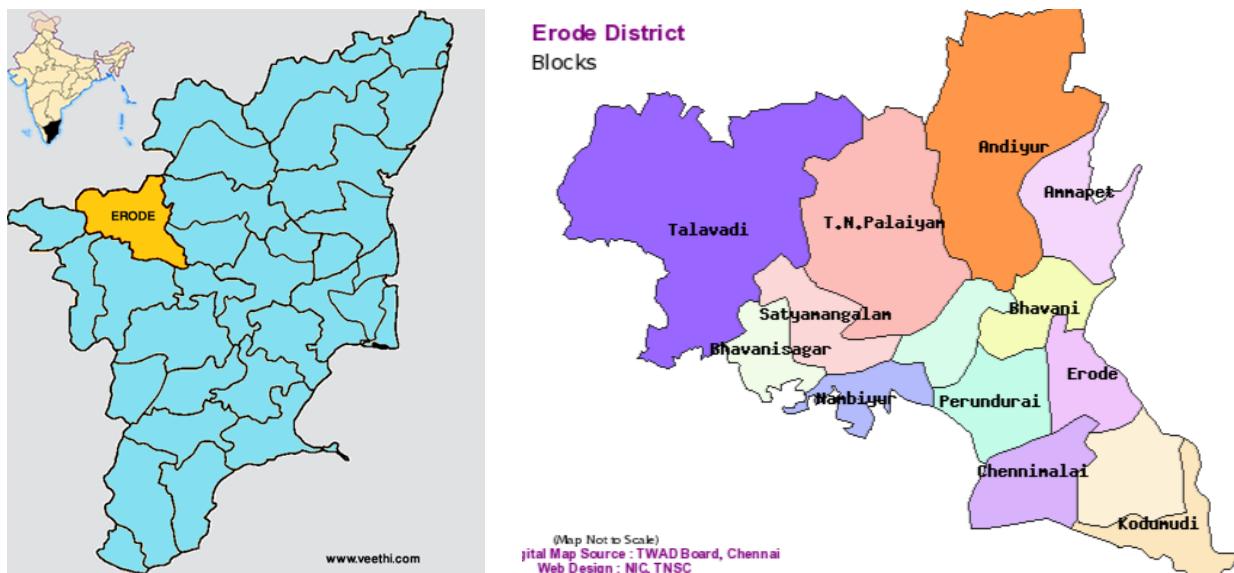


Fig. 13 Erode District Block map

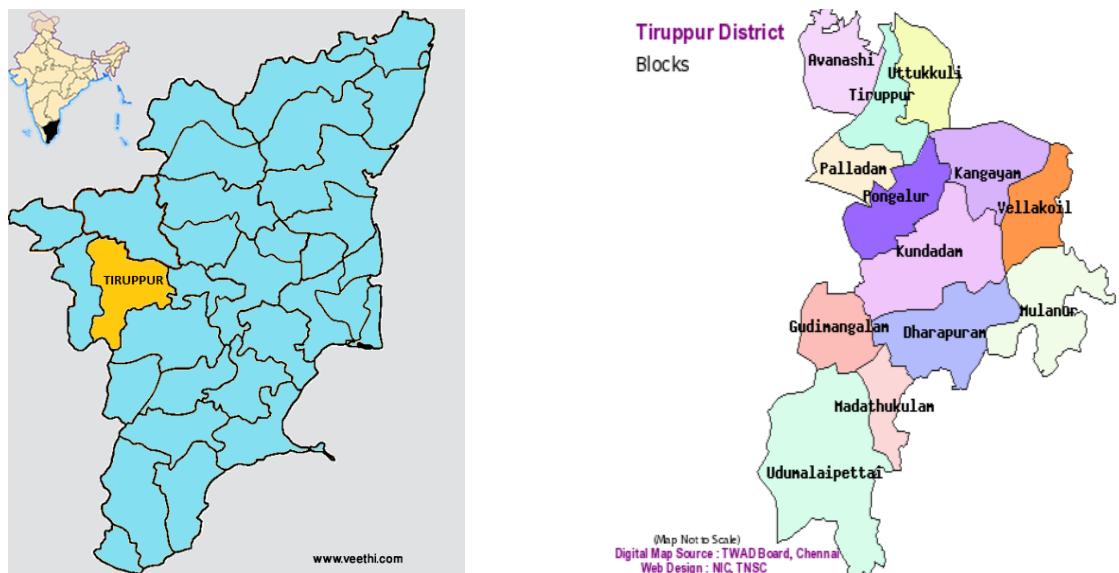


Fig. 14 Tiruppur District Block map

2.1 Coimbatore district

Coimbatore is situated in the extreme west of Tamil Nadu, near the state of Kerala (Fig. 12). It is surrounded by mountains on the west, with reserve forests and the (Nilgiri Biosphere Reserve) on the northern side. The district is bounded by Palghat district of Kerala on the west and by Idukki district of Kerala in the South. Coimbatore shares its borders with Tirupur in the East and Nilgiris in the North. A small portion of Erode district shares the border near Puliampatti in the North East. The district has an area of 7,649 square kilometers. The headquarters of the district is Coimbatore city.

The district of Coimbatore is situated between $10^{\circ} 36'$ and $11^{\circ} 58'$ North Latitudes and $76^{\circ} 49'$ and $77^{\circ} 58'$ East Longitudes. As of 2011, Coimbatore district had a population of 3,458,045 with a sex-ratio of 1,000 females for every 1,000 males. Block wise number of revenue villages in Coimbatore district details are given Table 6.

In the rain shadow region of the Western ghats, Coimbatore enjoys a very pleasant climate all the year round, aided by the fresh breeze that flows through the 25 kms long Palakkad gap. The rich black soil of the region has contributed to Coimbatore's flourishing agriculture industry and, it is in fact the successful growth of cotton that served as a foundation for the establishment of its famous textile industry. The eastern side of the district, including the city is predominantly dry. The entire western and northern part of the district borders the Western Ghats with the Nilgiri biosphere as well as the Anaimalai and Munnar ranges. Because of its close proximity to the Western Ghats, the district is rich in fauna. The soil classification of Coimbatore districts are given in Table 7.

Many lakes and ponds were constructed near the river in ancient times. The major rivers flowing through the district are Bhavani, Noyyal, Amaravathi, Kousika River and Aliyar. The Siruvani dam is the main source of drinking water for Coimbatore city and is known for its tasty water. Waterfalls in Coimbatore District include Chinnakallar Falls, Monkey Falls, Sengupathi Falls, Siruvani Waterfalls, Thirumoorthy Falls and Vaideki Falls. A well known ancient river called Kousika river. Its starts from Kurudi Hill, Coimbatore and travel via Kovilpalaym, Vagarayampalaym, Thekkalur and joined in Noyyal river at Tiruppur. The city of Coimbatore has nine lakes. Singanallur Lake, Kuruchi Lake, Valankulam Lake, Krishnampatti Lake, Muthannan Lake and Seevagasintamani Lake are important of them. In most of the urban ecosystems, these wetlands are the major life-supporting component with high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. Average annual rainfall (1951-2010) of Coimbatore is 695.8 mm. The mean maximum and minimum temperatures for Coimbatore city during summer and winter vary between 35°C to 18°C .

Table 6 Coimbatore district block wise revenue villages

S.No	Block	Rev. villages	S.No	Block	Rev. villages
1.	Anaimalai	19	7.	Annur	21
2.	Karamadai	17	8.	Kinathukadavu	34
3.	Madhukkarai	9	9.	Periyanaickenpalayam	9
4.	Pollachi (North)	39	10.	Pollach (South)	26
5.	Sarcarsamakkulam	8	11.	Sultanpet	20
6.	Sulur	17	12.	Thondamuthur	10
				Total	229

Table 7 Coimbatore district soil classification

YEAR: 2015-2016		
Sl.No. (1)	Type of Soil (2)	Places in District (Blocks) (3)
1.	Irugur series (Modeatel shallow noncalareous well draine, sany loam, red soil)	Karamadai, Sulur, Anamalani, Pollachi (N & S) , Annur(North Part)
2.	Palladam series(shallow, calcareous, well drained, sandy clay loam, yellowish red soil)	Kinathukadavu, Sulthanpet, Pollachi(N& S)
3.	Palathurai series(Moderea,g shallow, calcaraeiou, well drained, sandy clay loam, reddish brown soil)	Thondamuthur, SS. Kulam, Perur, Madukarai, Karamadai(patches)
4.	Pilamedu series(Deep, calcareous, modereately drained, clay loam, very dark grayish brown soil)	S.S. Kulam(central& Eastern part) Madukkarai, Perur (Eastern part) Pollachi(S), Western part, Sulur(Central, western part)
5.	Vellalore series(Deep, moderately, weel drained, clay loam, reddish brown soil)	Annur
6.	Pichanur Series (Deep, Non calcareous, excessively drained, gravelly sand, dark brown soil)	P.N.Palayam(North part) Karamadai, Madukkari
7.	Somayanur series(very deep, calcareous, well drained, sandy clay loam, dark yellowish brown soil)	Thondamuthur (west part) P.N.Palayam (west & north)
8.	Dhasarapatti(Deep, calcareous, gypsum rich , poorly drained, clay, very dark grey soil)	Pollachi(south, eastern part) Kinathukadavu(ventral & eastern part) Sulthanpet(central part) Sulur(patches, southern part)
9.	P.N.Palayam(Deep, calcareous, Moderately drained, clay, very dark grayish brown soil)	P.N.palayam

Source: Senior Agricultural Officer, Soil Survey and Land Use Organization, Coimbatore.

2.2 Erode district

The district of Erode is surrounded by land from all sides and does not have a sea coast of its own (Fig. 13). The district is having its borders as Namakkal and Karur district to the East, Dindigul district to the South, Coimbatore district, Nilgiris district to the West and Chamarajanagar district of Karnataka in north. The district's region can be portrayed as a long undulating plain sloping towards the Kaveri River in the south-east.

Table 8 Erode district block wise revenue villages

S.No	Block	Rev. villages	SN	Block	Rev. villages
1.	Ammapet	20	8.	Andiyur	14
2.	Bhavani	15	9.	Bhavanisagar	15
3.	Chennimalai	22	10.	Erode	11
4.	Gopichettipalayam	21	11.	Kodumudi	10
5.	Modakurichi	23	12.	Nambiyur	15
6.	Perundurai	29	13.	Satyamangalam	15
7.	Talavadi	10	14.	Thoockanaickenpalayam	10
				Total	343

Table 9 Erode district soil classifications

Sl.No	Type of Soil	Places in District (Taluks)
1.	Red Loam	Sathyamangalam and Gobichettipalayam
2.	Literatic Soil	Bhavani, Sathyamangalam
3.	Black Soil	--
4.	Sandy Coastal Alluvium	--
5.	Red Sandy Soil	Erode, Perundurai, Bhavani
6.	Calcareous Soil	--

Source: Assistant Director of Survey and Land Records, Erode-11.

Table 10 Tiruppur district block wise revenue villages

S.No	Block	Revenue Villages	S.No	Block	Revenue Villages
1	Avinashi	31	8	Kangeyam	16
2	Gudimangalam	23	9	Dharapuram	15
3	Kundadam	24	10	Madathukulam	11
4	Mulanur	12	11	Palladam	10
5	Pongalur	16	12	Tiruppur	21
6	Udumalpettai	38	13	Utthukuli	37
7	Vellakoil	9		Total	273

The three major tributaries of Cauvery River are Bhavani River, Amaravati River and Noyyal River which drain the long stretch of mountains in the north. A part of the eastern boundary of Erode district is formed by Cauvery River, entering the district from Salem and flowing in the southern direction. The district forms the meeting point of Western Ghats and Eastern Ghats separated by Bhavani River. The district of Erode is situated between 10 degrees 36 minutes and 11 degrees 58 minutes to the North Latitudes and 76° 49' and 77° 58' to the East Longitudes. Block wise number of revenue villages in Erode district details are given Table 8. Erode district's major soil are given in Table 9. The climate is mostly dry and characterized by good rainfall. Unlike nearby Coimbatore district, Erode District has dry weather throughout the year except during the monsoons. The Palghat Gap in Western Ghats, which has a moderating effect on the climate of Coimbatore district, does not help in bringing down the dry climate in this area. The cool moist wind that gushes out of the west coast through Palghat gap loses its coolness and becomes dry by the time it crosses Coimbatore district and reaches Erode.

Generally the first two months of the year are pleasant, but in March the temperature begins to rise, which persists till the end of May. The highest temperatures are normally recorded during May. The scanty showers during this period do not provide much relief from the oppressive heat. However, there is an improvement in the climate during the June–August period. During the pre-monsoon period, the temperature reverses its trend. By September the sky gets heavily overcast, although the rains pour down. The northeast monsoon sets in vigorously only during October–November, and by December the rains disappear, rendering the climate clear and cold.

2.3 Tiruppur

Tiruppur district is recently bifurcated from part Coimbatore and Erode districts. It lies on the western part of Tamil Nadu bordering the Western Ghats (Fig. 14) and hence the district enjoys a moderate climate. The district is surrounded by Coimbatore district in the west, Erode district to the North and northeast and Karur district in the east, Dindigul district in the south east and idukki district of Kerala state in the South. The district has an area of 516.12 square kilometers. Block wise number of revenue villages in Trippur district details are given Table 10.

The southern and south western part of the district enjoys maximum rainfall, due to the surrounding of Western Ghats. The rest of the district lies in the rain shadow region of the Western Ghats and experiences salubrious climate most parts of the year, except the extreme east part of the district. The mean maximum and minimum temperatures for Tiruppur city during summer and winter vary between 35°C to 18°C. The average annual rainfall in the plains is around 700 mm with the North East and the South West monsoons contributing to 47% and 28% respectively to the total rainfall. The major rivers flowing through the district are Noyyal and Amaravathi. The Amaravati river is the main source of irrigation in the district. Amaravathi Dam, which created Amaravathi Reservoir, is located at Amaravathi nagar. Thirumurthy dam which is created by the PAP project is situated in this district. Both Amaravathi dam and Thirumurthy dam are the prime source of irrigation in the district, whereas Uppaar dam is another dam which receives water from seasonal rains. According to 2011 census, Tiruppur district had a population of 2,479,052 with a sex-ratio of 989 females for every 1,000 males, much above the national average of 929.

3. OBJECTIVES

1. To assess and establish the relationship between weather, field level management practices and land factors for crop yield forecasting.
2. To determine genetic coefficients for popular varieties of rice, Maize and Groundnut for running crop simulation models for crop yield forecasting.
3. To issue multiple crop yield forecast for rice in Western Zone of Tamil Nadu at mid-season (F2) and pre-harvest stage (F3)

4. COMMUNICATION DETAILS

- (i) Land Line : 0422 6611305; Mobile: 99944 33479 (PI), 09443935107 (Co-PI)
- (ii) Email ID : meteorology@tnau.ac.in, geetha@tnau.ac.in, gadheebakaran@yahoo.co.in
- (iii) Nearest railway station: Coimbatore Junction - 8 Km away from TNAU campus
- (iv) Nearest Airport – Coimbatore – 22 Km away from the Campus

5. PROGRESS MADE DURING 2018 -2019

- Block level weather data for the period from March 2018 to Feb. 2019 for the four season viz., Summer, SWM, NEM and Winter were collected from TNAU – Tamil Nadu Agricultural Weather Network (TAWN)
- District wise weather data issued by RMC, Chennai were collected from AMFU, Coimbatore for the Western Zone and grouped season wise.
- Statistical relationship between weather and crop yield were developed.
- Weather, crop management and experiment files were generated for DSSAT model for maize, rice and groundnut.
- Crop coefficients already developed in this scheme for the popular TNAU varieties during previous years of this scheme were used for maize (CoHM6) and rice (Co51). In groundnut, genetic coefficient was developed for two varieties viz., VRI 2.
- Yield forecast for western zone were derived using crop simulation model with identified genetic coefficient and verified with actual yield data collected from block level farmers.
- Forecasted and validated the F2 (flowering) and F3 (pre-harvest) rice yield prediction was developed for Coimbatore, Dharmapuri, Erode, Krishnagiri, Namakkal, Salem, Thiruvallur, Tiruppur, Vellore during *kharif* and *rabi* 2018.
- Forecasted the maize and groundnut at F2 and F3 stages for Coimbatore, Erode, Tirunelveli, Tuticorin and Vellore districts.

Collection of data for developing crop yield prediction

i. Collection of weather data:

Historical weather data was collected from NDC data sets and the various research stations of Tamil Nadu to construct the weather file. In addition to that reanalysis data at a resolution of 0.25 x 0.25 grid for a period from 1979-2010 was extracted from Global data set available in SWAT open source webpage and used in the study. Current weather data for the study was also extracted from the Automatic Weather Stations data available from the Agro Climate Research Centre, TNAU.

ii. Collection of crop area, production and productivity data

a. Historical data: Area, production and productivity of the mandate crops (paddy, Maize and Groundnut) for 30 years time period for the study districts were collected from Seasonal crop reports and Department of Economics and Statistics, Tamil Nadu. For the newly formed Districts, the data of original district was considered.

b. Collection of Current yield data: Area and productivity of study crops for the year 2016 were obtained from the Commissioner of Agriculture Office, Tamil Nadu.

iii. Collection of input data for running crop weather model

Crop simulation model viz., DSSAT was calibrated for rice cultivars using the field experimental data carried out at Tamil Nadu Agricultural University, Coimbatore. Inputs details required by DSSAT model including site information, soil properties, initial conditions, Planting time, irrigation management (dates, amounts and schedule), and fertilizer management (dates, amounts, sources, method of incorporation and depth of placement) were obtained from the field experiments. The daily weather data on solar radiation, maximum and minimum air temperatures, and rainfall were collected from the Tamil Nadu Agricultural University observatory. CERES-Rice (DSSAT) was calibrated by comparing simulated outcomes with the available measured data on days to Panicle initiation, flowering, maturity and grain yield at harvest.

Genetic co-efficient of crop cultivars used in this projects

Table 11 CERES - Rice in DSSAT model calibrated for Rice cultivar Co51

Crop/Variey	P1	P2R	P5	P20	G1	G2	G3	G4	PHINT	G5
Rice - CO50	640.7	160.4	328.9	11.9	68.0	.0200	1.00	1.10	83.0	1.0

Table 12 CERES – Maize in DSSAT model calibrated for Rice cultivar CoHM6

Crop/Variety	P1	P2	P5	G2	G3	PHINT
Maize - COH6	295.0	0.510	840.0	635.0	8.30	39.00

Table 13 CROPGRO - Peanut in DSSAT model calibrated for peanut cultivar VRI 2 & CO6

VRI 2	CSDL	PPSEN	EM-FL	FL-SH	FL-SD	SD-PM	FL-LF	LFMAX	SLAVR
	11.84	0	14	9	16	58	78	1.65	273
	SIZLF	XFRRT	WTPSD	SFDUR	SDPDV	PODUR	THRSH	SDPRO	SDLIP
	18	0.83	1.03	31	2	15	85	0.27	0.51
Co 6	CSDL	PPSEN	EM-FL	FL-SH	FL-SD	SD-PM	FL-LF	LFMAX	SLAVR
	11.84	0	27	11.7	15.4	84.71	78	1.39	273
	SIZLF	XFRRT	WTPSD	SFDUR	SDPDV	PODUR	THRSH	SDPRO	SDLIP
	15	0.53	1.0	38	1.85	15	79.1	0.27	0.51

Statistical methods used for developing district wise crop yield forecast

Statistical method was employed for forecasting crop yield of Rice crop at selected districts. The yield forecast was developed by relating the historical crop yield (1985-2013) with long term weather data (1985-2013) and the weather condition prevailed during different crop growth stages. The weather variables considered in the model are weekly average Maximum and Minimum temperature, Rainfall, morning and evening Relative Humidity. Final forecast model used for Crop Yield Forecasting under FASAL

$$Y = A_0 + \sum_{i=1}^p \sum_{j=0}^1 a_{ij} Z_{ij} + \sum_{i \neq i'=1}^p \sum_{j=0}^1 a_{ii'j} Z_{ii'j} + cT + e$$

Where

$$Z_{ij} = \sum_{w=1}^m r_{iw}^j X_{iw}$$

$$Z_{ii'j} = \sum_{w=1}^m r_{ii'w}^j X_{iw} X_{i'w}$$

r_{iw} is correlation coefficient of yield with i^{th} weather variable (x) in w^{th} period

$r_{ii'w}$ is correlation coefficient of yield with product of i^{th} and i'^{th} weather variables (x) in w^{th} period

m is period of forecast

p is number of weather variables used

e is random error distributed as $N(0, \sigma^2)$.

T is technology factor

Crop yield forecast using Crop Simulation Model (CSM) and Statistical Model (Stat)

Kharif rice	Forecasted yield kg/ha				Actual yield kg/ha	Yield deviation (%)			
	Stat - F2	Stat - F3	CSM - F2	CSM - F3		Stat - F2	Stat - F3	CSM - F2	CSM - F3
Coimbatore	4454	4637	3729	3550	3980	11.9	16.5	-6.3	-10.8
Erode	4852	5072	4540	4720	4000	21.3	26.8	13.5	18.0
Tiruppur	4588	4772	3842	3657	4100	11.9	16.4	-6.3	-10.8
Dharmapuri	3668	3809	3346	3581	3130	17.2	21.7	6.9	14.4
Krishnagiri	3765	3913	3100	2952	3280	14.8	19.3	-5.5	-10.0
Namakkal	2814	2596	2898	2730	3350	-16.0	-22.5	-13.5	-18.5
Salem	3481	3750	3471	2675	3170	9.8	18.3	9.5	-15.6
Vellore	3743	4896	3776	3587	4210	-11.1	16.3	-10.3	-14.8
Thiruvallur	5263	5459	4944	5184	4360	20.7	25.2	13.4	18.9

Rabi rice	Forecasted yield kg/ha				Actual yield kg/ha	Yield deviation (%)			
	Stat - F2	Stat - F3	CSM - F2	CSM - F3		Stat - F2	Stat - F3	CSM - F2	CSM - F3
Coimbatore	4550	4051	4132	4367	4260	6.8	-4.9	-3.0	2.5
Erode	4653	4099	4372	4394	4470	4.1	-8.3	-2.2	-1.7
Tiruppur	4550	4062	4266	4288	4340	4.85	-6.4	-1.7	-1.2
Dharmapuri	4226	4058	4158	4033	3560	18.7	14.0	16.8	13.3
Krishnagiri	3077	2947	3721	3602	3620	-15.0	-18.6	2.8	-0.5
Namakkal	3062	3044	3683	3562	3650	-16.1	-16.6	0.9	-2.4
Salem	3525	3506	3950	3540	3730	-5.5	-6.0	5.9	-5.1
Vellore	4205	4183	4570	4345	4450	-5.5	-6.0	2.7	-2.4
Thiruvallur	5195	5459	5113	5329	4810	8.0	13.5	6.3	10.8

Maize	Forecasted yield kg/ha				Actual yield kg/ha	Yield deviation (%)			
	Stat - F2	Stat - F3	CSM - F2	CSM - F3		Stat - F2	Stat - F3	CSM - F2	CSM - F3
Coimbatore	3820	2494	3629	3353	3290	16.1	-24.2	10.3	1.9
Erode	5196	4126	4087	4344	4280	21.4	-3.6	-4.5	1.5
Tirunelveli	6110	6131	5446	5928	5350	14.2	14.6	1.8	10.8
Tuticorin	4122	3684	4412	3936	4210	-2.1	-12.5	4.8	-6.5
Vellore	3154	5387	4787	4157	4380	-28.0	23.0	9.3	-5.1

Groundnut	Forecasted yield kg/ha				Actual yield kg/ha	Yield deviation (%)			
	Stat - F2	Stat - F3	CSM - F2	CSM - F3		Stat - F2	Stat - F3	CSM - F2	CSM - F3
Coimbatore	1565	1603	1410	1271	1330	17.7	20.5	6.0	-4.4
Erode	1828	1753	1377	1408	1530	19.5	14.6	-10.0	-8.0
Tirunelveli	2695	2712	2714	2053	2360	14.2	14.9	15.0	-13.0
Tuticorin	1462	1523	1362	1254	1480	-1.2	2.9	-8.0	-15.3
Vellore	2159	2262	1934	1748	1860	16.1	21.6	4.0	-6.0

***Kharif* Rice yield forecast**

Deviation of statistical model based *Kharif* rice yield forecast from the actual yield of various district of Tamil Nadu was -11.1 to 21.3 per cent at F2 (Flowering stage) and -22.5 to 26.8 per cent at F3 (Pre harvest stage).

Deviation of Crop Simulation Model based *Kharif* rice yield forecast from the actual yield of various district of Tamil Nadu was -13.5 to 13.4 per cent at F2 (Flowering stage) and -18.5 to 18.9 per cent at F3 (Pre harvest stage).

Both the model results showed better prediction at F2 stage than F3 stage. Among the two methods, Crop Simulation Model performs better than statistical methods.

***Rabi* Rice yield forecast**

Deviation of statistical model based *rabi* rice yield forecast from the actual yield of various district of Tamil Nadu was -16.1 to 18.7 per cent at F2 (Flowering stage) and -18.6 to 14.0 per cent at F3 (Pre harvest stage).

Deviation of Crop Simulation Model based *rabi* rice yield forecast from the actual yield of various district of Tamil Nadu was -3.0 to 16.8 per cent at F2 (Flowering stage) and -5.1 to 13.3 per cent at F3 (Pre harvest stage).

Both the model results showed better prediction at F2 stage than F3 stage. Between the two methods, Crop Simulation Model performs better than statistical methods.

Both the methods perform better during *rabi* than *Kharif* yield forecast. The deviation between actual and crop simulation model forecast was well within in the limit of 15 per cent. The results indicated that the yield forecast had better prediction in Coimbatore, Erode, Tiruppur, Salem, Vellore, Thiruvallur and had more deviation in Dharmapuri, Krishnagiri and Namakkal.

***Rabi* Maize yield forecast**

Deviation of statistical model based *rabi* maize yield forecast from the actual yield of various district of Tamil Nadu was -2.1 to 21.4 per cent at F2 (Flowering stage) and -24.2 to 23.0 per cent at F3 (Pre harvest stage).

Deviation of Crop Simulation Model based *rabi* maize yield forecast from the actual yield of various district of Tamil Nadu was -4.5 to 10.3 per cent at F2 (Flowering stage) and -6.5 to 10.8 per cent at F3 (Pre harvest stage).

Results inferred that the Crop Simulation model based maize yield forecast had better matched with actuals in both the F2 stage and F3 stage.

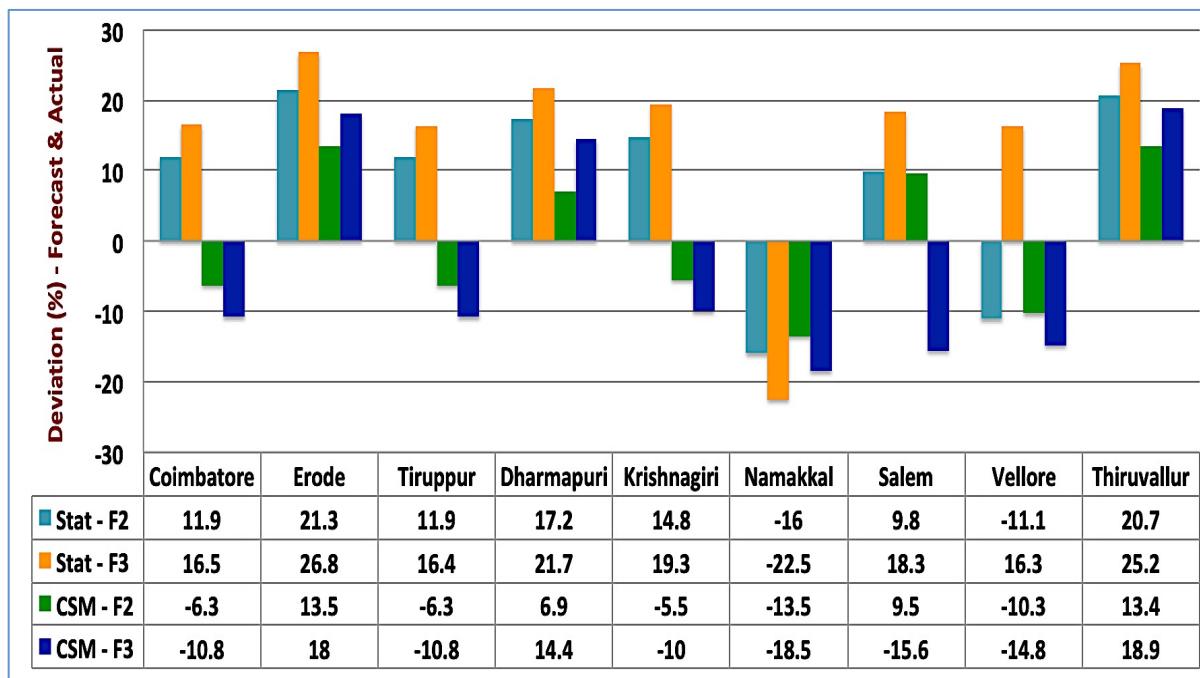


Fig. 14 Verification of Statistical Model & Crop Simulation Model - *Kharif* Rice yield forecast- 2018

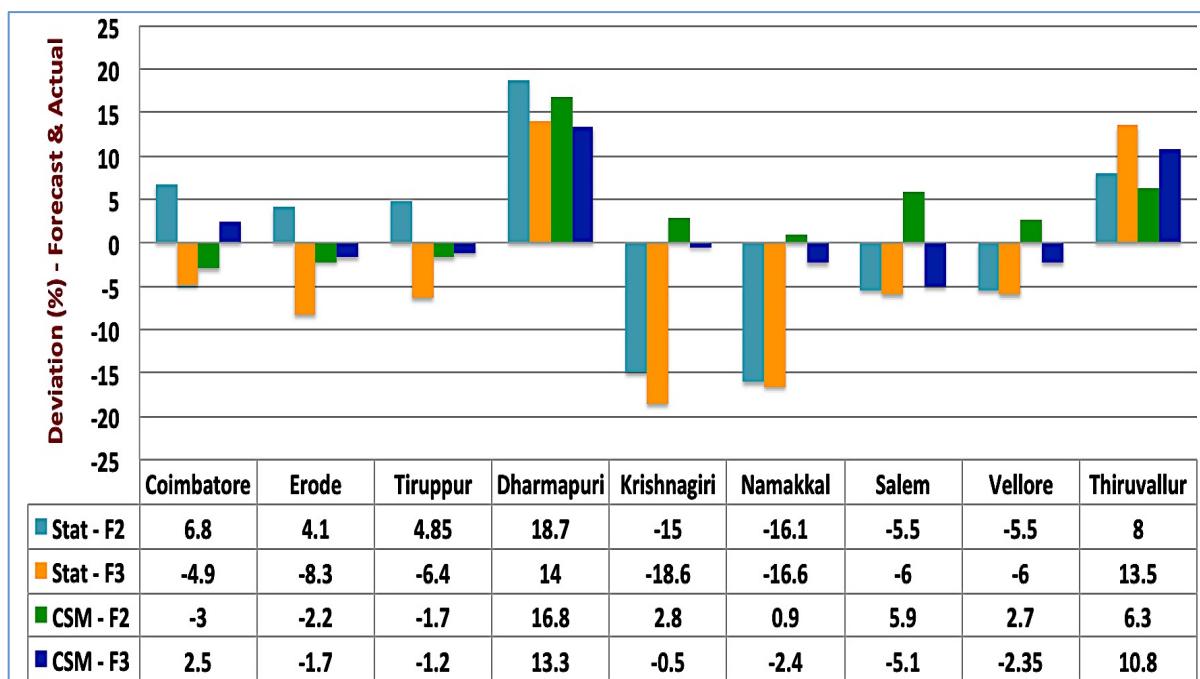


Fig. 15 Verification of Statistical Model & Crop Simulation Model - *Rabi* Rice yield forecast- 2018

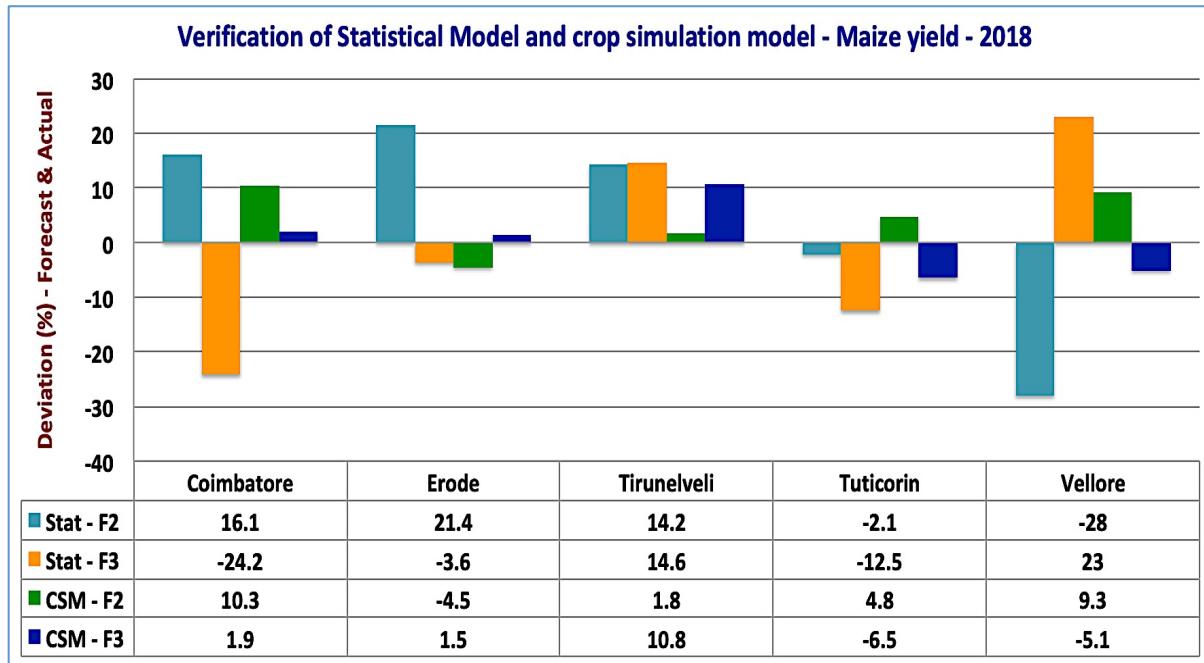


Fig. 16 Verification of Statistical Model & Crop Simulation Model - Maize yield forecast– 2018

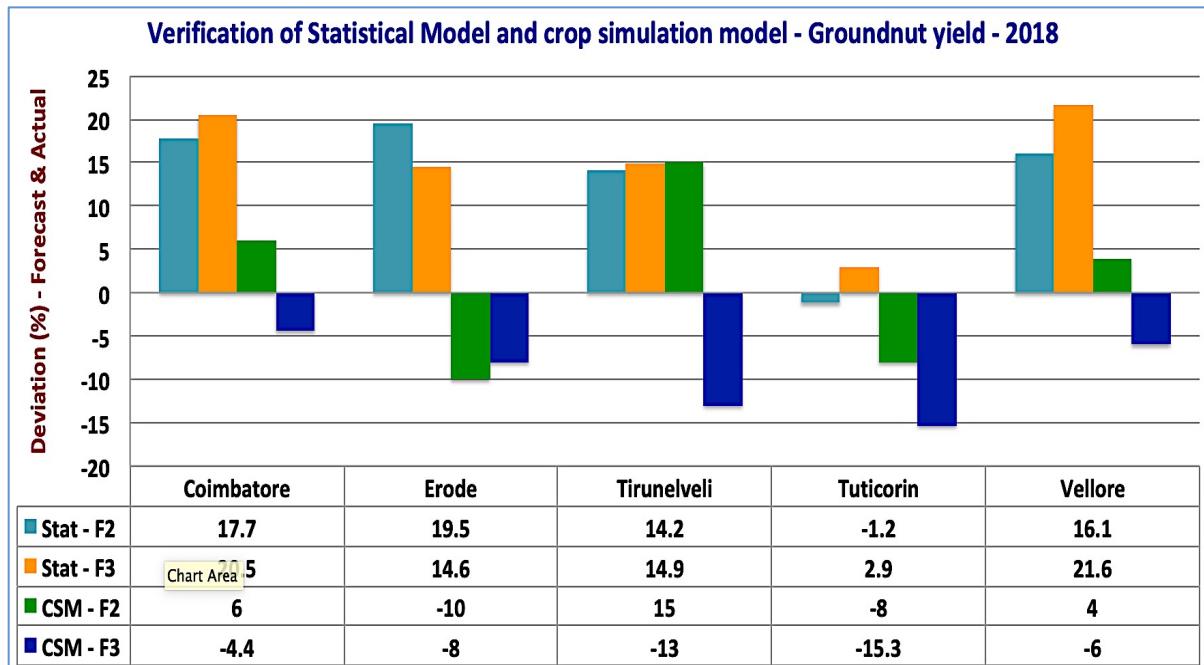


Fig. 17 Verification of Statistical & Crop Simulation Model - Groundnut yield forecast - 2018

***Rabi* Groundnut yield forecast**

Deviation of statistical model based *rabi* Groundnut yield forecast from the actual yield of various district of Tamil Nadu was -1.2 to 19.5 per cent at F2 (Flowering stage) and -2.9 to 21.6 per cent at F3 (Pre harvest stage).

Deviation of Crop Simulation Model based *rabi* *Groundnut* yield forecast from the actual yield of various district of Tamil Nadu was -10.0 to 15.0 per cent at F2 (Flowering stage) and -15.3 to -4.4 per cent at F3 (Pre harvest stage).

Results inferred that the Crop Simulation model based maize yield forecast had better matched with actuals in both the F2 stage and F3 stage.

Audit Utilization Certificate

2018 – 19



GFR12 - A [(See Rule 238 (1)]

FORM OF UTILIZATION

CERTIFICATE FOR AUTONOMOUS BODIES OF THE GRANTEE ORGANIZATION
 UTILIZATION CERTIFICATE FOR THE YEAR 2018-19 in respect of recurring/non-recurring
 GRANTS-IN-AID/SALARIES/CREATION OF CAPITAL ASSETS

1.	Name of the Scheme	:	Forecasting Agricultural Output Using Space, Agrometeorology and Land based observations "FASAL" to AAS, Coimbatore, Tamil Nadu.
2.	Whether recurring or non-recurring grants	:	Recurring
3.	Grants position at the beginning of the financial year 2018-19	:	
i	Cash in Hand/Bank	:	Rs. 75,096/-
ii	Unadjusted advances	:	
iii	Total	:	Rs. 75,096/-

4. Details of grants received, expenditure incurred and closing balances: (Actuals)

Unspent Balance of Grants received years [figure as at Sl. No. 3(iii)]	Interest Earned thereon 2018-19 (Rs.)	Interest deposited back to the Govt. (Rs.)	Grant received during the year 2017-18 (Rs.)			Total Available funds (1+2-3+4) (Rs.)	Expenditure incurred (Rs.)	Closing Balance (5-6) (Rs.)
			1	2	3			
			Sanction No. (i)	Date (ii)	Amount (iii)			
Rs. 75,096/-	Nil-		Letter no. ASC/FAS AL/TN-19/04/HQ-2010	31.01.2019	3,04,640	3,79,736	Rs. 3,22,418	57,318

Component wise utilization of grants:

Grant-in-aid—General(Rs.)	Grant-in-aid—Salary(Rs.)	Grant-in-aid—creation of capital assets(Rs.)	Total(Rs.)
Rs. 3,22,418/-	Nil	Nil	Rs. 3,22,418/-

Details of grants position at the end of the year

- (i) Cash in Hand/Bank : Rs. 57,318/-
 (ii) Unadjusted Advances : Nil
 (iii) Total : Rs. 57,318/-

Principal Investigator
 FASAL

Professor and Head
 ACRC

PROFESSOR AND HEAD
 Agro Climate Research Centre
 Tamil Nadu Agricultural University
 K.S. COIMBATORE - 641 003.
 11/7/19

GENERAL FINANCIAL RULES 2017
Ministry of Finance
Department of Expenditure



Certified that I have satisfied myself that the conditions on which grants were sanctioned have been duly fulfilled/are being fulfilled and that I have exercised following checks to see that the money has been actually utilized for the purpose for which it was sanctioned:

- i. The main accounts and other subsidiary accounts and registers (including assets registers) are maintained as prescribed in the relevant Act/Rules/Standing instructions (mention the Act/Rules) and have been duly audited by designated auditors. The figures depicted above tally with the audited figures mentioned in financial statements/accounts.
- ii. There exist internal controls for safeguarding public funds/assets, watching outcomes and achievements of physical targets against the financial inputs, ensuring quality in asset creation etc. & the periodic evaluation of internal controls is exercised to ensure their effectiveness.
- iii. To the best of our knowledge and belief, no transactions have been entered that are in violation of relevant Act/Rules/standing instructions and scheme guidelines.
- iv. The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in nature.
- v. The benefits were extended to the intended beneficiaries and only such areas/districts were covered where the scheme was intended to operate.
- vi. The expenditure on various components of the scheme was in the proportions authorized as per the scheme guidelines and terms and conditions of the grants-in-aid.
- vii. It has been ensured that the physical and financial performance under FASAL has been according to the requirements, as prescribed in the guidelines issued by Govt. of India and the performance/targets achieved statement for the year to which the utilization of the fund resulted in outcomes given at Annexure – I duly enclosed.
- viii. The utilization of the fund resulted in outcomes given at Annexure – II duly enclosed (to be formulated by the Ministry/Department concerned as per their requirements/specifications.)
- ix. Details of various schemes executed by the agency through grants-in-aid received from the same Ministry or from other Ministries is enclosed at Annexure –II (to be formulated by the Ministry/Department concerned as per their requirements/specifications).

Principal Investigator
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11/1/19

Deputy Director
Local Fund Audit

Director
Crop Management
DIRECTOR
Directorate of Crop Management
Tamil Nadu Agricultural University
Coimbatore - 641 003.

COMPTROLLER
Comptroller
Tamil Nadu Agricultural University
Coimbatore - 641 003.
10/12/2019
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Annexure-I to Utilization Certificate:

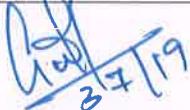
Performance / targets achieved statement for the Financial year 2018-19 to which the utilization of the fund resulted in outcome is given below:-

Physical performance statement

SN	Performance / target Fixed	Performance / target achieved
1.	<ul style="list-style-type: none"> • To establish the relationship between weather and crop growth, crop development and yield for rice, maize and groundnut. • To assess and establish the relationship between weather, field level management practice and land factors for crop yield forecast. • To determine genetic coefficient for popular varieties of rice, maize and ground nut for running crop simulation models for crop yield forecast. • To issue multiple crop yield for rice, maize and ground nit in western zone of Tamil Nadu at mid season (F2) and pre harvest stage. 	<ul style="list-style-type: none"> • Block level weather data for the period from March 2018 to Feb. 2019 for the four season viz., Summer, SWM, NEM and Winter were collected from TNAU – Tamil Nadu Agricultural Weather Network (TAWN) • District wise weather data issued by RMC, Chennai were collected from AMFU, Coimbatore for the Western Zone and grouped season wise. • Statistical relationship between weather and crop yield were developed. • Weather, crop management and experiment files were generated for DSSAT model for maize, rice and groundnut. • Crop coefficients already developed in this scheme for the popular TNAU varieties during previous years of this scheme were used for maize (CoHM6) and rice (Co51). In groundnut, genetic coefficient was developed for two varieties viz., VR1 2. • Yield forecast for western zone were derived using crop simulation model with identified genetic coefficient and verified with actual yield data collected from block level farmers' field.

Financial performance

SN	Particulars	Performance / target Fixed Rs.	Performance / target achieved Rs.
1.	Salary to manpower	Disbursement of salary to: One Senior Res. Fellow from April '18 to Mar. '19 as her entitlement and University guidelines. Rs.3,00,000/-	Salary disbursed to: One Senior Res. Fellow from 22 nd Feb to 31 st Mar. 2019 as her entitlement and University guidelines. Rs.3,00,000/-
2.	Disbursement of contingency	Rs.20,000/-	Rs.17,580/-
3.	Travel Allowances for attending the meeting/workshop etc. related to FASAL	Rs.20000/-	-
4.	Institutional charges	Rs.39,736/-	Rs.4,838/-
5.	Sub Total	Rs.3,79,736/-	Rs.3,22,418/-
6.	Interest earned during 2018-19	Nil	
7.	Grand Total	Rs.3,79,736/-	Rs.3,22,418/-


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KS **Tamil Nadu Agricultural University**
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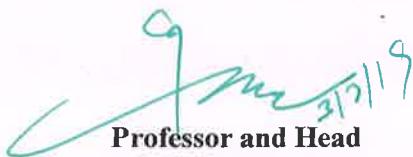
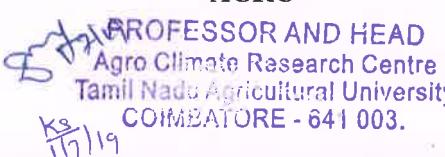
Annexure-II to Utilization Certificate

1. The utilization of fund resulted in outcomes:-

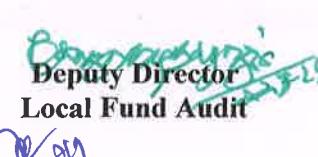
Certified that out of Rs.3,04,640/-grants-in-aid was released during the financial year 2018-2019, in favour of the Comptroller, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu under this Ministry/Department letter No. ASC/FASAL/TN-19/04/HQ-2010 dated 31.01.2019 and an amount of Rs. 75,096/-was adjusted as unspent balance amount of the previous year 2017-18. The amount of Rs. Nil was received as interest on the GIA, IMD, MoEs. The total amount Rs.3,79,736/- (Rs.3,04,640/- + Rs.75,096/-) was available for expenditure for the year 2018-19. A sum of Rs. 3,22,418/-only has been utilized during 2018-19 for the purpose of project work for which it was sanctioned and that the unspent balance amount of Rs. 57,318/-at the end of the financial year will be carry forwarded or adjusted towards the grants-in-aid payable during the next year 2019-20 by the IMD, MoES, New Delhi.

2 . Details of various schemes executed by the agency through grants-in-aid received from the same ministry or from other Ministry (if any) during the financial year 2018-19: GKMS, Coimbatore


Principal Investigator
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Ks
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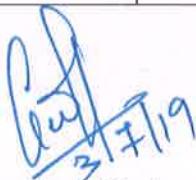
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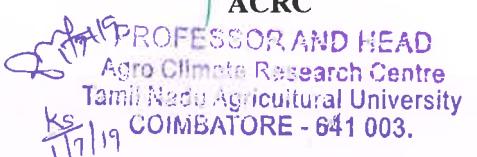
Forecasting Agricultural Output Using Space,
Agrometeorology and Land based observations
“FASAL” to AAS, Coimbatore, Tamil Nadu.
Tamil Nadu Agricultural University,
Coimbatore

Appendix(Ic)

GRANTS SANCTIONED AND EXPENDITURE MADE DURING THE YEAR
2018 -2019(FASAL to AAS unit at AMFU-Coimbatore)

Grant for the year 2018 – 19 (Rs.)		Expenditure for the year 2018 – 19 (Rs.)		Balance (Rs.)
Heads of Account	Amount allocated	Heads of Account	Amount Spent	Unspent /Overspent (-)
Manpower - SRF	3,00,000/-	Manpower - SRF	3,00,000/-	0/-
Contingency	20,000/-	Contingency	17,580/-	2,420/-
Travel	20,000/-	Travel	0	20,000/-
Institutional Charges 15%	39,736/-	Institutional Charges 15%	4,838/-	34,898/-
Sub Total	3,79,736/-	Sub Total	3,22,418/-	57,318/-
Earned by interest for 2018-19	Nil		0	Nil/-
Total	3,79,736/-	Total	3,22,418/-	57,318/-


Principal Investigator
FASAL


Professor and Head
ACRC

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Agro Climate Research Centre
Tamil Nadu Agricultural University
COIMBATORE - 641 003.
17/1/19


Director
Crop Management
DIRECTOR
Directorate of Crop Management
Tamil Nadu Agricultural University
Coimbatore - 641 003.


COMPT Auditor
Tamil Nadu Agricultural University
Coimbatore - 641 003.


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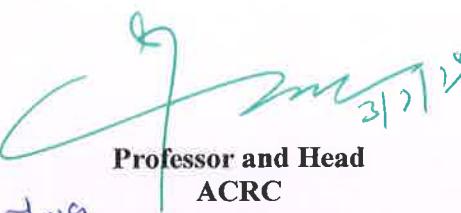
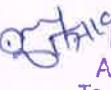
Forecasting Agricultural Output Using Space,
Agrometeorology and Land based observations
“FASAL” to AAS, Coimbatore, Tamil Nadu.
Tamil Nadu Agricultural University,
Coimbatore

Appendix(Id)

Budget requirement for the year 2019-2020

Heads	Amount (Rs.)
A. MANPOWER (SALARY)	
Senior Research Fellow	
Pay scale + Grade Pay	25000 x 12 months
Basic Pay	3,00,000
Dearness Allowance	0
House rent Allowance	0
Transport Allowance	0
City Allowance	0
Other Allowance	0
Sub Total – Man power	3,00,000
B. Contingency	30,000
C. Travel Expenses	30,000
Total (A+ B + C)	3,60,000
D. Institutional Charge @ 15%	54,000
Sub Total	4,14,000
E. Institutional charges balance of 2018-19. (Wrongly deducted Rs. 4838/- instead of Rs. 48,363/-)	43,525
Amount to be sanctioned	4,57,525
Deducting unspent balance amount of the previous year	57,318
Net amount to be released	4,00,207


Principal Investigator
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Administrative orders

2018 - 19



TAMIL NADU AGRICULTURAL UNIVERSITY

Directorate of Research
TNAU, Coimbatore.

No.DR/P7-4/ACRC,CBE/GoI-IMD(MoES)/FASAL/ASO/2019, dt.04.02.2019

PROCEEDINGS

Sub : TNAU – Research – **Administrative Sanction** – IMD funded FASAL project - Forecasting Agricultural output using Space, Agro meterology and Land based observation(FASAL) in western zone of Tamil Nadu at ACRC, Coimbatore – 2018-19 - Orders – Issued.

Ref :

1. ASO No. DR/P7-4/ACRC,CBE/GOI-IMD(MoES)/LP of AMFU for AAS (GKMS),CBE/FASAL/Ag.Met.Agron./Annual ASO Contn., PI.Locatn.change/2017 dt. 29.01.2018
2. No. ASC/FASAL/TN-19/04/HQ-2010 dt. 9.1.2019 - Budget sanction order for 2017 –18 from the O/o. DGM, IMD, New Delhi
3. Audit utilization certificate of FASAL scheme for 2017-18
4. File No. ASC/FASAL/TN-19/04/HQ-2010 dt. 7.11.17 for unspent balance difference between sponsor and 2016-17 AUC of TNAU.
5. No.P&H/ACRC/FASAL/Administrative Sanction Order/2019 dt.25.01.2019 of Prof. & Head, ACRC, TNAU, Coimbatore sent through Director, Crop Management, TNAU, Coimbatore and approved by the Vice-Chancellor, TNAU on 03.02.2019.

The following order is issued with the approval of the Vice-Chancellor, TNAU as per ref.(5) cited.

ORDER

Approval is hereby accorded for the operation of the research project funded by India Meteorological Dept. (IMD), Ministry of Earth Sciences (MoES), GoI, New Delhi entitled **“Forecasting Agricultural output using Space, Agrometeorology and Land based observations (FASAL)”** at the Agro Climate Research Centre, DCM, TNAU, Coimbatore during 2018-2019

The details of the scheme are as follows :

PROJECT NO.		:	IMD/DCM/CBE/ACR/2010/R001
HEAD OF ACCOUNT		:	E28 QK
1.	NAME & TITLE OF THE SCHEME		: Forecasting Agricultural output using Space, Agro meterology and Land based observation(FASAL)
2.	LOCATION		: Agro climatic research centre, DCM, TNAU, Coimbatore



3.	NAME OF THE SCIENTIST(S) INCHARGE	:	<p>PI: Dr. V. Geethalakshmi, Prof.(Agron.) Director, Crop Management, TNAU, Coimbatore -3</p> <p>Co-PI: Dr.Ga.Dheebakaran, Asst.Prof. (Agron.), Agro Climate Research Centre, DCM, TNAU, Coimbatore -3</p>
4.	OBJECTIVES	:	<ul style="list-style-type: none"> • To establish the relation between weather and crop growth, crop development and yield for rice, maize and groundnut. • To assess and establish the relationship between weather, field level management practices and land factors for crop yielding forecasting. • To determine genetic co-efficient for popular varieties of Rice, Maize and Groundnut for running crop simulation models for crop yield forecasting. • To issue multiple crop yield forecast for rice, maize and groundnut in western zone of Tamil Nadu at mid-season (F_2) and pre-harvest stage (F_3).
5.	TECHNICAL PROGRAMME	:	<ol style="list-style-type: none"> 1. Collection of long term district level crop yield (from DAC) and weather data (from IMD), pertaining to western zone of Tamil Nadu. 2. Computation of AgroMet indices 3. Receive training on development of crop yield forecasting models(crop growth simulation model – DSSAT software, data requirement and statistical yield forecasting model) 4. Collection of existing data on crop (including genetic coefficients), soil and management practices from thesis and experiments conducted in the past by SAUs/ICAR centers 5. Conduct field experiments at AMFU to collect detailed observations on crop growth and development (crop management phenology & growth attributes), soil, etc., for <i>Rabi</i> and <i>Kharif</i> crops and to derive genetic co-efficients of different crops and popular varieties of major crops like rice, maize and groundnut for running crop simulation models for crop yield forecasting. 6. To assess and establish relationship between weather, field level management practices and land factors for crop yield forecasting. 7. Calibration of crop simulation model to derive genetic coefficients of major cultivars for selected <i>Rabi</i> and <i>Kharif</i> crops using existing data and observation created from field experiments. 8. Validation of crop simulation models for selected cultivars and crops. 9. Develop and validate statistical model for yield forecasting at district level for selected crops. 10. Crop yield estimate at district/Agro – Climatic zone level using statistical model 11. Crop yield estimate at district/Agro – Climatic zone level using crop simulation model 12. Operational yield forecast at district/Agro – Climatic zone level combining both methods 13. Validation of operational yield forecasts using ground-truth information
6.	DURATION OF THE PROJECT	:	01.04.2018 to 31.03.2019



7.	FUNDING AGENCY	: GoI-IMD,MoES : IMD (India Meteorological Dept.), Ministry of Earth Sciences, with the funds provided by the Crop Forecast Coordination Centre-CFCC (Formerly, National Crop Forecasting Centre-NCFC) in the Directorate of Economics & Statistics, Economic Administration Division, Dept. of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, GoI, Krishi Bhawan, New Delhi.
8.	STAFF	: Senior Research Fellow – 1 No. Qualification : Post graduate in Computer Application/ Post graduate in Agricultural Meteorologywith crop weather modelling experience.
9.	BUDGET DETAILS	:
Rs. 3,79,736/- is available for the year 2018 – 2019. For the rest of the project period, the budget will be received on annual basis.		
Details of the carry over funds from the year 2017 – 2018 (Rs. 75,096/-) is presented in table 1 and the amount received for 2018 – 19 (Rs. 3,04,640/-) is given in Table 2		

Table 1 Budget and expenditure statement (E 28 QK) - 1.4.2017 to 31.3.2018 (Rs.)

S N	Details	Budget Sanctioned for 2017 -18	Expenditure upto 31.03.18	Closing Balance as on 31.3.18
1.	Man power	3,00,000/-	2,25,456/-	74,544/-
2.	Contingency	20,000/-	20,000/-	0/-
3.	Travel expenses	20,000/-	19,817/-	183/-
4.	Field experiment	50,000/-	49,880/-	120/-
5.	Institutional charges @ 15%	58,500/-	58,500/-	0/-
6.	Total	4,48,500/-	3,73,653/-	74,847/-
7.	Interest earned for 2017-18	249/-		249/-
8.	Grand Total	4,48,749/-		75,096/-

BUDGET for 2018 -2019:

SN	Particulars	Amount
1.	Man power (SRF with MCA*)	3,00,000/-
2.	Contingency	20,000/-
3.	Travel expenses	20,000/-
4.	Institutional charges @ 15%	39,736/-
Total budget sanctioned for 2018 -19		3,79,736/-
Unspent balance of 2017 - 18		-75,096/-
Balance amount received for 2018-19		3,04,640/-



10.	WHETHER FUNDS HAVE BEEN RECEIVED & FUND AVAILABILITY DETAILS	:	<ul style="list-style-type: none"> a. Unspent balance of Rs. 75,096/- from the year 2017 – 18 is available with TNAU b. Towards the payment of excess IC to TNAU, an amount of Rs. 1,14,481/- is available with TNAU* c. An amount of Rs. 3,04,640/- has been received from IMD to the Comptroller, TNAU (Ref.2) <p>*During the previous years, Institutional charges (IC) have been paid @ 15 per cent for the entire sanctioned amount, whereas the sponsor has approved IC for the actual expenses alone. As per the sponsors, an amount Rs. 1,14,481/- has been paid as excess in the head of IC to TNAU (Ref. 4)</p>
11.	INSTITUTIONAL CHARGES	:	Rs.39,736 (2018 – '19)
12.	EVALUATION PROCEDURE	:	The project will be reviewed by the Director Of Research and the Vice-Chancellor, TNAU, Coimbatore.
13.	ADMINISTRATION	:	The scheme will function under the technical and administrative control of the Professor and Head , Agro climate Research Centre, DCM, TNAU, Coimbatore and will be regularly monitored by the Director, DCM, TNAU, Coimbatore.

This ASO is issued for Administrative purpose only. Expenditure has to be made only after ascertaining the availability of funds.

Franklin 11/12/19
DIRECTOR OF RESEARCH
May 12/19

TO

The PI & Co-PIs of the project through the respective officers.

The Prof. & Head, Agro Climate Research Centre (ACRC), DCM, TNAU, Coimbatore.

CC : Director, DCM, TNAU, Coimbatore.

The Comptroller, TNAU, Coimbatore, with a request to permit the use of the same Head of account to operate the scheme by the Prof. & Head, ACRC, Coimbatore



No. ASC/FASAL/TN-19/04/HQ-2010
Govt. of India
Ministry of Earth Sciences
India Meteorological Department
Mausam Bhawan, Lodi Road,
New Delhi – 110 003

Dated: 9th January 2019

Sanction of the Director General of Meteorology is hereby accorded of ₹ 3,79,736/- and for release of ₹ 3,04,640/- (**Rupees Three Lakh Four Thousand Six Hundred Forty only**) for the project Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL) to **Agro Advisory Services at Coimbatore**, under Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu for the year 2018-19.

The break-up is given below:-

a. Manpower	₹ 3,00,000.00
b. Contingency	₹ 20,000.00
c. Travel Expenses	₹ 20,000.00
d. Field Experiment	₹ 00.00
e. Institutional charges on above @ 15%	₹ 39,736.00
Total	₹ 3,79,736.00
Unspent amount of the previous year 2017-18	₹ (-) 75,096.00
Grand Total	₹ 3,04,640.00

2. The amount of ₹ 3,04,640/- (**Rupees Three Lakh Four Thousand Six Hundred Forty only**) will be drawn by Pay & Accounts Officer, IMD, Lodi Road, New Delhi-110003 by Drawing & Disbursing Officer (DDO), Office of the Director General of Meteorology, New Delhi who has been nominated as the Drawing Officer for the purpose and paid to the **Comptroller, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu by e-payment in their SBI A/c no. 10663188052 (SBI MICR code 641002005 and IFSC code SBIN0002274)**.

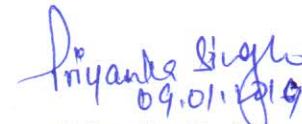
3. The funds released are subject to the condition that the accounts of the University shall be open to inspection by the sanctioning authority/audit whenever the University is called upon to do so. It may also be certified that conditions specified in GFR-2017 regarding release of funds have been satisfied. The University shall also submit Progress Report at end of the financial year along with Statement of Expenditure & Utilization Certificate.

4. The expenditure involved will be debitible under:

Grant No. 1
2401- Crop Husbandry
111-Agricultural Economics & Statistics
31- Green Revolution- Krishonatti Yojana
04- Integrated Scheme on Agriculture Census and Statistics
31.04.28- Professional Services,
15 digit code 2401.00.111.31.04.28.

5. The amount will be adjusted against the amount received by Pr. Pay and Account Office of ₹2,00,00,000/- (Two Crore only) under Sanction no. Pr.AO/Agri./BS/LOA/Grant no.1/2018-19/ 693-707 dated 07.08.2018.

6. This issues under the delegated powers in the Ministries/Department and approval of DGM, vide Dy. No. 11/DGM Secretariat/18 dated 18.12.2018 and concurrence of DDG (FINANCE), IMD, vide Dy.No.1471 dated 18.12. 2018.


Priyanka Singh
09.01.2019

(Priyanka Singh)
Scientist- 'B' (AASD)
For Director General of Meteorology

To,

The Pay & Accounts Officer,
India Meteorological Department,
New Delhi – 110 003

No.ASC/FASAL/TN-19/04/HQ-2010

Dated: 9th JANUARY, 2019.

Copy forwarded for information and necessary action to :-

1. **The Comptroller, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu**
2. Director Research, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu
3. **Nodal Officer, Agromet Advisory Unit, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu**
4. IF Division, MoES, Prithvi Bhawan, Lodi Road, New Delhi-110003.
5. Director of Audit (CW&M-II), IP Estate, AGCR Building, New Delhi-110002.
6. DDO, DGM's Office, New Delhi for drawing the amount and disbursing to the University
7. Planning Section at HQ.
8. Dr. Dalip Singh, Additional Statistical Advisor, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Krishi Bhawan, New Delhi.
9. DDGM (Agrimet), India Meteorological Department, Ganeshkhind Road, Shivaji Nagar, Pune-411005.


(S.K.SAGAR)

Meteorologist 'A' (AASD)
For Director General of Meteorology
