22. AGROMETEOROLOGY

CROP PLANNING AND MANAGEMENT

DRYLAND

1. Length of Growing Period

Length of growing period is defined as a period in which the available soil moisture is enough to meet the evapotranspiration requirement of dry land crops and hence the dry land productivity is assured. Based on scientific study (Jeevananda Reddy, 1983), length of growing period for different rain gauge stations of each district of different agroclimatic zones of Tamil Nadu have been computed. The length of growing period is given as 'G' with starting and ending of length of growing period in terms of Meteorological standard weeks. If the G is less than 5 weeks period it means that always crop failures will occur. The G period must be a minimum of 14 weeks (98 days) which permit the dry land crop to attain its potential productivity. If the growing period is 14 weeks, a single dry land crop can be cultivated. If G period is between 14 to 20 weeks, suitable inter cropping system can be recommended. If the G period is more than 20 weeks long duration crop / double crop can be organized.

The following information indicates length of growing period for different district of Tamil Nadu. Based on the G period, suitable dry land crop may be selected.

1. North Eastern Zone

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
Thiruvallur	Athipattu	34-52	19
	Ponneri	33-52	20
	Poonamallee	32-52	21
	Saidapet	32-52	21
	Tirutani	31-50	20
	Tiruvallur	31-51	21
Kanchipuram	Chengalpattu	30-52	23
	Cheyur	33-52,1	21
	Covelong	31-52	22
	Kanchipuram	29-51	23
	Madurantakam	30-52	23
	Sriperupudur	31-51	21

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Uthiramerur	30-51	22
	Vayalur	34-52	19
Vellore	Ambur	33-46	14
	Arakkonam	29-51	13
	Gudiyattam	33-47	15
	Sholingar	31-49	19
	Tiruppattur	31-45	15
	Vaniyambadi	32-45	14
	Vellore	30-50	21
	Walajapet	30-50	21
Tiruvannamalai	Arani	30-50	21
	Chengam	31-49	19
	Cheyyar	30-50	21
	Polur	30-50	21
	Tiruvannamalai	31-50	20
	Vandavasi	29-51	23
Villupuram	Gingee	30-51	22
	Tindivanam	31-52	22
	Tirukkovilur	30-50	21
	Ulundurpettai	32-51	20
	Vanur	32-52,1	22
	Villupuram	31-51	21
Cuddalore	Cuddalore	32-52,1,2	23
	Kurinjippadi	32-52,1	22
	Marakkanam	32-52	21
	Panruti	31-52	22
	Porto Novo	33-52, 1,2	22
	Srimushnam	33-52	20
	Tittagudi	31-51	21
	Vriddhachalam	31-51	21

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
Perambalur	Chettikulam	35-48	14
	Jayamkonda cholapuram	35-52	18
	Uppiliyapuram	38-48	11
Chennai	Nungambakkam	32-52	21
2. North Western Zone			
Dharmapuri	Denkanikota	32-46	15
	Dharmapuri	32-46	15
	Harur	33-47	15
	Hosur	33-45	13
	Krishnagiri	33-45	13
	Palacode	32-46	15
	Pennagaram	33-45	13
	Rayakottai	33-46	14
	Thalli	31-44	14
	Uttangarai	31-46	16
Salem	Attur	33-48	16
	Omalur	29-45	17
	Salem	27-45	19
	Sankari Durg	33-45	13
	Tammampatti	34-49	16
	Valapadi	33-46	14
Namakkal	Namakkal	33-46	14
	Paramathi	35-45	11
	Rasipuram	30-45	16
	Sendamangalam	32-45	14
Perambalur	Ariyalur	35-50	16
	Perambalur	35-50	16
3. Western Zone			
Coimbatore	Annur	38-47	10
	Avanashi	38-47	10

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Coimbatore	41-47	7
	Mettupalayam	39-50	12
	Palladam	41-47	7
	Periyanaiakampalayam	38-49	12
	Pollachi	24-31, 41-47	8, 7
	Sulur	41-46	6
	Tiruppur	38-47	10
	Udumalaipettai	41-48	8
Erode	Bhavani	34-47	14
	Dharapuram	40-47	8
	Erode	34-47	14
	Gopichettipalayam	35-47	13
	Kangayam	38-47	10
	Kodumudi	38-44	7
	Perundurai	35-47	13
	Sathyamangalam	35-47	13
Karur	Aravakkurichi	39-46	8
	Karur	39-45	7
Dindigul	Nilakottai	36-47	12
	Palani	40-49	10
Theni	Periakulam	38-49	12
	Uttamapalayam	40-48	9
Madurai	Usilampatti	36-49	14
Tiruchchirapalli	Manaparai	36-48	13
4. Cauvery Delta Zone			
Thanjavur	Atirampattinam	34-52	19
	Kattumavadi	39-51	13

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Kumbakonam	34-52	19
	Papanasam	35-52	18
	Pattukottai	35-52	18
	Thanjavur	35-51	17
	Tirukkatupalli	35-49	15
	Vallam	33-50	18
Thiruvarur	Kudavasal	35-52,1	19
	Mannargudi	34-52,1	20
	Muttupet	35-52,1,2	20
	Nannilam	35-52,1	19
	Neidavasal	35-52,1,2	20
	Nidamangalam	35-52,1	19
	Thiruvaiyaru	35-50	16
	Thiruvarur	35-52,1,2	20
	Tirutturaippundi	35-52,1,2	20
	Valangiman	35-52	18
Nagapattinam	Mayuram	35-52,1	19
	Nagapattinam	37-52,1,2	18
	Sirkazhi	34-52,1,2	21
	Tarangambadi	35-52,1,2	20
	Tiruppundi	36-52,1,2,3	20
	Vedaranyam	35-52,1,2,3	21
Tiruchchirapalli	Kulattur	36-48	13
	Kulittalai	38-47	10
	Lalgudi	38-49	12
	Manapparai	36-48	13
	Musiri	38-47	10
	Tattayyangarpettai	36-47	12
	Tiruchirapalli	36-48	13
Perambalur	Turaiyur	36-47	12
Cuddalore	Chidambaram	33-52,1,2	22

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Kattumannarkovil	33-52,1	21
Pudukkottai	Arantangi	34-50	17
5. Southern Zone			
Ramanathapuram	Kamudhi	41-47	7
	Mudukulattur	41-49	9
	Pamban	42-52,1	12
	Paramakudi	40-48	9
	Ramanathapuram	41-52	12
	Theethanatham	41-51	11
	Tiruvadanai	41-50	10
	Vattaram	41-51	11
Virudunagar	Arupukottai	39-48	10
	Sattur	41-48	8
	Sivakasi	41-48	8
	Srivilliputtur	41-49	9
	Virudunagar	38-48	11
	Watrap	39-50	12
Tuticorin	Arasadi	43-49	7
	Kayattur	41-49	9
	Kovilpatti	41-49	9
	Kulasekarapatnam	42-52	11
	Morkulam	42-51	10
	Ottappidaram	41-48	8
	Sattankulam	42-50	9
	Srivaikuntam	42-50	9
	Tiruchchendur	42-52	11
	Tuticorin	43-50	8
Tirunelveli	Ambasamudram	42-52,1	12
	Ayikudi	42-51	10
	Kadaiyam	42-52,1	12
	Kadaiyanallur	42-51	10

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Kirnurnam	43-51	9
	Nanguneri	42-51	10
	Palayamkottai	42-50	9
	Radhapuram	42-49	8
	Sankarankovil	41-49	9
	Shencottah	41-51	11
	Sivagiri	41-52	12
	Tenkasi	41-52	12
	Tirunelveli	42-51	10
Sivaganga	Manamadurai	39-48	10
	Sivaganga	35-48	14
	Tirupattur	33-48	16
Madurai	Cholavandan	36-48	13
	Madurai	34-48	15
	Melur	33-49	17
	Peraiyur	36-49	14
	Tirumangalam	34-49	16
Pudukkottai	Adanakottai	37-49	13
	Alangudi	36-50	15
	Annavasal	36-47	12
	Ilupur	36-48	13
	Karambakkudi	38-50	13
	Kilanilai	38-49	12
	Marungapuri	35-49	15
	Ponnamaravathi	34-48	15
	Pudukkottai	35-49	15
	Tirumayam	36-48	13
	Udyalipatti	37-47	11
	Viralimalai	38-48	11
Dindigul	Chattrapatti	38-50	13
	Nattham	33-49	17

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Dindigul	36-49	14
	Vedasanthur	38-48	11
Theni	Bodinayakanur	39-48	10
6. High Rainfall Zone			
Kanyakumari	Aramboli	41-49	9
	Eranial	19-29, 39-48	11, 10
	Kalial	14-50	37
	Kolachel	21-30, 40-48	10, 9
	Kottaram	42-48	7
	Kulasegraram	12-50	39
	Kuzhitturai	15-48	34
	Meycode adanadi	15-49	35
	Mulakumood	15-31, 40-49	17, 10
	Nagerkoil	20-26, 40-48	7, 9
	P.P. Channel	16-29, 40-50	14, 11
	Pechiaprai	13-50	38
	Puthendam	13-50	38
	Rajakkammangalam	19-27, 40-48	9, 9
	Seetapal	19-26, 40-48	8, 9
	Shorlakode	18-25, 36-47	8, 12
	Thadikarekonam	14-49	36
	Thamaraikulam	42-47	6
The Nilgiris	Devala	17-50	34
	Glen Morgan	16-50	35
	Gudalur	17-49	33
	Kallatty	17-51	35
	Ketty	18-52,1	36
	Kodanadu	18-52,1,2	37
	Kotagiri	14-52,1-3	40
	Kundha (Kailkund)	21-52,1	33
	Naduvattam	16-49	34

District	Station	G period (Met. Standard week)	No. of G period (No. of weeks)
	Ootacamund	16-51	36
Coimbatore	Anaimalai	32-52,1	22
Dindigul	Kodaikanal	32-52,1	22
Salem	Yercaud	34-50	17

2. Climate of Tamil Nadu

South West Monsoon Arid (MI = (-) 66.7 to (-) 100)
Coimbatore, Erode, Tiruchirapalli, Karur, Perambalur, Madurai, Theni, Dindugal, Ramanathapuram, Sivagangai,Viruudunagar, Tirunelveli, Tuticorin

Semi arid (MI = (-) 66.7 to (-) 33.3)
Kanchipuram, Thrivallur Cuddalore, Villupuram Dharmapuri, Krishnagiri Salem, Namakal Pudukottai Thanjavur ,Nagai & Thiruvarur Kanyakumari Velore, Thiruvannamalai

Humid (MI = 20 to 80)
The Nilgiris

North East Monsoon

Dry sub humid MI= (-) 33 to 0
Coimbatore, Erode, Dharmapuri, Krishnagiri. Salem, Namakal

Moist sub humid MI= 0 to 20
Triuchirapalli, Karur, Perambalur, Pudukottai, Madurai, Theni, Dindugal, Sivagangai, Vridunagar, Ramanathapuram, Kanchipuram, Thiruvallur, Vellore, Tiruvannamalai, Cuddalore,Villupuram, Thanjavur, Nagai, Thiruvarur, Kanyakumari, Thirunelveli, Tuticorin

Per humid MI=100 and above.
The Nilgiris

3. Rain fall pattern in Tamil Nadu

The rainfall pattern of Tamil Nadu based on the criteria of rainfall quantity and Seasons of precipitation is given below: (NCA, 1976)

A = > 30 cm rainfall per month
B = 30-20 cm rainfall per month
C = 20-10 cm rainfall per month
D = 10-5 cm rainfall per month

E = < 5 cm rainfall per month

Three distinct seasons have been considered

Pre monsoon season :

February to May Monsoon season :

June to September Post monsoon season :

October to January

Considering the distribution of rainfall within a season, a standard pattern is developed.

This is explained through the following example

$A_2\ B_2\ (C_1\ B_1\ A_1\ E_1)\ C_2\ D_1\ E_1$

Where in,

i) Alphabets in bracket denote rainfall in monsoon season months.

ii) Left to bracket denotes rainfall in pre-monsoon months.

iii) Right to bracket denotes rainfall in post monsoon months.

iv) Numerical suffix gives the number of months.

Rainfall pattern in Tamil Nadu

Rainfall	Taluks in which the pattern is seen
$E_4\ (E_4)\ C_2\ E_2$	Aruppukottai, Paramakudi, Muthukulathur, Thiruvadanai, Sathur, Srivilliputhur, Kovilpatti, Vilathikulam, Sankarankovil, Thoothukudi, Srivaikuntam, Udumalpet, Coimbatore, Dharapuram, Palladam, Gobichettipalayam, Bhavani, Erode, Avinashi, Uthamapalayam, Palani, Kodaikanal, Vedasandur, Dindugul, Nilakottai, Usilampatti, Thirumangalam, Periakulam, Karur
$E_4\ (E_4)\ B_1\ C_2\ E_1$	Tiruchendur, Nanguneri, Tirunelveli, Ambasamudram, Ramanathapuram $E_4\ (E_4)\ A_1\ B_2\ E_1$ Nagapattinam, Thiruthuraipoondi, Lalgudi, Musiri

E_4 (C_1 E_3) C_2 E_2	Thuraiyur, Kulithalai, Tiruchirappalli, Manapparai, Pollachi, Agastheswaram
E_4 (C_1 E_3) A_1B_1 C_1 E_1	Mayavaram, Nannilam
E_4 (C_2 E_2) C_1 E_3	Vaniyambadi, Thirupathur, Uthankarai, Thirukoilur, Kallakurichi, Perambalur, Kulathur, Alangudi, Thirumayam, Harur, Athur, Thanjavur, Aranthangi, Arakkonam, Walajapet, Cheyyar, Arani, Polur, Chengam, Thiruvannamalai,,Gudiyatham, Vellore, Thiruthani, Madurai North, Madurai South, Melur, Thirupathur, Sivaganga, Chengam, Wandavasi.
E_4 (C_2 E_2) B_1C_2 E_1	Virudhachalam, Ariyalur, Udayarpalayam, Kumbakonam, Papanasam, Mannargudi, Pattukottai, Orathanadu, Tenkasi, Shencottai, Thiruvallur, Sriperumpudur, Kanchipuram, Chengalpattu, Maduranthagam, Tindivanam, Villupuram.
E_4 (C_2 E_2) A_1 B_1 C_1 E_1	Ponneri, Saidapet, Chidambaram, Sirkazhi.
C_1 E_3	Hosur, Denkanikottai,
C_1 E_3(C_2 E_2) C_1 E_3	Omalur, Krishnagiri, Dharmapuri, Mettur, Salem, Rasipuram, Sangagiri, Thiruchengodu, Namakkal

4. Pre monsoon sowing

Based on the probability of receiving sowing rains, pre monsoon dry seeding weeks have been identified for the different districts of Tamil Nadu, which is feasible in Vertisols.

Name of the Districts	Sowing STD week	Dates
1. Coimbatore & Erode	37 to 38	Sep 10 to 23
2. Dharmapuri	38 to 39	Sep 17 to 30
3. Vellore	36 to 37	Sep 3 to 16
4. Ramanathapuram	40 to 41	Oct 1 to 14
5. Thoothukudi	39 to 40	Sep 24 to Oct 7
6. Thrinelveli	39 to 40	Sep 24 to Oct 7
7. Virudhunagar	38 to 39	Sep 17 to 30

5. Water balance study

Water balance study was conducted for Tamil Nadu based on the Water Requirement Satisfaction Index (WRSI). It is suggested that sorghum can be sown during 36th Std week against 16th Std week. The data from the Table indicate that if it is sown during 16th Std week, the crop may suffer with soil moisture stress. This result is valid for sorghum crop for Manapparai Taluk sowing by 36th standard week is recommended.

Manapparai - Sorghum crop

Manapparai (16th week sowing)			Manapparai (36th week sowing)		
STD week	**Date**	**WRSI**	**STD week**	**Date**	**WRSI**
16	April 16 - 22	100.00	36	Sep 3 - 9	100
17	April 23 - 29	100.00	37	Sep 10 - 16	100
18	April 30-May 6	97.78	38	Sep 17 - 23	100
19	May 7 - 13	95.81	39	Sep 24 - 30	100
20	May 14 - 20	92.11	40	Oct 1 - 7	100
21	May 21 - 27	87.59	41	Oct 8 - 14	100
22	May 28 -Jun 3	81.80	42	Oct 15 - 21	100
23	June 4 - 10	74.58	43	Oct 22 - 28	100
24	June 11 - 17	66.13	44	Oct 29 - Nov 4	100
25	June 18 - 24	54.06	45	Nov 5 - 11	100
26	June 25-July 1	48.29	46	Nov 12 - 18	100
27	July 2 - 8	43.93	47	Nov 19 - 25	100
28	July 9 - 15	43.93	48	Nov 26 - Dec 2	100

Simila study was undertaken for Namakkal Taluk for Groundnut sowing:

The result indicates that, rainfed groundnut sowing can be taken in the order of 28th Std week, 26th Std week, 23rd Std week.

Further studies were made from water balance for rainfed crops of Virudhunagar district and the information are presented in the Table *

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Aruppukottai	Cotton	Black	36	4	1 to 4
Virudhunagar	Rajapalayam	Cotton	Black	36	4	3 to 4
Virudhunagar	Sattur	Cotton	Black	36	4	1 to 4
Virudhunagar	Srivilliputtur	Cotton	Black	36	4	2 to 4
Virudhunagar	Tiruchuli	Cotton	Black	36	4	1 to 4
Virudhunagar	Virudhunagar	Cotton	Black	36	4	1 to 4
Virudhunagar	Aruppukottai	Cotton	Black	37	5	1 to 5
Virudhunagar	Rajapalayam	Cotton	Black	37	5	2 to 5
Virudhunagar	Sattur	Cotton	Black	37	5	1 to 5
Virudhunagar	Srivilliputtur	Cotton	Black	37	5	2 to 5
Virudhunagar	Tiruchuli	Cotton	Black	37	5	51to 5
Virudhunagar	Virudhunagar	Cotton	Black	37	5	2 to 5
Virudhunagar	Aruppukottai	Cotton	Black	38	6	1 to6
Virudhunagar	Rajapalayam	Cotton	Black	38	6	2 to 6
Virudhunagar	Sattur	Cotton	Black	38	6	1 to 6
Virudhunagar	Srivilliputtur	Cotton	Black	38	6	2 to 6
Virudhunagar	Tiruchuli	Cotton	Black	38	6	51to 6
Virudhunagar	Virudhunagar	Cotton	Black	38	6	1 to 6
Virudhunagar	Aruppukottai	Cotton	Black	39	7	1 to 7
Virudhunagar	Rajapalayam	Cotton	Black	39	7	2 to 7
Virudhunagar	Sattur	Cotton	Black	39	7	1 to 7
Virudhunagar	Srivilliputtur	Cotton	Black	39	7	2 to 7
Virudhunagar	Tiruchuli	Cotton	Black	39	7	1 to 7
Virudhunagar	Virudhunagar	Cotton	Black	39	7	1 to 7
Virudhunagar	Aruppukottai	Cotton	Red	36	4	49 to 4
Virudhunagar	Rajapalayam	Cotton	Red	36	4	51 to 4
Virudhunagar	Sattur	Cotton	Red	36	4	52 to 4
Virudhunagar	Srivilliputtur	Cotton	Red	36	4	50 to 4
Virudhunagar	Tiruchuli	Cotton	Red	36	4	49 to 4
Virudhunagar	Virudhunagar	Cotton	Red	36	4	51 to 4
Virudhunagar	Aruppukottai	Cotton	Red	37	5	50 to 5
Virudhunagar	Rajapalayam	Cotton	Red	37	5	51 to 5

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Sattur	Cotton	Red	37	5	50 to 5
Virudhunagar	Srivilliputtur	Cotton	Red	37	5	50 to 5
Virudhunagar	Tiruchuli	Cotton	Red	37	5	49 to 5
Virudhunagar	Virudhunagar	Cotton	Red	37	5	51 to 5
Virudhunagar	Aruppukottai	Cotton	Red	38	6	50 to 6
Virudhunagar	Rajapalayam	Cotton	Red	38	6	51 to 6
Virudhunagar	Sattur	Cotton	Red	38	6	50 to 6
Virudhunagar	Srivilliputtur	Cotton	Red	38	6	51 to 6
Virudhunagar	Tiruchuli	Cotton	Red	38	6	49 to 6
Virudhunagar	Virudhunagar	Cotton	Red	38	6	50 to 6
Virudhunagar	Aruppukottai	Cotton	Red	39	7	51 to 7
Virudhunagar	Rajapalayam	Cotton	Red	39	7	51 to 7
Virudhunagar	Sattur	Cotton	Red	39	7	51 to 7
Virudhunagar	Srivilliputtur	Cotton	Red	39	7	51 to 7
Virudhunagar	Tiruchuli	Cotton	Red	39	7	50 to 7
Virudhunagar	Virudhunagar	Cotton	Red	39	7	50 to 7
Virudhunagar	Aruppukottai	Pulses	Black	36	48	-
Virudhunagar	Rajapalayam	Pulses	Black	36	48	-
Virudhunagar	Sattur	Pulses	Black	36	48	-
Virudhunagar	Srivilliputtur	Pulses	Black	36	48	-
Virudhunagar	Tiruchuli	Pulses	Black	36	48	-
Virudhunagar	Virudhunagar	Pulses	Black	36	48	-
Virudhunagar	Aruppukottai	Pulses	Black	37	49	-
Virudhunagar	Rajapalayam	Pulses	Black	37	49	-
Virudhunagar	Sattur	Pulses	Black	37	49	-
Virudhunagar	Srivilliputtur	Pulses	Black	37	49	-
Virudhunagar	Tiruchuli	Pulses	Black	37	49	-
Virudhunagar	Virudhunagar	Pulses	Black	37	49	-
Virudhunagar	Aruppukottai	Pulses	Black	38	50	-
Virudhunagar	Rajapalayam	Pulses	Black	38	50	-
Virudhunagar	Sattur	Pulses	Black	38	50	-
Virudhunagar	Srivilliputtur	Pulses	Black	38	50	-
Virudhunagar	Tiruchuli	Pulses	Black	38	50	-

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Virudhunagar	Pulses	Black	38	50	-
Virudhunagar	Aruppukottai	Pulses	Black	39	51	-
Virudhunagar	Rajapalayam	Pulses	Black	39	51	-
Virudhunagar	Sattur	Pulses	Black	39	51	-
Virudhunagar	Srivilliputtur	Pulses	Black	39	51	-
Virudhunagar	Tiruchuli	Pulses	Black	39	51	-
Virudhunagar	Virudhunagar	Pulses	Black	39	51	-
Virudhunagar	Aruppukottai	Pulses	Red	36	48	-
Virudhunagar	Rajapalayam	Pulses	Red	36	48	-
Virudhunagar	Sattur	Pulses	Red	36	48	-
Virudhunagar	Srivilliputtur	Pulses	Red	36	48	-
Virudhunagar	Tiruchuli	Pulses	Red	36	48	-
Virudhunagar	Virudhunagar	Pulses	Red	36	48	-
Virudhunagar	Aruppukottai	Pulses	Red	37	49	-
Virudhunagar	Rajapalayam	Pulses	Red	37	49	-
Virudhunagar	Sattur	Pulses	Red	37	49	-
Virudhunagar	Srivilliputtur	Pulses	Red	37	49	-
Virudhunagar	Tiruchuli	Pulses	Red	37	49	-
Virudhunagar	Virudhunagar	Pulses	Red	37	49	-
Virudhunagar	Aruppukottai	Pulses	Red	39	51	-
Virudhunagar	Rajapalayam	Pulses	Red	39	51	-
Virudhunagar	Sattur	Pulses	Red	39	51	-
Virudhunagar	Srivilliputtur	Pulses	Red	39	51	-
Virudhunagar	Tiruchuli	Pulses	Red	39	51	-
Virudhunagar	Virudhunagar	Pulses	Red	39	51	-
Virudhunagar	Aruppukottai	Redgram	Black	36	01	-
Virudhunagar	Rajapalayam	Redgram	Black	36	01	-
Virudhunagar	Sattur	Redgram	Black	36	01	-
Virudhunagar	Srivilliputtur	Redgram	Black	36	01	-
Virudhunagar	Tiruchuli	Redgram	Black	36	01	-
Virudhunagar	Virudhunagar	Redgram	Black	36	01	-
Virudhunagar	Aruppukottai	Redgram	Black	37	02	-
Virudhunagar	Rajapalayam	Redgram	Black	37	02	-

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Sattur	Redgram	Black	37	02	-
Virudhunagar	Srivilliputtur	Redgram	Black	37	02	-
Virudhunagar	Tiruchuli	Redgram	Black	37	02	-
Virudhunagar	Virudhunagar	Redgram	Black	37	02	-
Virudhunagar	Aruppukottai	Redgram	Black	38	03	-
Virudhunagar	Rajapalayam	Redgram	Black	38	03	-
Virudhunagar	Sattur	Redgram	Black	38	03	03
Virudhunagar	Srivilliputtur	Redgram	Black	38	03	-
Virudhunagar	Tiruchuli	Redgram	Black	38	03	-
Virudhunagar	Virudhunagar	Redgram	Black	38	03	-
Virudhunagar	Aruppukottai	Redgram	Red	36	01	-
Virudhunagar	Rajapalayam	Redgram	Red	36	01	-
Virudhunagar	Sattur	Redgram	Red	36	01	-
Virudhunagar	Srivilliputtur	Redgram	Red	36	01	-
Virudhunagar	Tiruchuli	Redgram	Red	36	01	-
Virudhunagar	Virudhunagar	Redgram	Red	36	01	-
Virudhunagar	Aruppukottai	Redgram	Red	37	02	-
Virudhunagar	Rajapalayam	Redgram	Red	37	02	-
Virudhunagar	Sattur	Redgram	Red	37	02	02
Virudhunagar	Srivilliputtur	Redgram	Red	37	02	-
Virudhunagar	Tiruchuli	Redgram	Red	37	02	02
Virudhunagar	Virudhunagar	Redgram	Red	37	02	01 to 02
Virudhunagar	Aruppukottai	Redgram	Red	38	03	02 to 03
Virudhunagar	Rajapalayam	Redgram	Red	38	03	03
Virudhunagar	Sattur	Redgram	Red	38	03	01 to 03
Virudhunagar	Srivilliputtur	Redgram	Red	38	03	03
Virudhunagar	Tiruchuli	Redgram	Red	38	03	01 to 03
Virudhunagar	Virudhunagar	Redgram	Red	38	03	01 to 03
Virudhunagar	Aruppukottai	Sorghum	Black	36	52	48 to 52
Virudhunagar	Rajapalayam	Sorghum	Black	36	52	-
Virudhunagar	Sattur	Sorghum	Black	36	52	49 to 52
Virudhunagar	Srivilliputtur	Sorghum	Black	36	52	-
Virudhunagar	Tiruchuli	Sorghum	Black	36	52	48 to 52

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Virudhunagar	Sorghum	Black	36	52	49 to 52
Virudhunagar	Aruppukottai	Sorghum	Black	37	01	49 to 01
Virudhunagar	Rajapalayam	Sorghum	Black	37	01	-
Virudhunagar	Sattur	Sorghum	Black	37	01	50 to 01
Virudhunagar	Srivilliputtur	Sorghum	Black	37	01	-
Virudhunagar	Tiruchuli	Sorghum	Black	37	01	49 to 01
Virudhunagar	Virudhunagar	Sorghum	Black	37	01	50 to 01
Virudhunagar	Aruppukottai	Sorghum	Black	38	02	50 to 02
Virudhunagar	Rajapalayam	Sorghum	Black	38	02	-
Virudhunagar	Sattur	Sorghum	Black	38	02	51 to 02
Virudhunagar	Srivilliputtur	Sorghum	Black	38	02	02
Virudhunagar	Tiruchuli	Sorghum	Black	38	02	49 to 02
Virudhunagar	Virudhunagar	Sorghum	Black	38	02	51 to 02
Virudhunagar	Aruppukottai	Sorghum	Black	39	03	52 to 03
Virudhunagar	Rajapalayam	Sorghum	Black	39	03	01 to 03
Virudhunagar	Sattur	Sorghum	Black	39	03	51 to 03
Virudhunagar	Srivilliputtur	Sorghum	Black	39	03	02 to 03
Virudhunagar	Tiruchuli	Sorghum	Black	39	03	50 to 03
Virudhunagar	Virudhunagar	Sorghum	Black	39	03	51 to 03
Virudhunagar	Aruppukottai	Sorghum	Red	36	52	48 to 52
Virudhunagar	Rajapalayam	Sorghum	Red	36	52	-
Virudhunagar	Sattur	Sorghum	Red	36	52	49 to 52
Virudhunagar	Srivilliputtur	Sorghum	Red	36	52	-
Virudhunagar	Tiruchuli	Sorghum	Red	36	52	48 to 52
Virudhunagar	Virudhunagar	Sorghum	Red	36	52	49 to 52
Virudhunagar	Aruppukottai	Sorghum	Red	37	01	49 to 01
Virudhunagar	Rajapalayam	Sorghum	Red	37	01	51 to 01
Virudhunagar	Sattur	Sorghum	Red	37	01	50 to 01
Virudhunagar	Srivilliputtur	Sorghum	Red	37	01	52 to 01
Virudhunagar	Tiruchuli	Sorghum	Red	37	01	49 to 01
Virudhunagar	Virudhunagar	Sorghum	Red	37	01	49 to 01
Virudhunagar	Aruppukottai	Sorghum	Red	38	02	49 to 02
Virudhunagar	Rajapalayam	Sorghum	Red	38	02	51 to 02

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Sattur	Sorghum	Red	38	02	50 to 02
Virudhunagar	Srivilliputtur	Sorghum	Red	38	02	51 to 02
Virudhunagar	Tiruchuli	Sorghum	Red	38	02	49 to 02
Virudhunagar	Virudhunagar	Sorghum	Red	38	02	49 to02
Virudhunagar	Aruppukottai	Sorghum	Red	39	03	50 to 03
Virudhunagar	Rajapalayam	Sorghum	Red	39	03	51 to 03
Virudhunagar	Sattur	Sorghum	Red	39	03	50 to 03
Virudhunagar	Srivilliputtur	Sorghum	Red	39	03	51 to 03
Virudhunagar	Tiruchuli	Sorghum	Red	39	03	49 to 03
Virudhunagar	Virudhunagar	Sorghum	Red	39	03	49 to 03
Virudhunagar	Aruppukottai	Sunflower	Black	43	03	-
Virudhunagar	Rajapalayam	Sunflower	Black	43	03	-
Virudhunagar	Sattur	Sunflower	Black	43	03	02 to 03
Virudhunagar	Srivilliputtur	Sunflower	Black	43	03	-
Virudhunagar	Tiruchuli	Sunflower	Black	43	03	02 to 03
Virudhunagar	Virudhunagar	Sunflower	Black	43	03	02 to 03
Virudhunagar	Aruppukottai	Sunflower	Black	44	04	02 to 04
Virudhunagar	Rajapalayam	Sunflower	Black	44	04	04
Virudhunagar	Sattur	Sunflower	Black	44	04	02 to 04
Virudhunagar	Srivilliputtur	Sunflower	Black	44	04	04
Virudhunagar	Tiruchuli	Sunflower	Black	44	04	01 to 04
Virudhunagar	Virudhunagar	Sunflower	Black	44	04	02 to 04
Virudhunagar	Aruppukottai	Sunflower	Red	43	03	52 to 03
Virudhunagar	Rajapalayam	Sunflower	Red	43	03	01 to 03
Virudhunagar	Sattur	Sunflower	Red	43	03	52 to 03
Virudhunagar	Srivilliputtur	Sunflower	Red	43	03	01 to 03
Virudhunagar	Tiruchuli	Sunflower	Red	43	03	51 to 03
Virudhunagar	Virudhunagar	Sunflower	Red	43	03	52 to 03
Virudhunagar	Aruppukottai	Sunflower	Red	44	04	01 to 04
Virudhunagar	Rajapalayam	Sunflower	Red	44	04	01 to 04

District	Location	Crop	Soil	Sowing week (MSW)	Final harvest (MSW)	Moisture stress period(MSW)
Virudhunagar	Sattur	Sunflower	Red	44	04	52 to 04
Virudhunagar	Srivilliputtur	Sunflower	Red	44	04	01 to 04
Virudhunagar	Tiruchuli	Sunflower	Red	44	04	51 to 04
Virudhunagar	Virudhunagar	Sunflower	Red	44	04	52 to 04
Virudhunagar	Aruppukottai	Groundnut	Red	26	41	33 to 41
Virudhunagar	Rajapalayam	Groundnut	Red	26	41	31 to 41
Virudhunagar	Sattur	Groundnut	Red	26	41	30 to 41
Virudhunagar	Srivilliputtur	Groundnut	Red	26	41	29 to 41
Virudhunagar	Tiruchuli	Groundnut	Red	26	41	32 to 41
Virudhunagar	Virudhunagar	Groundnut	Red	26	41	30 to 41
Virudhunagar	Aruppukottai	Groundnut	Red	27	42	33 to 42
Virudhunagar	Rajapalayam	Groundnut	Red	27	42	31 to 42
Virudhunagar	Sattur	Groundnut	Red	27	42	31 to 42
Virudhunagar	Srivilliputtur	Groundnut	Red	27	42	31 to 42
Virudhunagar	Tiruchuli	Groundnut	Red	27	42	32 to 42
Virudhunagar	Virudhunagar	Groundnut	Red	27	42	32 to 42
Virudhunagar	Aruppukottai	Groundnut	Red	28	43	33 to 43
Virudhunagar	Rajapalayam	Groundnut	Red	28	43	31 to 43
Virudhunagar	Sattur	Groundnut	Red	28	43	32 to 43
Virudhunagar	Srivilliputtur	Groundnut	Red	28	43	32 to 43
Virudhunagar	Tiruchuli	Groundnut	Red	28	43	33 to 43
Virudhunagar	Virudhunagar	Groundnut	Red	28	43	33 to 43

* Note: During moisture stress period suitable agro- techniques may be adopted. If moisture stress period is long concerned sowing week may not be viable.

6. Weather Based Management Technologies

i) Nutrient management for *thaladi* season rice

Application of 200:75:75kg NPK/ha for November 15th transplanted crop (Co45 or Co43) under split application of N at 40, 20, 20 and 20% respectively during basal, active tillering, panicle initiation and flowering while 75 percent P and K as basal and 12.5 percent P and K as foliar spray twice at panicle initiation and flowering stages.

ii) Acceptable *insitu* moisture conservation practice for rainfed groundnut – sunflower and maize

During South West monsoon season groundnut sowing along the contour and ridging to be done three weeks after sowing. During NEM, especially for sunflower, the same technology of contour sowing followed by ridging three weeks latter can be adopted. In respect of maize, sowing and tieing alternate furrows with mulching of locally available material can be practiced.

iii) Sustainable dryland management for hybrid maize (UMH 28)

Sowing of dry land hybrid maize at 38th meteorological standard week (17th – 23 Sept.) with modified crop production recommendation based on medium range weather forecast is suggested.

iv) Time of sowing and nutrient level for sorghum under different rainfall situations in dryland (black soil) of western agro climate zone of Tamil Nadu

Sowing of sorghum variety CSV15 before the receipt of monsoon rainfall (Premonsoon sowing) is recommended with 60:30:0 kg NPK / ha during above average rainfall year and 40:20:0 Kg NPK / ha during below average rainfall year. The result is applicable when seasonal climate forecast information is available in advance.

v) Technical feasibility of introducing new irrigated cropping system of Greengram – Maize – Sunflower against the outdated cropping system of Cotton – Sorghum – Finger millet of western agro climatic zone of Tamil Nadu

Sowing of crops at normal sowing of concerned crops viz.; 33 Meteorological Standard Week (MSW) for (Aug 13-19) greengram, 48th MSW (Nov 26-Dec2) for maize and 15th MSW (April 9-15) for sunflower with 100 percent inorganic source of recommended nutrients for green gram (12.5:50:0 kg NPK / ha) and sunflower (40:20:20 kg NPK/ ha) and 25% organic N alone and 75 percent inorganic source of nutrient recommended to maize (135:62.5: 50 kg NPK/ ha) for the new tailored cropping system of Greengram –Maize – Sunflower.

vi) Potential season and sowing window for CoH3 Hybrid Maize under irrigated condition

Sowing of irrigated Maize hybrid CoH3 in the second fortnight of August during *Kharif* season with integrated application of both organics and inorganic at 50:50 either as blanket (135:625:50 kg NPK/ha) or as soil test based recommendation.

vii) Potential transplanting window for hybrid rice

Planting hybrid rice CORH2 either on 26th September or at 3rd October as compared to planting in normal date of planting of 19th September which is recommended for planting rice variety especially for the variety ADT39.

viii) Polyethylene film mulch for irrigated groundnut

Spreading of seven micron thickness black polyethylene film as mulch to irrigated groundnut along with pre-plant incorporation of fluchloralin @ 1.0 kg ai/ha under flat bed system.

ix) Forewarning disease incidence in groundnut

Forewarning model was developed against late leaf spot and rust diseases in groundnut. The model was validated and the deviation is around 10 percent. The model was developed for both for Aliyarnagar (mountain climate) and Vridhachalam (Marine climate) domain.

7. Basic information

i. Crop – weather studies

Rice grain yield of *Kuruvai* and *Thaladi* seasons over 30 years (1961 – 1990) were correlated with concerned weather data. Reproductive stage was very critical to prevalence weather parameters both for *Kuruvai* and *Thaladi* seasons. In addition maturity stage of *Kuruvai* and Vegetative stage of *thaladi* season were also critical to weather.

During *Thaladi* season, correlation study indicated the positive relationship for maximum temperature at vegetative and reproductive stages.

ii. Management response to seasonal climate forecast in cropping system

Two locations viz. Avinashi and Thiruchengodu were considered for the study. Model to simulate the yield of crops (Groundnut, Cotton) was done.

The chance of achieving (65%) at least 1000 kg/ha of peanut occur, when the Southern Oscillation Index (SOI) phase is positive for April / May. Conversely there is only 32% chance of achieving such a yield in years when the SOI is falling. Similar analysis was conducted for cotton and economic performance of both systems was compared on gross margin basis. Results indicate that in positive SOI years, peanuts out performed in cotton in 70 percent of years, but income difference can still range from Rs.(-)15,000 to (+) 15,000 / ha. However under falling SOI conditions peanut only had minor advantage in 40% of years (up to Rs.3,800/ ha).

iii. Seasonal rainfall Vs El-Nino

Analyses of long term average of Southwest monsoon rainfall during El-Nino years revealed that during El-Nino years, the amount of rainfall found decreased in all the locations of Tamil Nadu as compared to normal rainfall of this season, except North eastern parts of Tamil Nadu. Analyses of long term North east monsoon rainfall indicate that during El-Nino years there was increase in amount of rainfall than normal in all the locations of Tamil Nadu.

iv. Tamil years Vs annual rainfall forecast

The annual rainfall of a particular Tamil year in a cycle of 60 years was not the same for the corresponding Tamil years on the forth coming cycle and one can expect an opposite event.

v. Stars Vs Seasonal rainfall forecast

The star Revathi had greater influence on rainfall during hot weather period (March- May) while during Southwest monsoon (June – Sept) and Northeast monsoon seasons (Oct – Dec), stars Maham and Uthiram respectively did influence seasonal rainfall.

In the monthly analysis at 30% probability, the star Uthiram had influenced in getting rainfall of > 20mm during July and November months. While during other months the stars viz. Maham, Pooradam, Kettai, Swathi and Moolam showed their influence to get < 20mm of rainfall.

vi. Pest and weather relationship study in cotton

When maximum and minimum temperature got increased, the infestation from American bollworm also got decreased. In contrast, positive relationship existed for pink bollworm for the above weather parameters. In the case of aphid, maximum temperature, diurnal variation, Relative Temperature Disparity, bright sunshine hours, and wind speed, had negative relationship, while positive correlation was observed for minimum temperature.

vii. Study on the weather relationship of *eriophyid* mite in coconut

The maximum temperature had negative correlation with nuts affected in all the varieties (Tall (east coast), Dwarf (yellow), Tall X Dwarf, Orange, and Dwarf X Tall) at three months after spathe emergence; where as positive correlation was obtained for maximum temperature one to two months before spathe emergence in respect of Tall (east coast) and Dwarf x Tall varieties. In general *eriophyid* mite affected nuts were either positively and negatively influenced by minimum temperature and relative humidity respectively (0722 IST and 1422 IST). From the stepwise regression analysis made, one to two months earlier or one to two months after spathe emergence, wind speed had higher influence on the nuts affected with mite irrespective of varieties except Tall x Dwarf .

viii. Probing the association of lunar phases "*Thithies*" with rainfall at Coimbatore

Based on the interaction between earth and moon in relation to sun, each month is governed by both new moon and full moon. In between these two, there are fourteen *thithies* covering the 14 days interval. A study was undertaken to find out the association between rainfall and the different *thithies*. Results revealed that the first eight *thithies* succeeding new moon, and eight *thithies* preceding the new moon did relate to annual rainfall events. Higher rainfall occurred normally during the eight *thithies* preceding the new moon as compared to *thithies* succeeding the new moon. Almost similar results could be noticed for both Southwest and Northeast monsoon seasons. Analysis also indicated that towards full moon phase, the *thithi* Shasthi (sixth phase) is associated with high rainfall while such effect was noticed at Ekadasi (eleventh phase) *thithi* towards new moon. High intensity events occurred frequently during new moon phase as compared to full moon phase.

8. Medium range weather forecast

In Tamil Nadu, about 55.4 per cent of the arable land depends entirely on rainfall for its crop productions. Since rainfall varies in space and time, there is risk in farming for dry land crop production. Proper understanding of the climate and issuing weather forecast based on the dynamic nature of atmosphere would help in multiple ways. Four different weather forecasts are presently made. They are now casting, short range, medium range and long range.

Among the forecasts, the weather forecast given under medium range seems to serve the purpose of the farmers, since it provides enough time to the farmers to change the agricultural operations based on anticipated weather change under dry land environment.

In this context, a project on the establishment of National Centre for Medium Range Weather Forecast (NCMRWF) and Development of Agro-meteorological

service was approved by the Government of India and implemented by the Department of Science and Technology (DST) in mission mode. Currently local weather forecast based on Direct Model output of General Circulation Model (GCM) is prepared by NCMRWF and given to Agromet Advisory Service units located at different State Agricultural Universities (SAU) including seven in Tamil Nadu, four under TNAU (Coimbatore, Pechiparai, Kovilpatti and Aduthurai) and two under Tamil Nadu Veterinary and Animal Sciences University (Chennai and Namakkal) and one at Kannivadi (MSSRF). In turn the SAU prepares weather based agro advisory bulletin and communicate to the farmers for making decisions on agricultural activities based on anticipated weather change. The forecast covers, cloud cover, rainfall, wind speed, wind direction, maximum temperature, and minimum temperature. This forecast is given for four days from Tuesday to Friday and again from Friday to Monday and thus it covers a whole week.

Presently TNAU installs Automatic Weather Station at block level and once completed, block level weather forecast with agro advisories will be given.

9. Seasonal climate forecast

Seasonal climate forecast is being given to all districts of Tamil Nadu through TNAU Research Stations both for South-west and North-east monsoon seasons with a lead time of 15 days. This forecast contains the seasonal rainfall both in temporal and spatial dimensions. This forecast is based on probability analysis made through Australian Rainman Software. The inputs are location specific past rainfall data more than twenty one years and real time southern oscillation index and sea surface temperature. This type of forecast is being given from 1999 onwards and presently institutionalized by the TNAU. Based on the verification of the forecast, the accuracy goes up to 70 per cent. Since the forecast is given with a lead time the information is highly useful for farm planning and hence it becomes response farming in nature.

10. Climate change and crop production

a) Model result on Temperature and Rainfall

The results of the projected climate change over Cauvery basin of Tamil Nadu for A1B scenario using PRECIS and RegCM3 regional climate models showed an increasing trend for maximum temperature, minimum temperature and rainfall. Decadal means of maximum and minimum temperatures were generated to understand the variation more clearly and the results revealed that the increase in maximum temperature in PRECIS was 3.7^{o}C and in RegCM3, it was 3.1^{o}C. The increase in minimum temperature in PRECIS model was 4.2^{o}C and in RegCM3, it was 3.7^{o}C during the same period. The increase in minimum temperatures is higher than maximum temperatures in both models.

b) Model result on rice productivity

The study on the yield of ADT 43 rice over Cauvery Delta Zone as simulated by Decision support System for Agricultural technology Transfer (DSSAT) under CO2 fertilization, the result had shown that a reduction of 135 Kg ha^{-1} $decade^{-1}$ for PRECIS (Providing Regional Climates for Impact

Studies) model, while there was an increase in yield of24 Kg ha^{-1} $decade^{-1}$ for RegCM3 (Regional Climate Model System 3) model, thus indicating the possibility of change in rice yield under climate change scenario.

c) Impact of Climate change on crops

Analysis on the maize crop yield indicated reduction in yield by 3.0, 9.3 and 18.3 per cent respectively during 2020, 2050 and 2080 from the current yield levels in the major maize growing districts of Tamil Nadu with increase in minimum temperature. Sorghum crop yield is expected to decline by 4.5, 11.2 and 18.7 per cent during 2020, 2050 and 2080 from the current yield levels if no management intervention is made in the major sorghum growing districts of Tamil Nadu. This is due to nighttime temperature increase.

d) Adaptation strategies developed under ClimaRice project for sustaining rice productivity in Cauvery Delta Zone (CDZ) against climate change

- Introduction of System of Rice Intensification (SRI) under non-rainy season
- Introduction of temperature tolerant rice varieties
- Seed treatment with bio-fertilizer (Azospirillum), application of blue green alage (BGA) and growing azolla as dual crop in rice. This reduces methane emission from the rice field

Table of Meteorological Standard Week

Std. Week. No.	Month	Dates	Std. Week. No.	Month	Dates
1	January	1-7	27	July	2-8
2		8-14	28		9-15
3		15-21	29		16-22
4		22-28	30		23-29
5		29-4	31		30-5
6	February	5-11	32	August	6-12
7		12-18	33		13-19
8		19-25	34		20-26

Std. Week. No.	Month	Dates	Std. Week. No.	Month	Dates
9		26-4*	35		27-2
10	March	5-11	36	September	3-9
11		12-18	37		10-16
12		19-25	38		17-23
13		26-1	39		24-30
14	April	2-8	40	October	1-7
15		9-15	41		8-14
16		16-22	42		15-21
17		23-29	43		22-28
18		30-6	44		29-4
19	May	7-13	45	November	5-11
20		14-20	46		12-18
21		21-27	47		19-25
22		28-3	48		26-2
23	June	4-10	49	December	3-9
24		11-17	50		10-16
25		18-24	51		17-23
26		25-1	52		24-31**