



# AGROMETEOROLOGICAL BULLETIN

*July 2019*  
*3rd 10-day period*

- Temperature
- Relative Humidity
- Soil Temperature
- Sunshine Duration
- Precipitation
- Evaporation
- Growing Degrees
- Reference Evapotranspiration
- Accumulated Rainfall from the beginning of wet period
- Accumulated Reference Evapotranspiration
- Number of dry days



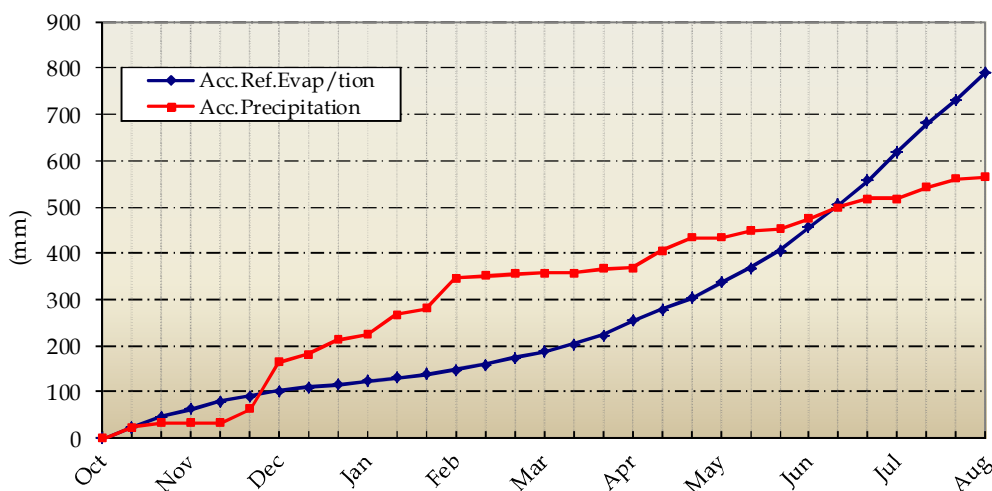
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3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	33.4	34.4	32.2	29.2	31.4	32.0	34.0	33.8	31.2	32.2	33.4	32.5	30.2	30.8
	Min	18.8	16.4	18.6	20.6	16.8	15.8	16.6	17.4	21.0	22.0	20.6	18.6	19.4	18.1
Relative Humidity	Max	81	78	80	93	82	85	92	95	85	95	93	87	92	-
	Min	26	27	44	43	28	32	26	30	51	40	43	35	51	-
Soil Temperature at 10 cm	06 UTC	25.6	25.6	26.2	24.2	24.0	24.6	25.2	26.2	27.2	27.4	27.4	25.8	24.8	24.5
	12 UTC	29.0	29.6	29.6	27.4	29.0	30.4	30.2	30.8	31.2	31.0	31.8	30.0	27.5	28.7
Sunshine Duration		13.0	12.5	9.5	8.6	12.4	13.3	13.3	13.2	12.7	6.3	11.5	11.5	8.0	10.3
Precipitation				3.3									3.3	56.7	5.5
Evaporation		10.6	10.7	6.4	7.6	8.3	6.7	11.4	9.8	2.8	6.0	7.0	87.3	60.2	104.4
Growing Degrees	5	21.1	20.4	20.4	19.9	19.1	18.9	20.3	20.6	21.1	22.1	22.0	225.9	217.8	213.8
	10	16.1	15.4	15.4	14.9	14.1	13.9	15.3	15.6	16.1	17.1	17.0	170.9	162.8	158.8

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	60.6	48.0	64.5
Precipitation - Reference Evapotranspiration	-57.3	8.7	-59.0
Number of Rainy Days	1.0	6.0	1.1
Number of Dry Days	8.0	5.0	-

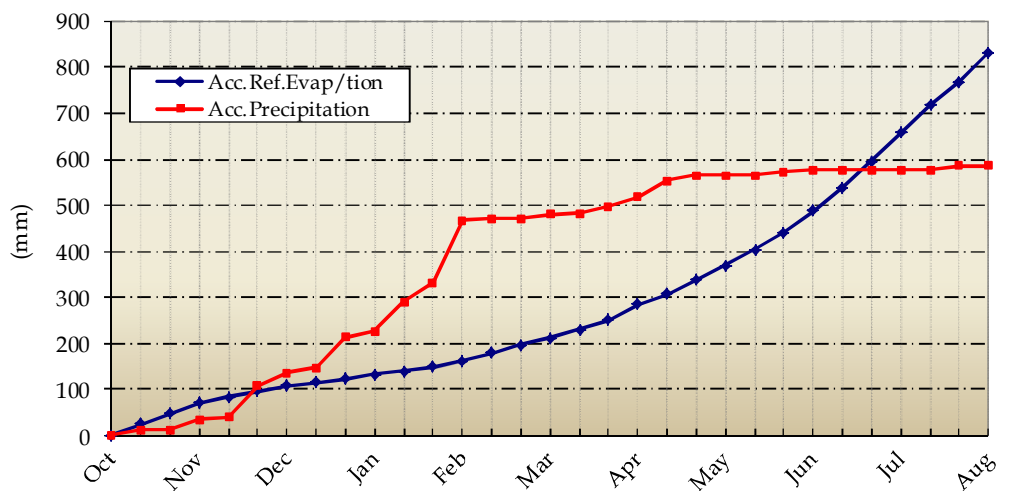
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	32.6	33.5	33.7	34.3	33.0	31.9	32.3	33.8	30.9	31.0	31.8	32.6	30.2	30.6
	Min	16.9	17.6	18.1	20.4	20.6	20.3	20.8	20.3	22.4	21.1	24.0	20.2	20.0	18.5
Relative Humidity	Max	94	89	96	89	93	95	100	100	87	90	85	93	88	-
	Min	32	29	30	30	30	38	31	28	49	42	48	35	43	-
Soil Temperature at 10 cm	06 UTC	26.4	27.2	27.8	28.4	29.0	29.0	29.0	29.0	29.8	29.2	30.0	28.6	27.4	27.4
	12 UTC	29.4	31.2	30.2	31.0	31.0	32.0	31.8	31.5	31.4	31.6	32.0	31.2	30.1	31.9
Sunshine Duration		13.3	13.2	12.9	12.7	13.1	13.0	12.4	12.4	12.6	12.7	12.8	12.8	10.6	11.8
Precipitation															2.9
Evaporation		10.0	10.2	11.2	10.0	10.5	9.0	8.0	9.1	8.6	10.0	9.6	106.2	69.8	81.3
Growing Degrees	5	19.8	20.6	20.9	22.4	21.8	21.1	21.6	22.1	21.7	21.1	22.9	235.7	220.7	215.1
	10	14.8	15.6	15.9	17.4	16.8	16.1	16.6	17.1	16.7	16.1	17.9	180.7	165.7	160.1

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	64.0	56.0	59.5
Precipitation - Reference Evapotranspiration	-64.0	-56.0	-56.6
Number of Rainy Days	0.0	0.0	0.3
Number of Dry Days	15.0	32.0	-

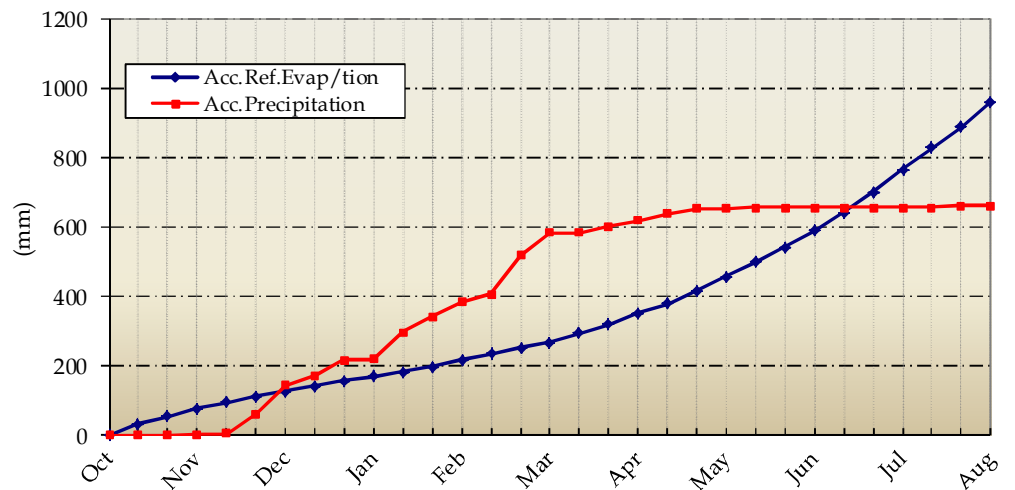
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	28.4	29.2	29.2	30.2	27.8	28.8	29.6	30.0	30.4	29.8	29.4	29.3	30.2	28.6
	Min	23.4	25.2	25.4	24.0	23.4	24.6	20.6	22.0	21.6	22.4	22.4	23.2	23.7	22.4
Relative Humidity	Max	71	67	62	68	73	63	62	75	68	91	91	72	83	-
	Min	56	50	47	46	54	46	43	47	41	54	64	50	59	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		12.8	12.9	12.5	13.0	13.5	12.7	13.0	12.8	12.7	13.0	12.3	12.8	11.4	11.6
Precipitation														1.3	0.4
Evaporation		10.6	13.2	8.3	9.8	8.3	7.9	6.5	8.3	5.9	6.7	7.3	92.8	65.6	102.1
Growing Degrees	5	20.9	22.2	22.3	22.1	20.6	21.7	20.1	21.0	21.0	21.1	20.9	233.9	241.7	225.3
	10	15.9	17.2	17.3	17.1	15.6	16.7	15.1	16.0	16.0	16.1	15.9	178.9	186.7	170.3

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	71.2	63.0	-
Precipitation - Reference Evapotranspiration	-71.2	-61.7	0.4
Number of Rainy Days	0.0	2.0	0.1
Number of Dry Days	14.0	38.0	-

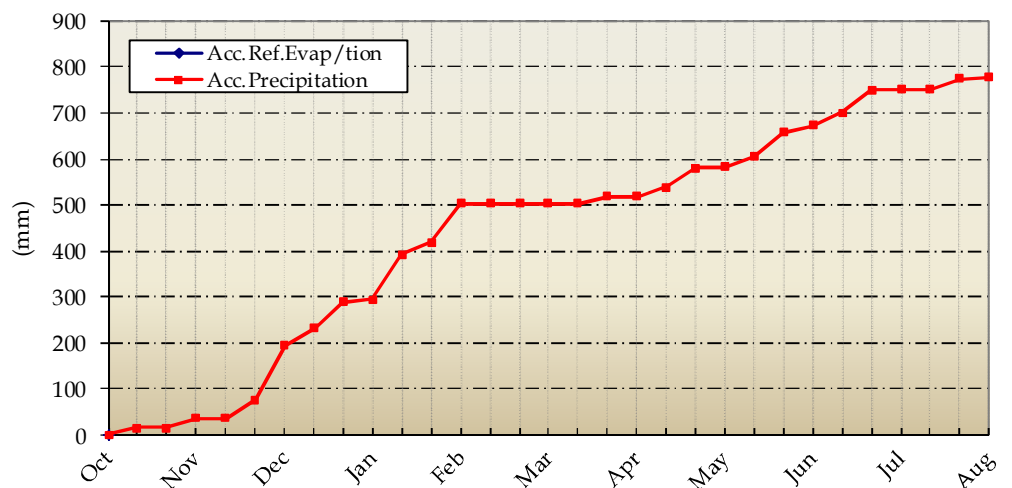
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	32.6	34.8	32.0	32.6	32.6	32.4	32.4	34.0	29.4	29.4	33.4	32.3	31.5	31.1
	Min	15.2	15.4	16.6	17.4	17.2	17.6	16.2	17.6	23.0	23.4	17.4	17.9	16.2	15.7
Relative Humidity	Max	100	92	100	81	100	71	100	82	81	72	69	86	99	-
	Min	24	29	31	29	29	32	29	21	33	43	27	30	43	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	23.6
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	27.8
Sunshine Duration		11.6	12.0	7.7	12.0	11.7	11.7	12.5	12.4	10.4	11.7	11.6	11.4	8.7	10.1
Precipitation				3.7						0.7			4.4	45.7	10.3
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-	85.3
Growing Degrees	5	18.9	20.1	19.3	20.0	19.9	20.0	19.3	20.8	21.2	21.4	20.4	221.3	207.2	197.9
	10	13.9	15.1	14.3	15.0	14.9	15.0	14.3	15.8	16.2	16.4	15.4	166.3	152.2	144.4

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	-	55.8
Precipitation - Reference Evapotranspiration	-	-	-45.5
Number of Rainy Days	2.0	6.0	1.5
Number of Dry Days	3.0	15.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



# Agrometeorological Data

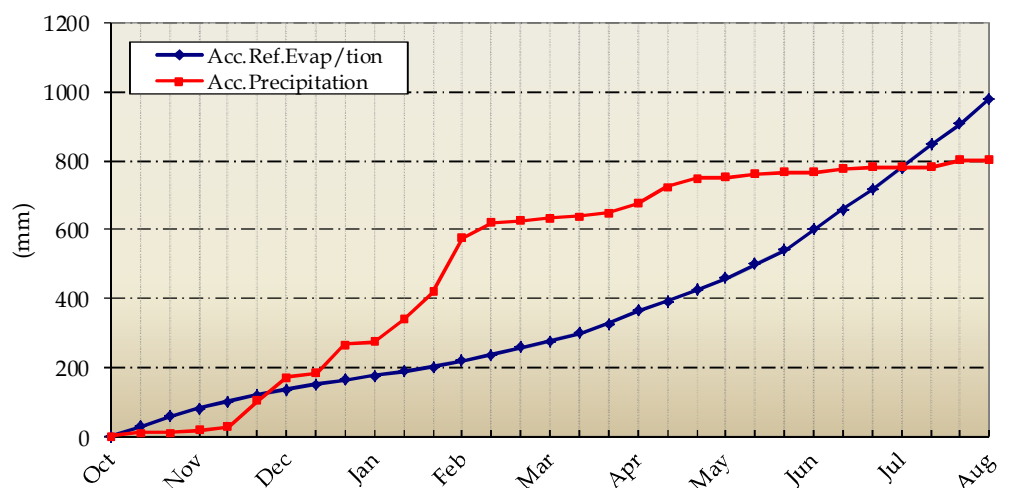
## July 2019

Kalamata

3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	34.4	34.6	35.8	32.1	33.2	31.9	34.9	33.4	34.0	34.1	31.4	33.6	33.0	31.5
	Min	18.2	18.7	20.1	20.4	20.6	21.0	21.5	20.4	17.7	21.5	21.2	20.1	19.3	18.2
Relative Humidity	Max	73	78	81	88	87	75	82	76	78	78	81	80	84	-
	Min	11	21	23	38	33	31	27	34	28	31	27	28	33	-
Soil Temperature at 10 cm	06 UTC	26.0	26.8	27.4	28.2	28.6	27.8	27.7	28.6	28.2	28.6	29.0	27.9	27.2	26.0
	12 UTC	34.2	31.0	31.2	32.2	33.2	31.5	34.2	32.4	31.6	32.0	31.0	32.2	29.7	30.3
Sunshine Duration		12.5	12.5	11.1	9.9	10.4	11.7	12.4	12.4	12.2	12.4	9.0	11.5	11.7	11.2
Precipitation														5.8	0.9
Evaporation		7.3	8.9	6.6	8.8	9.4	7.8	9.4	9.6	8.0	12.2	7.6	95.6	106.8	90.1
Growing Degrees	5	21.3	21.7	23.0	21.3	21.9	21.5	23.2	21.9	20.9	22.8	21.3	240.6	232.7	218.3
	10	16.3	16.7	18.0	16.3	16.9	16.5	18.2	16.9	15.9	17.8	16.3	185.6	177.7	163.3

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	73.8	69.0	62.2
Precipitation - Reference Evapotranspiration	-73.8	-63.2	-61.3
Number of Rainy Days	0.0	1.0	0.4
Number of Dry Days	15.0	28.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



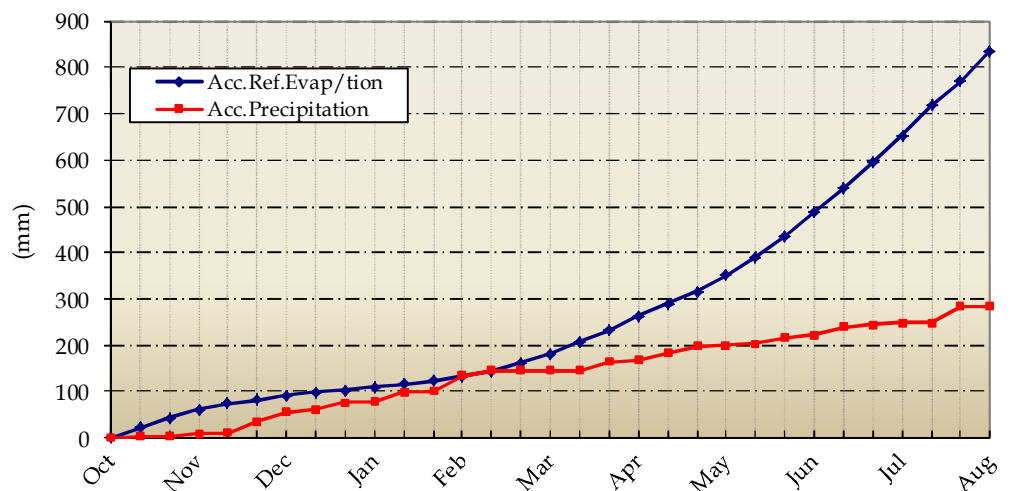


Larisa

3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	33.8	35.0	34.2	33.2	32.0	34.6	36.6	34.4	35.0	34.0	34.7	34.3	32.8	33.2
	Min	16.4	19.0	21.8	21.4	20.8	18.6	18.9	21.2	19.8	21.8	21.6	20.1	19.7	18.1
Relative Humidity	Max	86	83	74	76	83	85	85	83	77	65	77	79	89	-
	Min	31	31	34	31	33	31	26	36	30	31	33	32	38	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	26.9
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	29.2
Sunshine Duration		11.5	10.2	9.5	8.2	10.8	11.2	11.3	11.4	10.3	9.9	11.1	10.5	8.3	10.7
Precipitation														15.6	4.4
Evaporation		12.4	9.8	9.0	7.5	10.4	13.3	10.6	12.3	13.2	11.2	9.9	119.6	85.8	104.1
Growing Degrees	5	20.1	22.0	23.0	22.3	21.4	21.6	22.8	22.8	22.4	22.9	23.2	244.4	234.1	227.1
	10	15.1	17.0	18.0	17.3	16.4	16.6	17.8	17.8	17.4	17.9	18.2	189.4	179.1	172.1

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	66.2	54.6	66.2
Precipitation - Reference Evapotranspiration	-66.2	-39.0	-61.8
Number of Rainy Days	0.0	3.0	1.1
Number of Dry Days	14.0	14.0	-

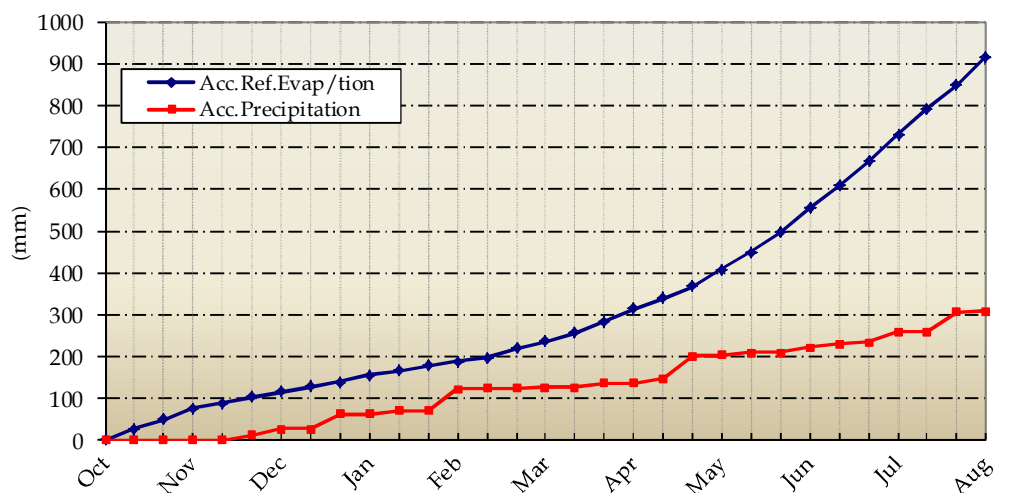
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	32.7	34.2	33.5	32.4	31.2	32.4	33.4	32.8	32.6	32.2	34.2	32.9	31.8	31.8
	Min	20.6	20.3	23.9	22.7	21.3	21.0	20.2	21.3	20.6	23.4	22.2	21.6	21.1	19.4
Relative Humidity	Max	76	83	76	71	84	79	80	77	77	84	87	79	80	-
	Min	31	33	40	34	39	36	37	42	37	46	38	38	38	-
Soil Temperature at 10 cm	06 UTC	26.0	26.8	27.4	27.5	27.2	27.6	27.4	28.0	27.6	28.6	28.6	27.5	26.1	26.8
	12 UTC	30.0	30.6	28.4	30.4	30.8	31.4	31.0	31.4	31.5	31.8	32.0	30.8	29.4	31.6
Sunshine Duration		12.7	12.4	10.9	10.0	11.8	12.5	12.7	12.3	12.1	10.0	12.0	11.8	9.6	10.5
Precipitation				0.5									0.5	29.1	9.4
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	83.5	101.0
Growing Degrees	5	21.7	22.3	23.7	22.6	21.3	21.7	21.8	22.1	21.6	22.8	23.2	244.6	236.2	226.2
	10	16.7	17.3	18.7	17.6	16.3	16.7	16.8	17.1	16.6	17.8	18.2	189.6	181.2	171.2

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	68.7	59.7	65.4
Precipitation - Reference Evapotranspiration	-68.2	-30.6	-56.0
Number of Rainy Days	1.0	7.0	1.5
Number of Dry Days	6.0	13.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



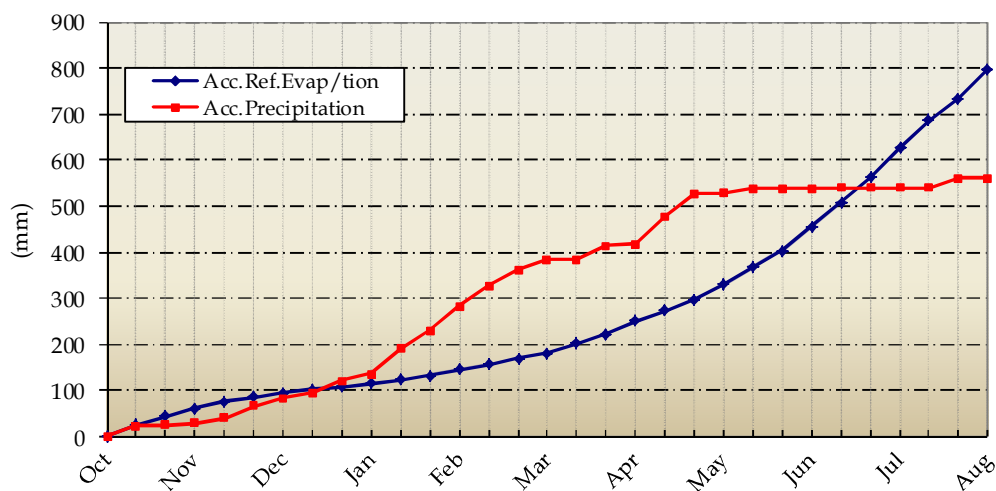


Tanagra

3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	31.6	32.5	32.0	31.7	30.0	31.9	34.6	34.8	36.2	34.0	33.2	33.0	32.8	32.0
	Min	19.3	17.4	20.4	20.1	19.8	17.5	18.7	19.7	21.4	22.1	20.2	19.7	20.8	18.6
Relative Humidity	Max	62	71	61	72	75	62	62	62	59	76	80	67	81	-
	Min	22	29	28	28	27	23	22	21	17	26	31	25	28	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		12.7	13.3	12.8	9.3	12.3	12.8	13.1	13.2	12.6	11.1	12.6	12.3	9.5	
Precipitation														12.9	1.3
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Growing Degrees	5	20.5	20.0	21.2	20.9	19.9	19.7	21.7	22.3	23.8	23.1	21.7	234.6	239.9	
	10	15.5	15.0	16.2	15.9	14.9	14.7	16.7	17.3	18.8	18.1	16.7	179.6	184.9	

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	64.6	57.0	
Precipitation - Reference Evapotranspiration	-64.6	-44.1	1.3
Number of Rainy Days	0.0	4.0	0.7
Number of Dry Days	14.0	26.0	-

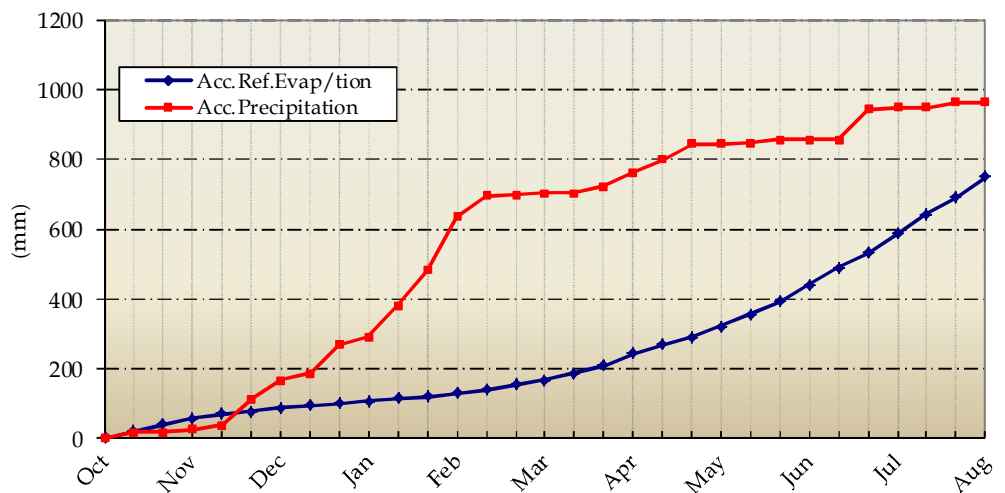
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/07/2019)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	29.5	30.2	31.0	30.9	28.7	30.3	31.9	33.5	29.4	32.2	30.1	30.7	29.2	30.5
	Min	17.6	18.7	19.5	15.5	15.3	12.7	14.5	14.6	16.2	14.8	16.5	16.0	14.9	14.6
Relative Humidity	Max	56	59	79	89	91	81	86	93	83	92	94	82	97	-
	Min	20	25	24	29	31	25	25	26	30	26	35	27	35	-
Soil Temperature at 10 cm	06 UTC	-	24.4	25.6	25.8	24.4	24.0	24.8	25.2	26.2	25.8	26.6	25.3	23.1	25.8
	12 UTC	-	31.0	31.6	32.0	31.2	32.4	32.4	32.4	33.0	33.0	32.4	32.1	27.3	28.5
Sunshine Duration		13.1	13.2	11.6	6.6	12.9	11.7	10.4	13.0	12.8	12.1	6.9	11.3	8.0	10.6
Precipitation					0.0							0.3	0.3	85.3	4.2
Evaporation		-	11.1	8.9	3.9	6.3	8.5	5.4	9.8	8.7	8.0	6.6	-	-	71.9
Growing Degrees	5	18.6	19.5	20.3	18.2	17.0	16.5	18.2	19.1	17.8	18.5	18.3	201.8	187.5	192.7
	10	13.6	14.5	15.3	13.2	12.0	11.5	13.2	14.1	12.8	13.5	13.3	146.8	132.5	137.7

3rd 10-day period (21-31/07/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	59.5	45.6	58.9
Precipitation - Reference Evapotranspiration	-59.2	39.7	-54.7
Number of Rainy Days	1.0	8.0	1.2
Number of Dry Days	13.0	3.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration





◆ **List of Symbols and Abbreviations**

**Reference Evapotranspiration ETo (mm):**

Calculated by the FAO Penman-Montieth equation

$$ET_0 = \frac{0.408 * \Delta * (R_n - G) + \gamma * \frac{900}{T + 273} * u_2 * (e_s - e_a)}{\Delta + \gamma * (1 + 0.34 * u_2)}$$

using 10-day step.

R<sub>n</sub> is estimated from sunshine measurements and G assumed to be zero.

**Growing Degrees:** Degrees with mean temperature exceeding the base of 5 or 10 °C.

**Number of Rainy Days:** Number of days with precipitation of at least 0.1 mm.

**Number of Dry Days:** Number of dry days recorded since the last rainy day.

**Measurements Units**

- ◆ Temperature : °C
- ◆ Relative Humidity : %
- ◆ Soil Temperature : °C
- ◆ Sunshine Duration : Hours
- ◆ Precipitation : mm
- ◆ Evaporation (Pan) : mm
- ◆ Growing Degrees : °C

**UTC (Universal Time coordinates) in Greece**

- ◆ Winter : Time(UTC) = Local time - 2
- ◆ Summer : Time(UTC) = Local time - 3

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