



# AGROMETEOROLOGICAL BULLETIN

*November 2019*  
*1st 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



Hellenic National Meteorological Service  
 Division of Climatology-Applications  
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 Helliniko, Athens

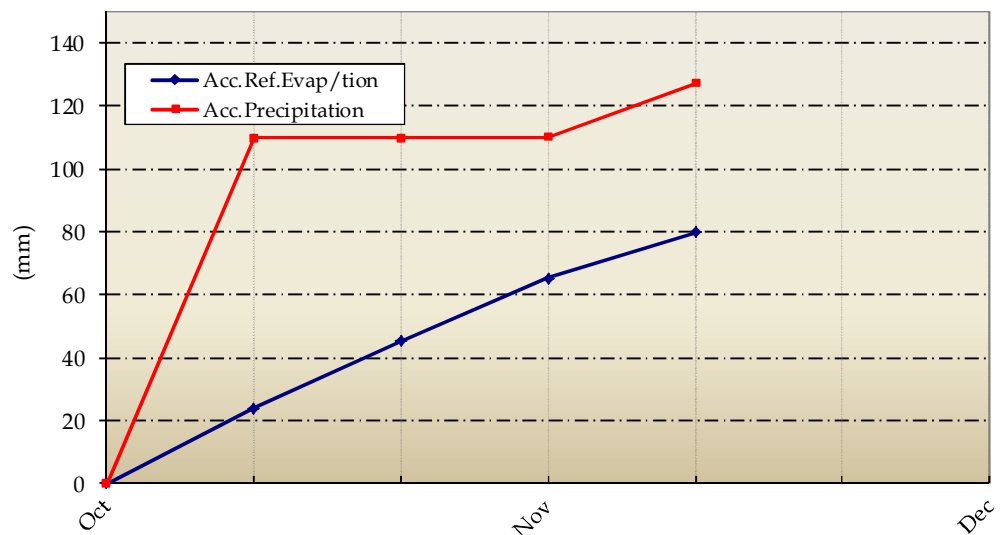
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Alexandroupoli

1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.4	18.4	19.0	21.2	22.2	23.2	23.0	21.6	22.4	21.4	20.7	19.5	15.8
	Min	11.4	8.4	8.2	12.8	16.4	15.2	19.4	16.2	14.6	13.2	13.6	11.1	7.1
Relative Humidity	Max	83	79	92	91	94	94	96	91	96	95	91	83	-
	Min	57	41	49	81	70	73	75	64	70	73	65	51	-
Soil Temperature at 10 cm	06 UTC	14.6	13.0	12.4	17.0	16.6	17.0	18.2	17.4	17.4	16.6	16.0	15.5	11.0
	12 UTC	15.6	16.8	16.6	17.6	19.4	19.6	20.0	19.0	20.2	18.6	18.3	17.5	12.9
Sunshine Duration		0.7	9.1	8.3	0.1	8.6	3.9	6.2	4.1	8.1	4.5	5.4	5.5	4.1
Precipitation					16.1						1.2	17.3	0.3	19.0
Evaporation		2.3	1.3	7.0	2.5	3.2	2.4	3.0	1.4	2.0	2.0	27.1	29.5	25.4
Growing Degrees	5	7.9	8.4	8.6	12.0	14.3	14.2	16.2	13.9	13.5	12.3	121.3	103.1	64.9
	10	2.9	3.4	3.6	7.0	9.3	9.2	11.2	8.9	8.5	7.3	71.3	53.1	23.3

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	14.8	17.0	14.9
Precipitation - Reference Evapotranspiration	2.5	-16.7	4.1
Number of Rainy Days	2.0	1.0	1.9
Number of Dry Days	3.0	14.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

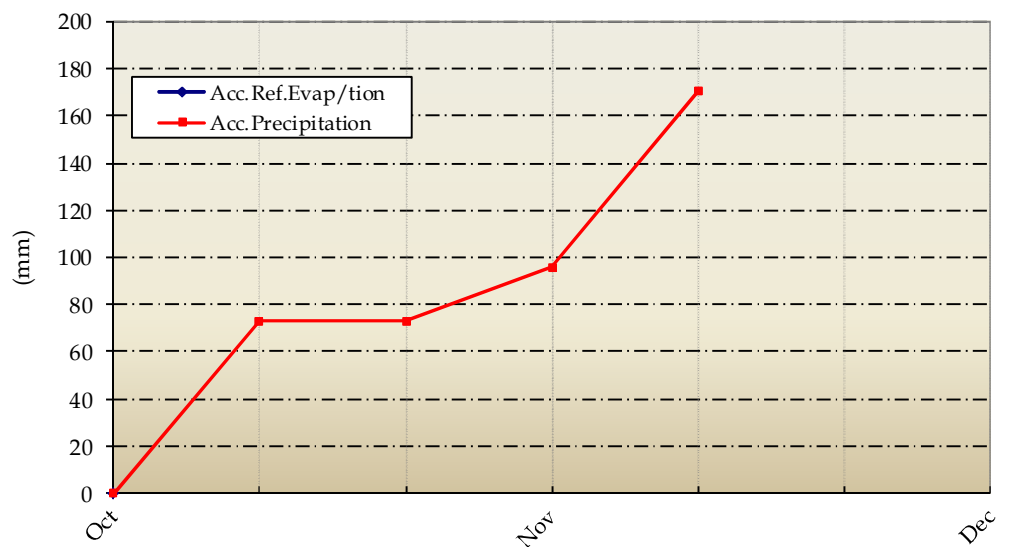


1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	24.0	23.8	23.2	22.4	24.6	24.0	25.9	22.2	23.2	22.7	23.6	23.8	20.0
	Min	12.9	11.1	13.7	15.0	14.0	15.6	12.3	15.1	12.2	13.8	13.6	10.7	10.4
Relative Humidity	Max	100	100	98	100	100	93	100	100	100	100	99	97	-
	Min	56	52	61	85	56	58	52	57	51	51	58	40	-
Soil Temperature at 10 cm	06 UTC	18.2	18.6	18.6	19.2	18.0	18.8	18.2	18.0	17.4	18.0	18.3	17.8	14.3
	12 UTC	19.6	21.0	21.2	20.6	19.5	19.4	19.6	21.0	21.4	19.2	20.2	19.9	16.6
Sunshine Duration		7.5	7.9	8.2	0.6	7.6	5.9	4.6	5.3	8.2	6.9	6.3	6.7	6.0
Precipitation					32.4				13.2		28.8	74.4	6.2	45.1
Evaporation		1.0	1.2	0.3	0.8	1.4	1.8	2.0	2.0	2.8	2.0	15.3	33.3	25.9
Growing Degrees	5	13.5	12.5	13.5	13.7	14.3	14.8	14.1	13.7	12.7	13.3	135.9	122.6	101.6
	10	8.5	7.5	8.5	8.7	9.3	9.8	9.1	8.7	7.7	8.3	85.9	72.6	52.1

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	13.4	14.3
Precipitation - Reference Evapotranspiration	-	-7.2	30.8
Number of Rainy Days	3.0	2.0	3.2
Number of Dry Days	3.0	14.0	-

The missing info in the tables and the graph are due to the absence of data.

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

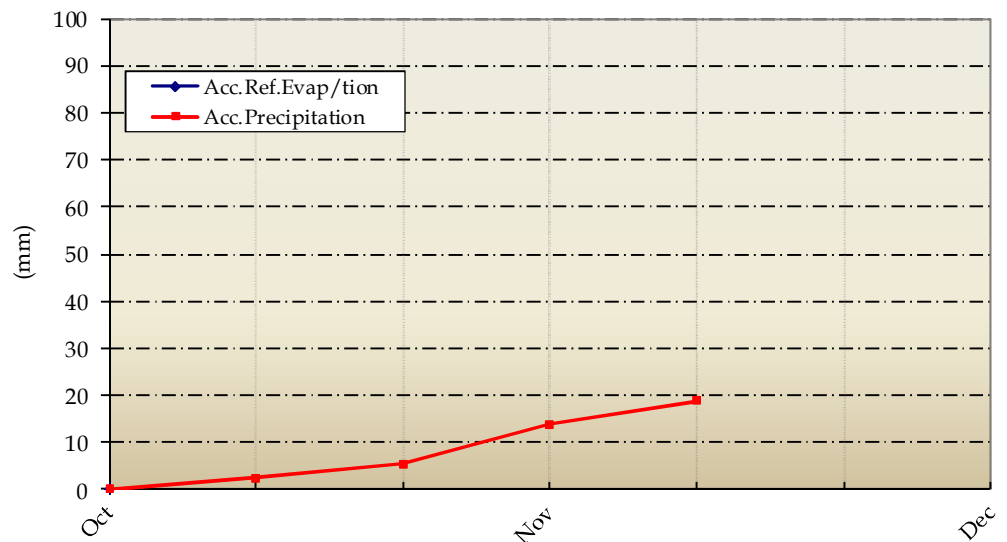


1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	22.0	21.2	22.6	26.6	27.6	28.8	28.6	28.0	23.0	26.4	25.5	21.5	20.4
	Min	16.8	16.6	15.0	19.2	19.8	20.4	20.8	19.8	16.8	17.8	18.3	16.3	14.3
Relative Humidity	Max	90	93	89	82	75	76	86	91	94	91	87	94	-
	Min	62	68	63	45	46	39	35	40	72	46	52	77	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		3.9	4.4	9.0	8.6	6.7	8.5	8.6	7.3	7.0	3.7	6.8	5.9	5.0
Precipitation		0.1	5.0									5.1	1.6	20.0
Evaporation		2.1	2.0	2.5	4.8	3.1	4.5	5.8	2.1	0.9	2.3	30.1	21.7	39.9
Growing Degrees	5	14.4	13.9	13.8	17.9	18.7	19.6	19.7	18.9	14.9	17.1	168.9	139.0	123.4
	10	9.4	8.9	8.8	12.9	13.7	14.6	14.7	13.9	9.9	12.1	118.9	89.0	73.4

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	16.6	-
Precipitation - Reference Evapotranspiration	-	-15.0	20.0
Number of Rainy Days	2.0	2.0	2.6
Number of Dry Days	0.0	15.0	-

The missing info in the tables and the graph are due to the absence of data.

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

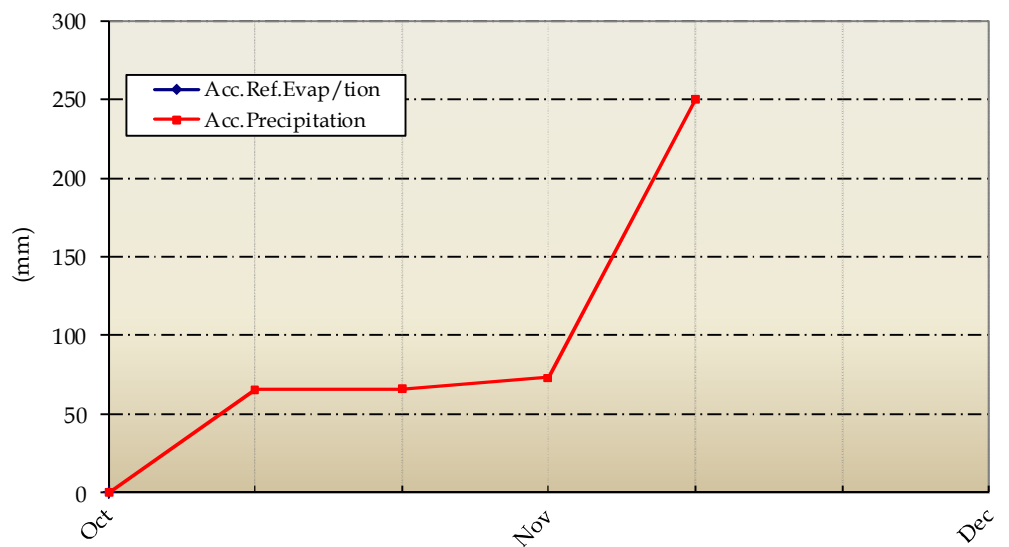


1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	20.2	20.3	19.5	16.0	19.5	19.0	16.4	15.2	15.1	17.8	17.9	20.1	16.0
	Min	11.0	9.5	13.0	12.2	8.6	10.0	12.8	10.6	7.4	9.0	10.4	6.8	5.4
Relative Humidity	Max	100	100	100	100	100	100	100	100	100	100	100	98	-
	Min	52	53	65	91	75	68	91	88	85	58	73	46	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	10.0
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	11.8
Sunshine Duration		3.7	5.7	0.7	0.0	1.7	1.5	0.0	0.4	0.0	4.1	1.8	4.7	4.1
Precipitation		0.2		11.2	36.1		0.2	47.4	45.3	5.0	31.7	177.1	0.7	40.1
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	16.8
Growing Degrees	5	10.6	9.9	11.3	9.1	9.1	9.5	9.6	7.9	6.3	8.4	91.6	84.6	57.3
	10	5.6	4.9	6.3	4.1	4.1	4.5	4.6	2.9	1.3	3.4	41.6	35.9	16.4

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	-	10.7
Precipitation - Reference Evapotranspiration	-	-	29.4
Number of Rainy Days	8.0	1.0	3.4
Number of Dry Days	0.0	7.0	-

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Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

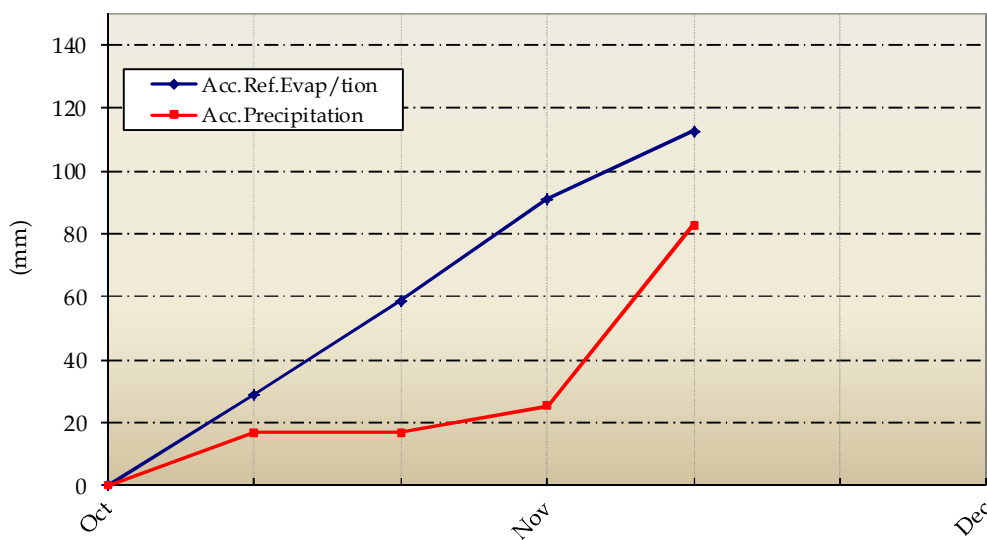


Kalamata

1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	23.4	24.4	23.7	22.9	24.3	24.1	25.7	23.4	23.2	23.6	23.9	24.0	21.0
	Min	12.1	12.8	11.0	15.2	12.9	12.7	12.8	14.3	12.0	14.3	13.0	11.8	10.2
Relative Humidity	Max	92	82	80	93	94	93	92	90	94	97	91	88	-
	Min	50	38	37	69	57	46	46	53	54	43	49	39	-
Soil Temperature at 10 cm	06 UTC	18.0	18.4	17.8	19.2	17.4	18.0	20.0	18.5	17.6	19.5	18.4	17.8	15.1
	12 UTC	19.4	20.4	23.5	20.0	19.4	19.6	19.5	19.6	19.0	18.8	19.9	19.6	16.9
Sunshine Duration		7.4	8.2	6.7	1.2	8.5	7.6	5.0	7.5	8.8	5.3	6.6	7.0	5.6
Precipitation				0.3	31.8	4.0			11.5		10.0	57.6	9.5	35.3
Evaporation		1.6	4.1	0.2	0.0	3.2	2.8	0.4	3.2	7.0	0.0	22.5	27.6	30.4
Growing Degrees	5	12.8	13.6	12.4	14.1	13.6	13.4	14.3	13.9	12.6	14.0	134.4	129.3	105.8
	10	7.8	8.6	7.4	9.1	8.6	8.4	9.3	8.9	7.6	9.0	84.4	79.3	55.9

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	21.6	20.4	16.4
Precipitation - Reference Evapotranspiration	36.0	-10.9	18.9
Number of Rainy Days	5.0	1.0	3.1
Number of Dry Days	2.0	7.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



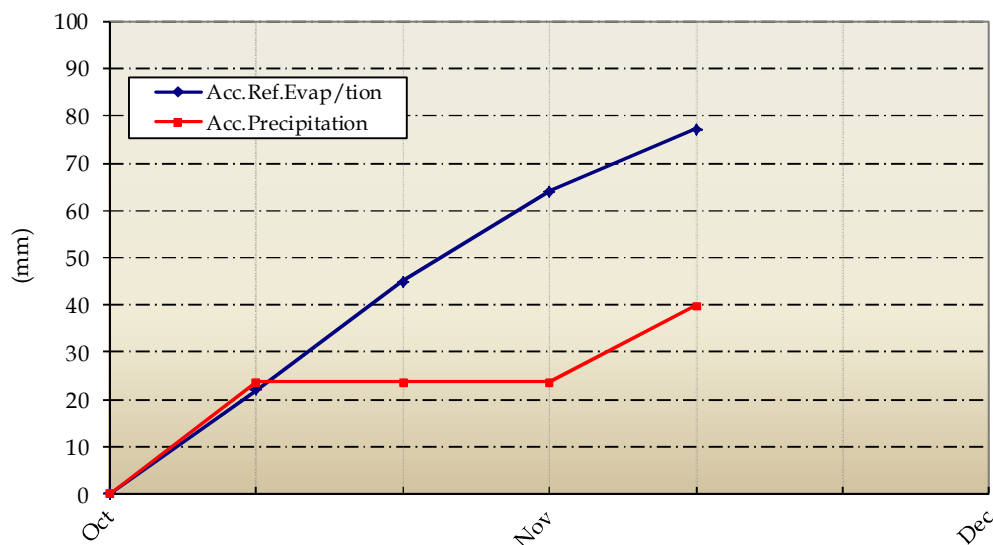
Larisa

1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.2	17.8	21.4	23.0	23.6	24.2	23.0	20.8	21.0	21.8	21.3	19.6	17.2
	Min	13.0	13.0	6.7	12.6	8.4	8.4	10.6	13.0	7.1	10.8	10.4	8.9	6.7
Relative Humidity	Max	94	98	98	97	99	98	94	98	99	97	97	96	-
	Min	78	36	54	56	47	46	51	48	49	40	50	60	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	12.3
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	13.2
Sunshine Duration		0.0	0.0	5.1	0.4	5.8	5.5	3.6	5.3	5.6	5.4	3.7	3.0	4.1
Precipitation		1.7			6.0				6.7		1.7	16.1	2.0	20.6
Evaporation		0.4	0.6	3.8	0.0	1.9	1.6	0.5	1.5	0.8	0.9	12.0	19.0	17.6
Growing Degrees	5	9.6	10.4	9.1	12.8	11.0	11.3	11.8	11.9	9.1	11.3	108.2	92.5	69.6
	10	4.6	5.4	4.1	7.8	6.0	6.3	6.8	6.9	4.1	6.3	58.2	42.5	25.7

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.2	11.6	11.7
Precipitation - Reference Evapotranspiration	2.9	-9.6	8.9
Number of Rainy Days	4.0	2.0	2.7
Number of Dry Days	23.0	15.0	-

The missing info in the tables are due to the absence of data.

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



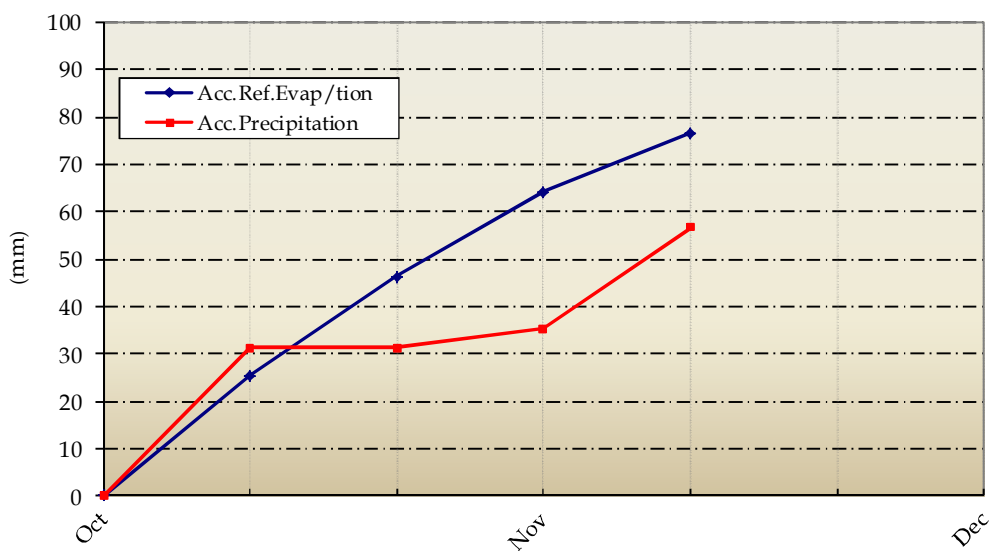
Mikra

1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.3	15.6	20.8	23.1	23.3	22.4	23.4	21.2	19.5	22.0	20.8	19.8	16.5
	Min	13.0	13.4	14.3	16.1	11.3	11.4	12.6	14.6	10.4	11.6	12.9	9.9	7.9
Relative Humidity	Max	97	92	86	95	91	96	97	96	99	91	94	87	-
	Min	84	75	60	63	49	67	56	62	77	56	65	53	-
Soil Temperature at 10 cm	06 UTC	17.0	16.6	16.6	17.2	15.8	16.2	16.4	17.4	16.2	16.7	16.6	16.1	11.5
	12 UTC	17.2	17.0	17.4	18.6	21.4	21.4	20.0	18.4	18.0	18.0	18.7	18.6	13.8
Sunshine Duration		0.0	0.0	3.5	2.5	8.7	4.5	5.3	4.4	5.9	4.9	4.0	5.5	4.0
Precipitation		11.7			1.5				8.1		0.1	21.4	0.7	18.1
Evaporation		-	-	-	-	-	-	-	-	-	-	-	20.4	22.5
Growing Degrees	5	9.7	9.5	12.6	14.6	12.3	11.9	13.0	12.9	10.0	11.8	118.2	98.5	72.4
	10	4.7	4.5	7.6	9.6	7.3	6.9	8.0	7.9	5.0	6.8	68.2	48.5	27.9

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	12.4	13.8	13.6
Precipitation - Reference Evapotranspiration	9.0	-13.1	4.5
Number of Rainy Days	4.0	1.0	2.5
Number of Dry Days	0.0	26.0	-

The missing info in the tables are due to the absence of data.

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration





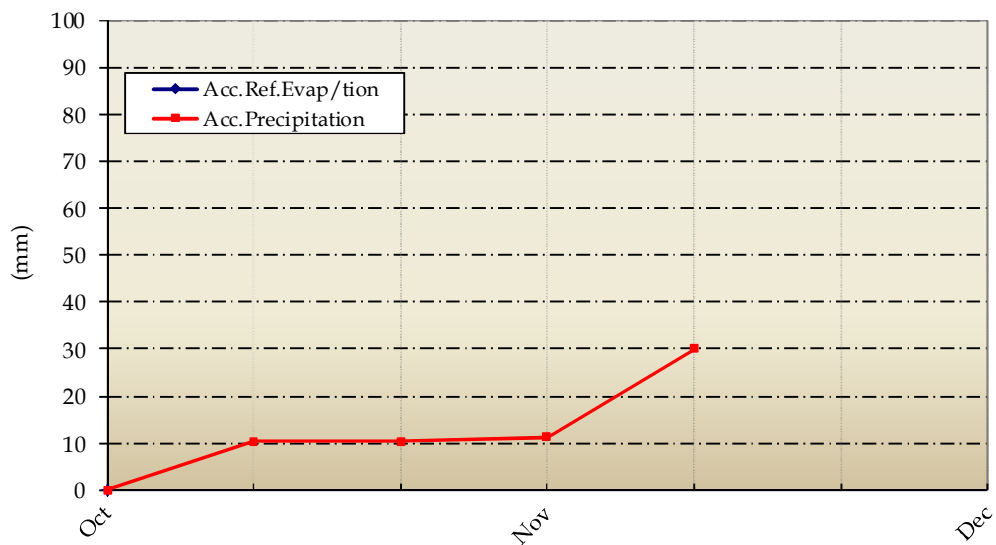
Tanagra

1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.8	20.6	21.9	24.1	25.2	24.4	26.0	23.8	23.2	22.4	22.9	19.5	19.0
	Min	14.6	11.6	7.0	18.0	12.4	10.1	11.3	13.1	7.8	13.5	11.9	11.3	9.1
Relative Humidity	Max	99	96	95	80	97	99	99	100	98	94	96	97	-
	Min	61	44	44	50	29	44	46	46	39	57	46	54	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		0.0	6.9	8.1	1.3	8.1	8.2	6.5	5.1	11.5	2.6	5.8	4.9	
Precipitation		3.5			2.0				11.1		2.3	18.9	9.7	19.6
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-
Growing Degrees	5	11.2	11.1	9.5	16.1	13.8	12.3	13.7	13.5	10.5	13.0	124.4	104.3	
	10	6.2	6.1	4.5	11.1	8.8	7.3	8.7	8.5	5.5	8.0	74.4	54.3	

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	13.4	
Precipitation - Reference Evapotranspiration	-	-3.7	19.6
Number of Rainy Days	4.0	2.0	3.1
Number of Dry Days	0.0	7.0	-

The missing info in the tables and the graph are due to the absence of data.

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

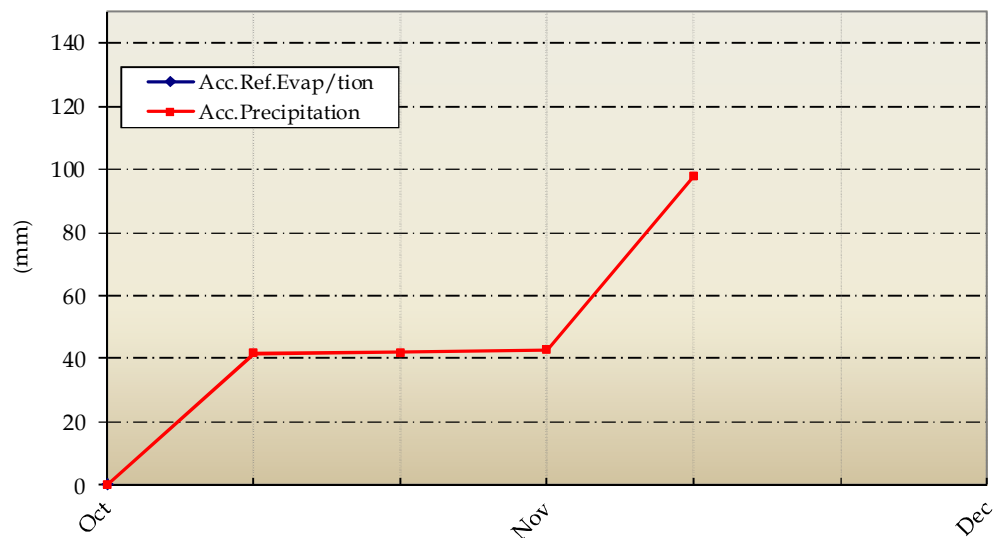


1st 10-day period (1-10/11/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.3	17.5	20.0	18.4	20.3	19.9	22.5	18.6	19.0	18.0	19.2	19.5	16.5
	Min	8.9	11.5	2.7	12.7	8.8	6.9	6.3	8.4	4.0	8.8	7.9	4.9	5.2
Relative Humidity	Max	100	88	100	98	100	100	100	99	100	100	98	97	-
	Min	59	49	39	69	47	52	44	51	50	44	50	41	-
Soil Temperature at 10 cm	06 UTC	14.0	-	-	14.8	13.8	12.8	12.4	-	-	-	13.6	12.1	11.0
	12 UTC	17.2	-	-	16.2	16.8	15.8	-	-	-	-	16.5	15.6	12.3
Sunshine Duration		4.9	7.7	6.3	1.5	8.9	8.0	6.6	5.9	4.4	7.8	6.2	6.4	5.1
Precipitation		0.0	0.7	0.0	26.0	0.6			12.5	0.0	15.3	55.1	12.4	28.3
Evaporation		-	-	-	3.0	1.9	1.7	-	-	-	-	-	-	18.0
Growing Degrees	5	8.6	9.5	6.4	10.6	9.6	8.4	9.4	8.5	6.5	8.4	85.8	71.9	58.6
	10	3.6	4.5	1.4	5.6	4.6	3.4	4.4	3.5	1.5	3.4	35.8	23.6	17.0

1st 10-day period (1-10/11/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	12.7	13.6
Precipitation - Reference Evapotranspiration	-	-0.3	14.7
Number of Rainy Days	5.0	2.0	2.6
Number of Dry Days	1.0	7.0	-

The missing info in the tables and the graph are due to the absence of data.

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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