

# WATER AVAILABILITY CALENDAR AND CROP MANAGEMENT OF THE PENNAR RIVER BASIN

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## **Abstract**

*The water availability days and calendar of the Pennar river basin has been worked out for 55 stations taking mean monthly potential evapotranspiration and mean monthly Actual Evapotranspiration (AE). From the analysis it is found that there are four periods in a calendar year, they are humid period, wet period, moderately dry period and dry period. The humid period is noticed in the months of September and October. The wet period is found in October, November and December. The moderately dry period is found in January, February, July and August months. And dry period is found in March, April, May and June months. Based on the water availability days and calendar crop management of the Pennar river basin is suggested region wise.*

**Keywords:** *Potential Evapotranspiration (PE), Actual Evapotranspiration (AE), water deficit, water surplus, moisture adequacy, Aridity Index and Moisture Index.*

## **Introduction**

Hydro-geomorphologically the Pennar basin is divided into excellent groundwater potential in fluvial plains and delta plains, very good ground water potential in valley fills and bajadas, good groundwater potential in wash plains, colluvial valley fills, structural valleys and fluvial terraced plains, very fair ground water potential in deeply weathered pediplains, black soils plains and piedmont plains, fair groundwater potential in shallow and moderately weathered pediplains and poor ground water potential in pediment inselberg complex. Water balance, is an applied climatology deals with water input and water loss in the form of evaporation and evapotranspiration. The major input is precipitation. Based on water input and water loss, the water surplus and water deficit zones can be identified. Water availability days and calendar studies are important to identify and suggest appropriate cropping pattern in the water deficit and water surplus zones. The study on water availability days and calendar carried out by Subramanyam.V.P. (1982) Sambasiva Rao (1997) has studied the eco-climatology water balance and availability days and calendar of Nallamalai and Erramalai hills,

## **Study area**

The Pennar River basin covers an area about 55,213km<sup>2</sup> and lies in between 10<sup>o</sup> and 16<sup>o</sup> North latitude and 77<sup>o</sup> and 81<sup>o</sup> East longitude. The river originates in northern part of Karnataka state in Nandi hills and passes through the Anantapuramu and Cuddapah districts of Rayalaseema region and empties into Bay of Bengal, 30km ENE of Nellore after passing through the Pennar delta of Nellore district. The average annual rainfall of the Pennar basin is 732.11mm. The average minimum temperature is about 18<sup>o</sup>C and the average maximum temperature is about 42<sup>o</sup>C. The basin enjoys semiarid, dry sub-humid and wet sub-humid types of climate.

## Objectives

The main objectives are: to study the water availability days of the Pennar river basin, to bring out the water availability calendar of the Pennar river basin and to describe the crop management of the Pennar river basin.

## Methodology

The water availability days and calendar has been prepared for 55 stations of the Pennar river basin. The water balance elements of the basin has been worked out for 55 stations taking mean monthly precipitation and mean monthly temperature over a period of 100 years adopting Thornthwaite and Mather (1955) method. The monthly water balance elements namely potential evapotranspiration (PE), actual evapotranspiration (AE), water deficit, water surplus, moisture adequacy, Aridity Index and Moisture Index are worked out for 55 stations of the Pennar river basin.

## Water availability days in the pennar basin

The water availability days during different periods have been worked out for 55 stations taking monthly actual evapotranspiration (AE) and potential evapotranspiration (PE) values. If the values of AE and PE values are equal, the period is considered to be humid, if the values of AE are  $\frac{1}{2}$  or more than  $\frac{1}{2}$  of the PE values the period is wet, if the values of AE are  $\frac{1}{4}$  or more than  $\frac{1}{4}$  but less than  $\frac{1}{2}$  of the PE values the period is considered to be moderately dry and if the values of AE are  $\frac{1}{8}$ <sup>th</sup> or more than  $\frac{1}{8}$ <sup>th</sup> of PE values but less than  $\frac{1}{4}$ <sup>th</sup> of the PE values the period is considered to be dry.

### Humid period

During humid period the number of days varies from 0 in Badvel station to a maximum of 184 days in Srisailam station. In about eight stations the numbers of days in humid period are more than 100 days. (Table-1). During the humid period in about 30 stations the number of days ranges from 61 to 92 days in 13 stations. The number of days varies from 30 to 60 and in four stations. In Banaganapalli, Bagepalli, Bangarupalem, Chick Ballapur, Punganur, GundlaBramheswaram, GowriBindanuru, PeddaAhobilam and Srisailam stations the number of days in humid period exceeds 100 days. In Badvel, Atmakur (ATP), Kunderu and Yadiki stations there is no humid period. In the western and southern stations the days vary from 32 to 60. In eastern and northeastern stations the days vary from 61 to 92 and in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballapur stations the days exceed 92 and vary from 122 to 153 days.

### Wet period

During wet period the number of water availability days varies from 61 in Dharmavaram to a maximum of 215 days in Badvel station. In about 18 stations the days are less than 94. In 19 stations the water availability days vary from 95 to 124. In 14 stations they range from 125 to 155 days and in 4 stations they exceed 156 days. In the western stations the water availability days are less than 94 days. In central and eastern stations they vary from 95 to 124 days. In few central and eastern stations, they range from 125 to 155 days and in Nandikotkur, Rajampet, Krishna Patnam and Badvel stations the water availability days range from 182 to 214.

### Moderately dry period

During the moderately dry period the number of water availability days vary from 31 in Rajampet to 212 days in Madakasira and Uravakonda stations. In ten stations the number of days in moderately dry period is less than 62 days. In about 12 stations they vary from 62 to 92 days. In 9 stations they vary from 93 to 122 days and in 24 stations they exceed 122 days. In a few central and southern stations the moderately dry period ranges from 62 to 92 days. In a few stations in the northern and central parts of the basin the number of days varies from 93 to 122 days. In the western, southern, eastern and northwestern stations the moderately dry period exceeds 122 days.

### Dry period

During dry period the number of days varies from 0 to 154 days. The days are nil in Guduru, GundlaBramheswaram, Kavali, Madakasira, Madanapalli, Nellore, PeddaAhobilam, Rapur, Udayagiri, GowriBindanuru, Chick Ballapur, Bagepalli, Bangarupalem, Isakapalli, Kalahasti, Krishna Patnam, Pathikonda, Rapur and Srisaillam stations. The maximum of 154 days are found in Kunderu station. In about 24 stations the dry period varies from 0 to 31 days. In about 12 stations the dry period ranges from 32 to 61 days. The dry period varies 62 to 92 days and in fourteen stations the number of days in dry period exceeds 92 days.

**Table-1 WATER AVILABILITY DAYS IN THE PENNAR RIVER BASIN**

S.No	Station	Humid	wet	Moderately dry	Dry
1	Allagadda	92	92	89	92
2	Aluru	61	123	89	92
3	Atmakur(ATP)	0	91	154	120
4	Anantapur	30	93	153	89
5	Badvel	0	215	58	92
6	Bagepalli	122	93	150	0
7	Bangarupalem	122	121	122	0
8	Bukkapatnam	61	92	123	59
9	Chandragiri	92	123	120	30
10	Chick Ballapur	122	152	91	0
11	Cuddapah	92	123	58	92
12	Darmavaram	30	61	154	120
13	Dhone	30	154	89	92
14	Giddalur	31	153	89	92
15	Guduru	92	120	153	0
16	G.Bramheswaram	153	120	92	0
17	Gooty	31	153	89	92
18	GowriBindanur	122	151	92	0
19	Hindupur	61	123	120	61
20	Isakapalli	92	89	184	0
21	Jammalamadugu	61	123	61	120
22	Atmakur	92	122	59	92
23	Kadiri	61	92	151	61
24	Kalahasti	92	151	92	0
25	Kalyandrug	30	92	182	61

26	Kamalapuram	30	185	58	92
27	Kavali	92	89	184	0
28	Koilkuntla	30	154	120	61
29	Krishna Patnam	92	182	91	0
30	Kuderu	0	61	150	154
31	Madakasira	31	132	212	0
32	Madanapalli	92	151	132	0
33	Nandikotkur	30	184	59	92
34	Nandyal	61	153	59	92
35	Nellore	92	121	122	0
36	Atmakur(Nellore)	91	90	184	0
37	P. Ahobilam	153	151	61	0
38	Pathikonda	61	123	151	0
39	Pavagada	61	123	120	61
40	Penukonda	61	61	182	61
41	Proddutur	61	123	89	92
42	Pulivendula	61	123	120	61
43	Punganur	122	151	92	0
44	Rajampet	61	182	31	91
45	Rapur	92	120	153	0
46	Rayachoti	61	123	120	61
47	Rayadurg	30	92	182	61
48	Sidhout	92	151	61	61
49	Srisailam	184	89	92	0
50	Tadipatri	30	92	182	61
51	Tumkur	91	62	182	30
52	Udaygiri	92	89	184	0
53	Uravakonda	30	92	212	31
54	Vailpadu	92	123	120	30
55	Yadiki	0	122	151	92

## Water availability calendar in the Pennar basin

### Humid period

The humid period is extended for one month in 13 stations of the basin. In Atmakur (ATP), Badvel and Yadiki stations the humid period is not noticed. It extended for one month in Anantapuramu, Dharmavaram, Dhone, Giddalur, Gooty, Kalyanadurg, Kamkalapuramu, Koilkuntla, Madakasira, Nandikotkur, Rayadurg, Tadipatri and Uravakonda stations. It is found either in September or October months. In Giddalur station the humid period is found in July month. The humid period has extended for two months in Alur, Bukkapatnam, Hindupur, Jammalamadugu, Kadiri, Nandyala, Pathikonda, Penukonda, Proddutur, Pulivendula, Rajampet, Rayachoti and Pavagada stations. The humid period in these stations is found in September and October months. The humid period has extended for three months in Allagadda, Atmakur (Kurnool and Nellore), Chandragiri, Cuddapah, Guduru, Kavali, Isakapalli, Kalahasti, Krishna Patnam, Madanapalli, Nellore, Rapur, Sidhout, Udayagiri, vailpadu, and Thumkur. In these stations the humid period is found in September, October and November months and October, November and December months.

The humid period has extended for four months in Bagepalli, Bangarupalem, Chick Ballapur, GowriBindanuru and Punganur stations. It is found in September, October, November and December months. The humid period has extended for five months in GundlaBramheswaram and PeddaAhobilam stations. It is found in July, August, September, October and November months. The humid period is found for six months in Srisailam station from July to December months.

### **Wet period**

The wet period in the basin has extended from two months. The two months of wet period is found in Dharmavaram, Kuderu, Penukonda, and Thumkur stations. It is noticed in October and November, September and October, November and December and August and December months respectively. The wet period has extended for three months in Allagadda, Atmakur (ATP) Anantapuramu, Atmakur (Nellore), Bagepalli, Bukkapatnam, Isakapalli, Kadiri, Kalyanadurg, Srisailam, Kavali, Tadipatri, Udayagiri, and Uravakonda stations. It is found in July, November and December months, October, November and December months, January, February, and September months, January, February and July months. The wet period has extended for four months in Atmakur (Kurnool), Alur, Bangarupalem, Chandragiri, Cuddapah, Guduru, GundlaBramheswaram, Hindupur, Jammalamadugu, Madakasira, Nellore, PeddaAhobilam, Pathikonda, Pavagada, Proddutur, Pulivendula, Rapur, Rayachoti, vayalpadu, and Yadiki stations. The wet periods in these stations are found in the months of June, July, August and December; January, July, August and December; January, February, August, and September; January, February, June and December, January, August, November and December, July, August November and December; August, September, November and December; January, February, July and August; January, July, August and September; January, February, July and September and January; August, November and December months. The wet period has extended for five months in Chick Ballapur, Dhone, Giddalur, Gooty, GowriBindanuru, Koilakuntla, Madanapalli, Nandyala, Punganur, stations. It is found in the months of July, August, October, November and December; August, September, October, November and December; June, July, August, November and December; January, July, August September and December; January, February, July August and December; January, February, June, July and August months; January, February, May, July and August months and January, February, July, August and September months. The wet period is extended for six months in Kamkalapuramu, Nandikotkur, and Rajampet stations. In these stations the wet period is found in January, July, August, October, November and December months; June, July, August, October, November and December months; January, February, July, August, September and December months respectively. The wet period is found for seven months in Badvel station. It is noticed in the January, July, August, September, October, November and December months.

### **Moderately dry period**

During the moderately dry period the values of actual evapotranspiration are more than or equivalent to  $\frac{1}{4}$  of values of the potential evapotranspiration but less than  $\frac{1}{2}$  of the values of PE. The moderately dry period is noticed in only one month in Rajampet station. It is found in May month. It is found in two months in Atmakur (Kurnool), Badvel, Cuddapah, Jammalamadugu, Kamkalapuramu, Nandikotkur, Nandyala, and Sidhout stations. The moderately dry period is noticed in January and February months; February and June months; January and June months; January and February months and May and June

months. The moderately dry period is found in three months in Allagadda, Alur, Chick Ballapur, Banaganapalli, Dhone, Giddalur, GundlaBramheswaram, PeddaAhobilam, Proddutur, GowriBindanuru, Kalahasti, Krishna Patnam, Punganur and Srisailam stations. It is noticed in the months of January, February and June: March, April and May months; and February, May and June; and April, May, June months; March, April, June; February, June, July months. The moderately dry period is found in four months in Gooty, Hindupur, and Koilakuntla. Bangarupalem, Bukkapatnam, Pavagada, Madanapalli, Nellore, Pulivendula, Rayachoti and Vayalpadu stations. The months are February, March, May and June months; and February, May, June and July months; and February, March, May and June months. The moderately dry period is found in five months in Anantapuramu, Atmakur (ATP), Bagepalli, Dharmavaram, Guduru, Atmakur (Kurnool) Kadiri, Pathikonda, Rapur and Yadiki stations. It is noticed in the five months of January, May, June July and August months; May, June, July, August and December months; and March, April, May, June and July months; February, May June, July and December months; and March, April, June and August months; January, February, June, July and August months; and February, March, April, May and June months. The moderately dry period is noticed in six months in Atmakur (Nellore), Isakapalli, Kalyanadurg, Kuderu, Atmakur (Nellore), Rayadurg, Kavali, Penukonda, Tadipatri, Udayagiri and Thumkur Stations. It found in the months of March, April, May, June, July and August months; January, February, May, June, July and August months; and March, April, May, June, July and August months; January, July, August, November and December months; January, February, March, May, June and July months; January, February, May, June, July and August months. The moderately dry period is found in seven months in Kuderu, Madakasira and Uravakonda stations. It is noticed in January, February, May, June and July months, January, June, July, August, November and December months and January, February, April, May, June, July and August months.

### **Dry period**

The dry period is found nil in Atmakur (Nellore), Bagepalli, Bangarupalem, Chick Ballapur, Guduru, GundlaBramheswaram, Kavali, Madakasira, Madanapalli, Nellore, PeddaAhobilam, Rapur, GowriBindanuru, Isakapalli, Krishna Patnam, Rapur, Srisailam and Udayagiri stations. The dry period is found in one month in Chandragiri, Kalahasti, Pathikonda, Uravakonda, vayalpadu and Thumkur stations. It is noticed in March or April months. The dry period is found in two months in Gooty, Hindupur, Kadiri, Kalyanadurg, Koilakuntla, Penukonda, Pulivendula, Rayachoti, Sidhout, Tadipatri and Pavagada stations. The dry period is noticed in March and April Months; and April and May months. The Dry period is found in three months in AllagaddaAnantapuramu, Alur, Atmakur,(Kurnool) Badvel, Bukkapatnam, Cuddapah, Dhone, Giddalur, Kamkalapuramu, Nandikotkur, Nandyala, Penukonda, Proddutur, Rajampet and Yadiki Stations. The dry period is noticed in March, April and May; March, April and June; February, March and April months. The dry period is found in four months in Atmakur (ATP), Dharmavaram, Jammalamadugu and Kuderu stations. It is noticed in January, February, March and April Months in Dharmavaram and January, February, March and May months in Jammalamadugu, Kuderu and Atmakur (ATP) stations.

The crop cultivation under natural climatic conditions in the humid and wet periods is important. The humid and wet period has extended only three months in the Dharmavaram station. The humid and wet period has extended for five months in Kadiri, Madakasira and Thumkur stations. The humid and wet periods has extended six months in Allagadda, Atmakur (Nellore), Dhone, Giddalur, Gooty, Hindupur, Jammalamadugu, KavaliKoilakuntla, Kurnool, Proddutur, Pulivendula, Rayachoti, Udayagiri and Pavagada stations. It is found

from July to December months: September, October, November and December, January and February months: August, September, October, November, December and January months: and September, October, November, December, January and February months. There is no break in the humid and wet period. The humid and wet periods are found in seven months in Atmakur (Nellore), Badvel, Cuddapah, Guduru, Kamkalapuramu, Nandikotkur, Nandyala, Nellore Pileru, Railway Koduru, Rapur and Vayalpadu stations. In these stations the humid and wet periods are found from June to December months: January and July to December months: January, February and August to December months: continuously without any break. The humid and wet periods are found the eight months in Madanapalli, Rajampet and Sidhout stations. The periods are noticed from January, February and July to December months continuously without any break. The humid and wet periods are found in nine months in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. They are found in January, February and from June to December months. The moderately dry and dry periods are found in three months in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. The moderately dry and dry periods are found in four months in Madanapalli, Rajampet and Sidhout stations. They are found in five months in Atmakur (Nellore), Badvel, Cuddapah, Guduru, Kamkalapuramu, Nandikotkur, Nandyala, Nellore Pileru, Railway Koduru, Rapur and Vayalpadu stations. The moderately dry and dry periods are found in six months in Jammalamadugu, Kavali, Koilakuntla, Kurnool, Proddutur, Pulivendula, Rayachoti, Udayagiri and Pavagada stations. The moderately dry and dry periods are found in seven months in Kadiri, Madanapalli and Thumkur stations. They are found in eight months in Anantapuramu, Kalyanadurg, Penukonda, Uravakonda and Dharmavaram stations. These stations lie on the western parts of the basin and these stations are subjected to frequent droughts. Crop cultivation is highly favorable in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. Crop cultivation is favorable in Allagadda, Atmakur (Kurnool and Nellore), Badvel, Cuddapah, Giddalur, Gooty, Guduru, Hindupur, Jammalamadugu, Kamkalapuramu, Nandikotkur, Kavali, Nandyala, Nellore, RapurRayachoti, Udayagiri, Vayalpadu and Pavagada stations.

Table-2 WATER AVAILABILITY CALENDAR IN THE PENNAR RIVER BASIN

S. No	Station	Humid	wet	Moderately dry	Dry
1	Allagadda	8,9,10	7,11,12	1,2,6	3,4,5
2	Aluru	9,10	1,8,11,12	2,6,7	3,4,5
3	Atmakur(ATP)	-----	9,10,11	1,6,7,8,12	2,3,4,5
4	Anantapur	9	10,11,12	1,5,6,7,8	2,3,4
5	Badvel	-----	1,7,8,9,10,11,12	2,6	3,4,5
6	Bagepalli	9,10,11,12	1,7,8	2,3,4,5,6	-----
7	Bangarupalem	9,10,11,12	1,2,7,8	3,4,5,6	-----
8	Bukkapatnam	9,10	8,11,12	1,5,6,7	2,3,4
9	Chandragiri	10,11,12	1,7,8,9	2,3,5,6	4
10	Chick Ballapur	9,10,11,12	1,2,5,7,8	3,4,6	-----
11	Cuddapah	9,10,11	1,7,8,12	2,6	3,4,5
12	Darmavaram	9	10,11	5,6,7,8,12	1,2,3,4
13	Dhone	9	7,8,10,11,12	1,2,6	3,4,5
14	Giddalur	7	8,9,10,11,12	1,2,6	3,4,5

15	Guduru	10,11,12	1,2,8,9	3,4,5,6,7	-----
16	G.Bramheswaram	7,8,9,10,11	1,2,6,12	3,4,5	-----
17	Gooty	9	7,8,10,11,12	1,2,5,6	3,4
18	GowriBindanur	9,10,11,12	1,2,6,7,8	3,4,5	-----
19	Hindupur	9,10	1,8,11,12	2,5,6,7	3,4
20	Isakapalli	10,11,12	1,2,9	3,4,5,6,7,8	-----
21	Jammalamadugu	9,10	7,8,11,12	1,6	2,3,4,5
22	Atmakur	9,10,11	6,7,8,12	1,5,6,7,8	2,3,4
23	Kadiri	9,10	1,8,11	2,5,6,7,12	3,4
24	Kalahasti	10,11,12	1,2,7,8,9	3,5,6	4
25	Kalyandrug	9	10,11,12	1,2,5,6,7,8	3,4
26	Kamalapuram	9	1,7,8,10,11,12	2,6	3,4,5
27	Kavali	10,11,12	1,2,9	3,4,5,6,7,8	-----
28	Koilkuntla	9	7,8,10,11,12	1,2,5,6	3,4
29	Krishna Patnam	10,11,12	1,2,3,7,8,9	4,5,6	-----
30	Kuderu	-----	9,10	1,6,7,8,11,12	2,3,4,5
31	Madakasira	10	8,9,11,12	1,2,3,4,5,6,7	-----
32	Madanapalli	10,11,12	1,2,7,8,9	3,4,5,6	-----
33	Nandikotkur	9	6,7,8,10,11,12	1,2	3,4,5
34	Nandyal	9,10	6,7,8,11,12	1,2	3,4,5
35	Nellore	9,10,11,12	1,2,7,8	3,4,5,6	-----
36	Atmakur(Nellore)	10,11,12	1,2,9	3,4,5,6,7,8	-----
37	P. Ahobilam	7,8,9,10,11	1,2,6,12	3,4,5	-----
38	Pathikonda	9,10,	1,8,11,12	2,3,5,6,7	4
39	Pavagada	9,10	1,8,11,12	2,5,6,7	3,4
40	Penukonda	9,10	11,12	1,2,5,6,7,8	3,4,5
41	Proddutur	9,10	7,8,11,12	1,2,6	3,4,5
42	Pulivendula	9,10	7,8,11,12	1,2,5,6	3,4
43	Punganur	9,10,11,12	1,2,6,7,8	3,4,5	-----
44	Rajampet	10,11	1,2,7,8,9,12	5	3,4,6
45	Rapur	10,11,12	1,2,7,9	3,4,5,6,8	----
46	Rayachoti	9,10	7,8,11,12	1,2,5,6	3,4
47	Rayadurg	9	10,11,12	1,2,5,6,7,8	3,4
48	Sidhout	9,10,11	1,2,7,8,12	5,6	3,4
49	Srisailam	7,8,9,10,11,12	1,2,6	3,4,5	-----
50	Tadipatri	9	10,11,12	1,2,5,6,7,8	3,4
51	Tumkur	9,10,11	8,12	1,2,3,5,6,7	4
52	Udaygiri	10,11,12	1,2,9	3,4,5,6,7,8	-----
53	Uravakonda	9	10,11,12	1,2,4,5,6,7,8	3
54	Vailpadu	10,11,12	1,7,8,9	2,3,5,6	4
55	Yadiki	-----	9,10,11,12	1,2,6,7,8	3,4,5

**Note:** Above numbers refer to 1 for January, 2 for February, 3 for March, 4 for April, 5 for May, 6 for June, 7 for July, 8 for August, 9 for September, 10 for October, 11 for November and 12 for December.

## Crop management of the pennar basin

The crop suitability is high under normal climatic conditions in GundlaBramheswaram, Madanapalli, PeddaAhobilam, Rajampet, Sidhout, Krishna Patnam, Isakapalli, Kalahasti, GowriBindanuru and Chick Ballapur stations. Two crops can be cultivated and in areas supplemented with irrigation facilities, three crops can be cultivated. Wet and dry food crops, fruits and vegetables and commercial crops like sugarcane, banana, horticulture and floriculture crops can be cultivated. In Alur, Allagadda, Atmakur, Badvel, Giddalur, Gooty, Guduru, Hindupur, Jammalamadugu, Kamkalapuramu, Nandikotkur, Kavali, Nandyala, Nellore, Rapur, Rayachoti, Udayagiri, Vayalpadu and Pavagada stations only single crop can be cultivated under normal climatic conditions and two crops under supplementary irrigation sources. Wet and dry food crops, pulses, oil seeds, fruits and vegetables can be cultivated. In Dharmavaram, Kadiri, Madakasira, Pathikonda, Rayadurg, Thumkur, Anantapuramu, Kalyanadurg, Penukonda and Uravakonda stations only one crop can be cultivated. Dry food crops and oil seeds like groundnut, sunflower, coriander, mustard can be cultivated from July to December months. In areas provided with irrigation facilities Paddy, Sugarcane, groundnut, fruits & vegetables can be cultivated. In Bagepalli, Bangarupalem, Chick Ballapur, Chandragiri, Kalahasti and Krishna Patnam and Srisailam stations the humid and wet period extend from 8 to 9 months. Wet food crops, fruits & vegetables, horticulture and floriculture crops and sugarcane could be cultivated in the central and western part of the Pennar basin. The wet and humid period is only for three months. The dry food crops and oil seeds like groundnut and sunflower may be cultivated. In the Nallamalai, Seshachalam, Palakonda and Thirumala hills the natural forests should be grown. Teak wood, red sandal wood, rose wood bamboo and other plantations of commercial value may be grown in the hills

## Conclusion

The water availability days, calendar and crop suitability under natural climatic conditions in the humid, wet, moderately dry and dry periods. The humid and wet period has extended only three months in the Dharmavaram station. The humid and wet period has extended for five months in Kadiri, Madakasira and Thumkur stations. The humid and wet periods has extended six months in Allagadda, Atmakur (Nellore), Dhone, Giddalur, Gooty, Hindupur, Jammalamadugu, Kavali, Koilakuntla, Kurnool, Proddutur, Pulivendula, Rayachoti, Udayagiri and Pavagada stations. It is found from July to December months: September, October, November and December, January and February months: August, September, October, November, December and January months: and September, October, November, December, January and February months. There is no break in the humid and wet period. The humid and wet periods are found in seven months in Atmakur (Nellore), Badvel, Cuddapah, Guduru, Kamkalapuramu, Nandikotkur, Nandyala, Nellore Pileru, Railway Koduru, Rapur and Vayalpadu stations. In these stations the humid and wet periods are found from June to December months: January and July to December months: January, February and August to December months: continuously without any break. The humid and wet periods are found the eight months in Madanapalli, Rajampet and Sidhout stations. The periods are noticed from January, February and July to December months continuously without any break. The humid and wet periods are found in nine months in

GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. They are found in January, February and from June to December months. The moderately dry and dry periods are found in three months in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. The moderately dry and dry periods are found in four months in Madanapalli, Rajampet and Sidhout stations. They are found in five months in Atmakur (Nellore), Badvel, Cuddapah, Guduru, Kamkalapuramu, Nandikotkur, Nandyala, Nellore Pileru, Railway Koduru, Rapur and Vayalpadu stations. The moderately dry and dry periods are found in six months in Jammalamadugu, Kavali, Koilakuntla, Kurnool, Proddutur, Pulivendula, Rayachoti, Udayagiri and Pavagada stations. The moderately dry and dry periods are found in seven months in Kadiri, Madanapalli and Thumkur stations. They are found in eight months in Anantapuramu, Kalyanadurg, Penukonda, Uravakonda and Dharmavaram stations. These stations lie on the western parts of the basin and these stations are subjected to frequent droughts. Crop cultivation is highly favorable in GundlaBramheswaram, PeddaAhobilam, GowriBindanuru and Chick Ballarpur stations. Crop cultivation is favorable in Allagadda, Atmakur (Kurnool and Nellore), Badvel, Cuddapah, Giddalur, Gooty, Guduru, Hindupur, Jammalamadugu, Kamkalapuramu, Nandikotkur, Kavali, Nandyala, Nellore, Rapur, Rayachoti, Udayagiri, Vayalpadu and Pavagada stations.

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