



AGROMETEOROLOGICAL BULLETIN

December 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



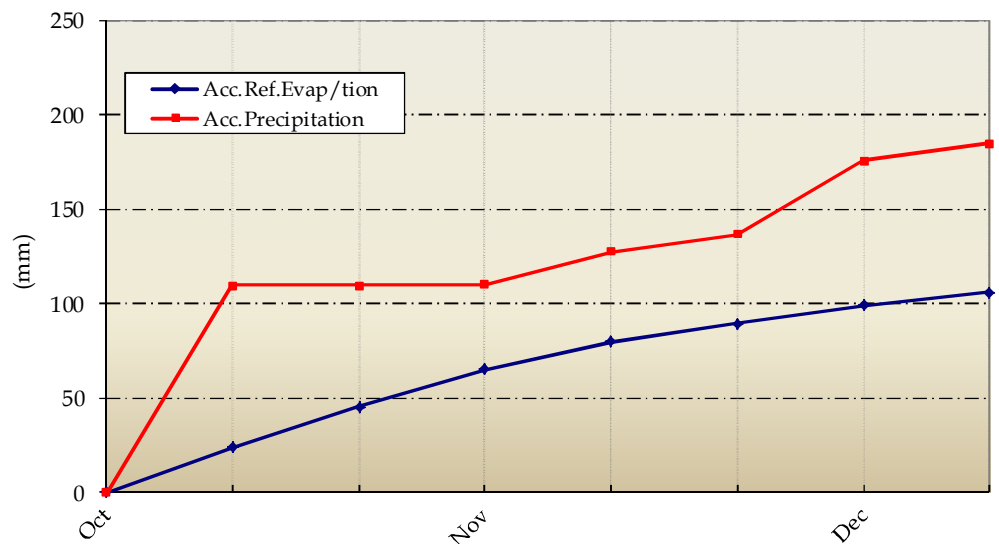
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Web adresses of HNMS
www.emy.gr
www.hnms.gr
www.emy.gov.gr
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www.meteohellas.gr

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.2	12.0	12.6	6.2	10.2	11.2	9.0	12.0	14.2	12.0	11.2	10.1	11.0
	Min	4.2	-0.6	0.6	3.4	-1.6	-1.6	-1.8	5.6	1.6	4.2	1.4	1.9	3.3
Relative Humidity	Max	98	92	98	93	84	98	97	97	98	94	95	87	-
	Min	34	47	53	44	48	60	74	75	59	56	55	59	-
Soil Temperature at 10 cm	06 UTC	11.2	9.2	10.6	9.0	6.6	6.4	6.4	7.6	8.0	9.0	8.4	6.3	7.1
	12 UTC	13.0	11.6	11.6	8.6	9.4	9.0	7.6	9.6	10.4	9.6	10.0	7.6	8.4
Sunshine Duration		8.1	6.2	2.3	0.0	5.9	5.4	0.5	0.6	4.5	0.8	3.4	2.9	2.7
Precipitation				0.1	8.4			0.5				9.0	17.5	30.2
Evaporation		0.0	1.8	0.2	0.0	0.0	0.0	0.0	1.3	0.4	1.2	4.9	5.1	14.9
Growing Degrees	5	3.2	0.7	1.6	0.0	0.0	0.0	0.0	3.8	2.9	3.1	15.3	19.1	28.2
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.3

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.2	7.0	9.7
Precipitation - Reference Evapotranspiration	1.8	10.5	20.5
Number of Rainy Days	3.0	2.0	3.2
Number of Dry Days	3.0	9.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

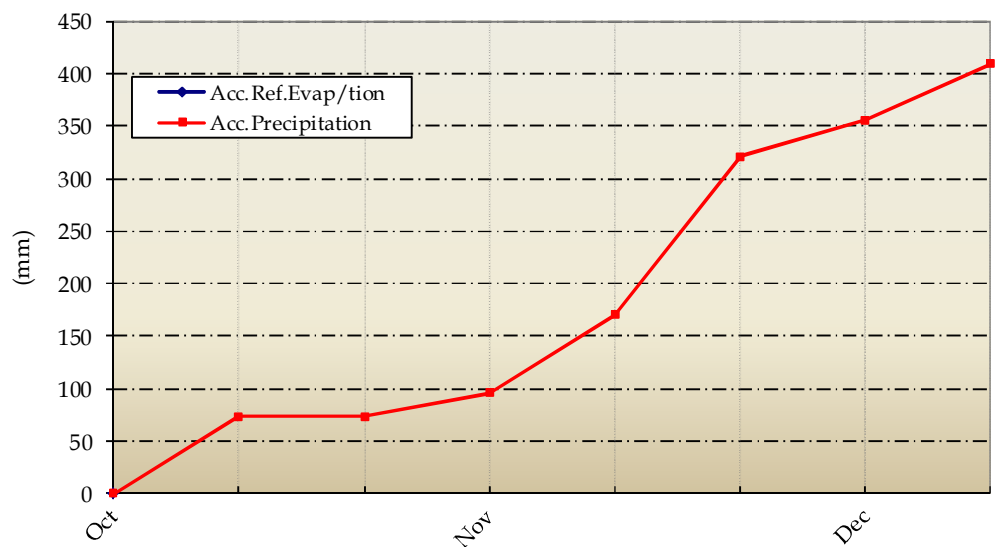


1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.0	15.9	18.6	18.0	17.0	17.3	20.4	18.7	19.3	13.6	17.7	16.6	15.9
	Min	8.3	4.8	13.1	9.8	9.2	9.2	11.8	9.6	7.7	11.0	9.4	5.5	7.3
Relative Humidity	Max	94	94	92	91	92	92	100	94	88	100	94	90	-
	Min	46	61	71	60	62	64	62	57	50	88	62	42	-
Soil Temperature at 10 cm	06 UTC	15.2	13.9	15.2	15.2	15.2	15.0	14.8	15.2	14.0	14.4	14.8	11.0	10.4
	12 UTC	16.2	14.6	15.8	15.8	15.6	15.4	15.4	15.8	14.9	12.6	15.2	13.1	12.0
Sunshine Duration		6.8	1.0	2.3	5.6	1.1	1.9	4.3	6.1	4.7	0.0	3.4	5.0	4.3
Precipitation				2.4	0.7	0.1		7.2			43.7	54.1	11.6	41.8
Evaporation		3.3	0.5	1.8	1.9	0.8	1.2	0.8	3.6	0.3	1.5	15.7	19.2	19.4
Growing Degrees	5	8.2	5.4	10.9	8.9	8.1	8.3	11.1	9.2	8.5	7.3	85.7	60.6	66.0
	10	3.2	0.4	5.9	3.9	3.1	3.3	6.1	4.2	3.5	2.3	35.7	14.5	20.7

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	8.6	9.1
Precipitation - Reference Evapotranspiration	-	3.0	32.7
Number of Rainy Days	5.0	3.0	4.6
Number of Dry Days	6.0	9.0	-

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

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



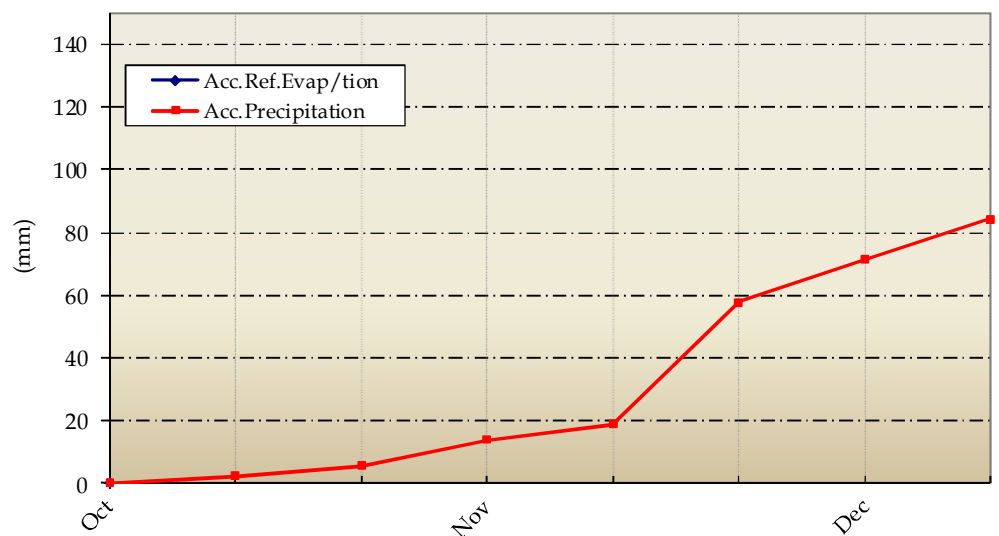
Iraklio

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.4	16.6	19.0	21.4	15.8	16.6	19.8	18.0	18.2	19.2	18.3	16.1	17.3
	Min	16.4	14.0	9.2	11.2	14.8	14.0	14.4	15.0	12.0	12.2	13.3	11.6	11.5
Relative Humidity	Max	83	79	88	87	72	70	83	91	90	91	83	89	-
	Min	54	52	46	55	53	55	63	58	56	59	55	67	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		1.8	6.8	8.1	7.9	1.8	2.3	7.8	1.3	7.6	2.6	4.8	3.1	3.5
Precipitation		1.2			0.2	0.1			5.4		6.2	13.1	28.8	24.2
Evaporation		1.5	2.2	0.8	1.5	5.1	2.4	0.8	2.4	0.2	2.3	19.2	25.5	28.3
Growing Degrees	5	12.4	10.3	9.1	11.3	10.3	10.3	12.1	11.5	10.1	10.7	108.1	88.6	94.2
	10	7.4	5.3	4.1	6.3	5.3	5.3	7.1	6.5	5.1	5.7	58.1	38.6	44.6

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	14.9	-
Precipitation - Reference Evapotranspiration	-	13.9	24.2
Number of Rainy Days	5.0	3.0	3.7
Number of Dry Days	3.0	2.0	-

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Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

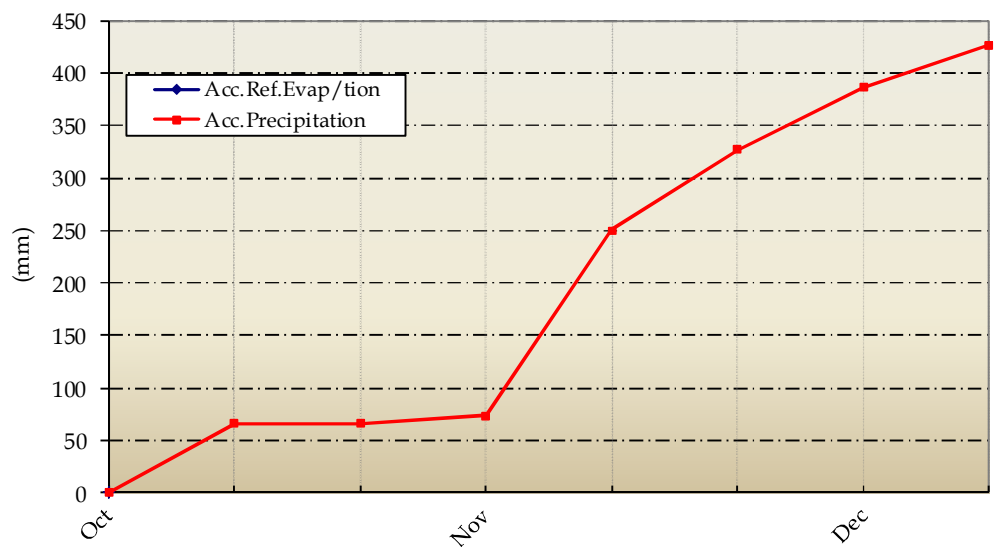


1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.2	11.0	10.3	12.0	9.0	13.0	14.0	12.4	13.0	8.6	11.4	11.3	10.3
	Min	0.0	-1.8	3.8	4.4	-2.0	7.0	9.6	5.2	4.0	4.6	3.5	1.7	1.9
Relative Humidity	Max	100	100	100	100	100	100	100	100	100	100	100	99	-
	Min	82	74	97	79	65	79	91	76	89	97	83	58	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	5.5
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	6.5
Sunshine Duration		1.6	1.7	0.0	0.5	1.0	0.2	0.0	3.4	1.2	0.0	1.0	3.5	2.5
Precipitation		0.0		10.7	14.0	0.1	0.0	8.0			8.4	41.2	38.0	51.5
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	10.5
Growing Degrees	5	0.1	0.0	2.1	3.2	0.0	5.0	6.8	3.8	3.5	1.6	26.1	18.1	17.8
	10	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0	0.9

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	-	6.1
Precipitation - Reference Evapotranspiration	-	-	45.4
Number of Rainy Days	5.0	3.0	4.2
Number of Dry Days	2.0	9.0	-

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

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

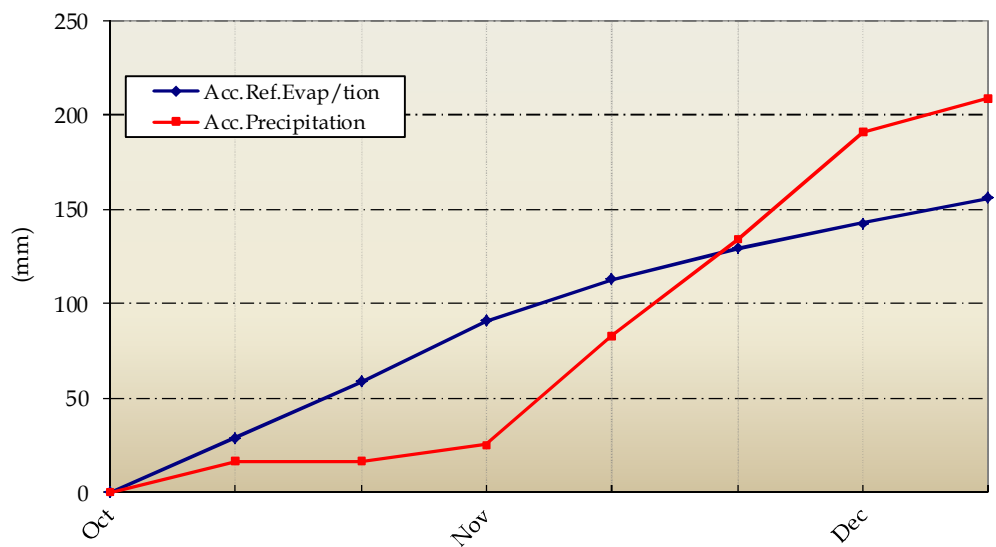


Kalamata

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	20.6	18.5	21.1	21.8	17.4	19.4	20.3	20.4	18.6	17.3	19.5	17.4	16.9
	Min	9.0	7.8	10.2	10.8	12.4	11.6	10.1	9.2	5.8	10.5	9.7	6.5	7.2
Relative Humidity	Max	90	88	91	93	62	90	92	91	88	93	88	86	-
	Min	34	52	55	55	50	55	61	37	45	63	51	44	-
Soil Temperature at 10 cm	06 UTC	15.0	14.0	14.6	14.8	14.8	14.4	14.6	14.6	13.2	14.0	14.4	12.4	11.5
	12 UTC	15.6	14.6	15.4	15.6	15.2	15.0	15.0	14.8	13.8	14.8	15.0	13.2	12.5
Sunshine Duration		8.3	3.2	7.9	6.3	2.5	8.7	5.0	8.0	6.4	0.5	5.7	5.9	4.0
Precipitation					2.3			1.5			13.8	17.6	12.0	45.8
Evaporation		0.4	1.1	0.9	0.3	6.1	0.6	0.0	2.7	1.3	0.6	14.0	21.6	26.7
Growing Degrees	5	9.8	8.2	10.7	11.3	9.9	10.5	10.2	9.8	7.2	8.9	96.4	69.4	70.4
	10	4.8	3.2	5.7	6.3	4.9	5.5	5.2	4.8	2.2	3.9	46.4	19.4	22.7

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.3	14.7	10.9
Precipitation - Reference Evapotranspiration	4.3	-2.7	34.9
Number of Rainy Days	3.0	2.0	4.7
Number of Dry Days	4.0	10.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



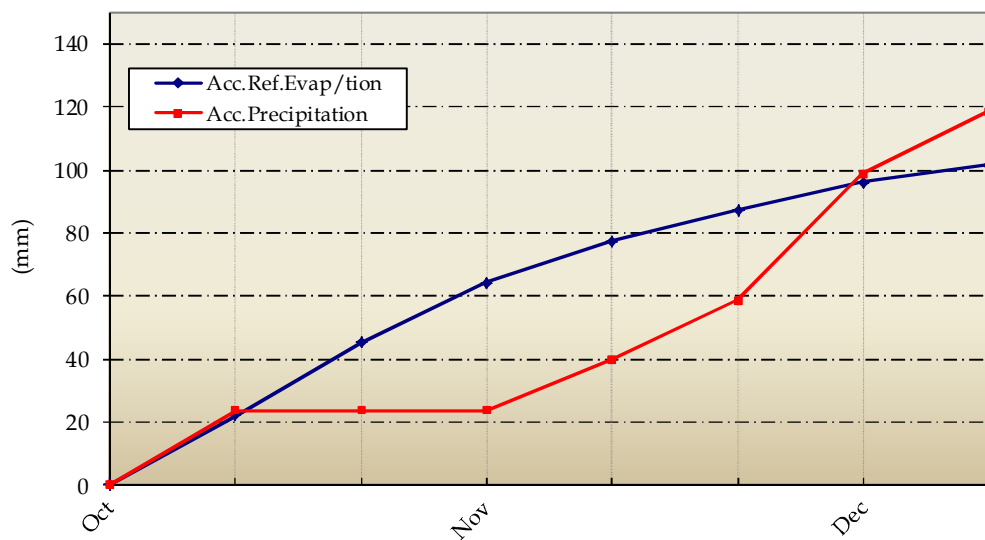
Larisa

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.8	11.2	9.6	9.6	9.6	11.6	11.2	10.0	7.4	10.2	10.3	12.2	11.5
	Min	4.0	0.0	1.8	4.6	4.4	5.6	5.9	7.0	3.4	5.1	4.2	0.6	2.7
Relative Humidity	Max	89	96	100	97	97	98	97	100	100	100	97	96	-
	Min	45	54	78	68	67	65	78	86	98	86	72	50	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	8.1
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	8.8
Sunshine Duration		4.9	2.6	0.0	0.0	0.0	2.6	0.0	1.9	0.0	0.0	1.2	5.1	2.9
Precipitation				0.4	19.3						0.3	20.0	5.3	18.5
Evaporation		2.4	1.5	4.6	-	1.4	0.6	0.2	0.5	-	-	-	11.5	7.8
Growing Degrees	5	3.4	0.6	0.7	2.1	2.0	3.6	3.6	3.5	0.4	2.7	22.5	16.6	25.6
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.5	6.4	6.7
Precipitation - Reference Evapotranspiration	14.5	-1.1	11.8
Number of Rainy Days	3.0	2.0	3.6
Number of Dry Days	3.0	9.0	-

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

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



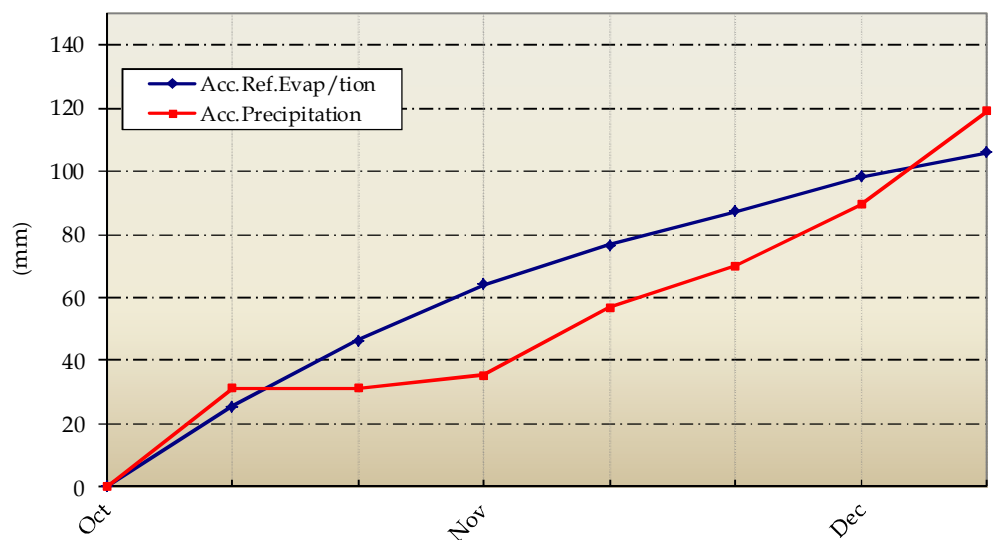
Mikra

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.0	11.3	12.1	10.2	9.8	10.6	11.2	16.0	14.5	12.4	12.0	11.6	11.5
	Min	4.1	1.5	4.4	4.5	5.8	6.2	4.0	2.4	4.0	6.0	4.3	2.4	3.4
Relative Humidity	Max	86	94	96	89	89	93	97	99	98	98	94	85	-
	Min	32	72	64	70	61	61	73	53	70	65	62	47	-
Soil Temperature at 10 cm	06 UTC	11.0	9.5	10.1	8.8	9.5	10.0	9.8	9.4	9.4	10.1	9.8	7.3	7.3
	12 UTC	10.4	10.7	11.0	9.0	10.1	10.0	10.4	12.0	10.8	11.0	10.5	9.1	8.9
Sunshine Duration		7.8	2.7	0.4	0.0	0.2	0.0	0.4	6.6	6.5	0.0	2.5	5.0	3.1
Precipitation				0.0	22.5			0.2			7.0	29.7	1.1	19.0
Evaporation		-	-	-	-	-	-	-	-	-	-	-	18.0	13.0
Growing Degrees	5	3.1	1.4	3.3	2.4	2.8	3.4	2.6	4.2	4.3	4.2	31.5	21.7	28.1
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	3.2

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.6	13.0	8.7
Precipitation - Reference Evapotranspiration	22.1	-11.9	10.3
Number of Rainy Days	3.0	2.0	3.0
Number of Dry Days	7.0	9.0	-

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

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



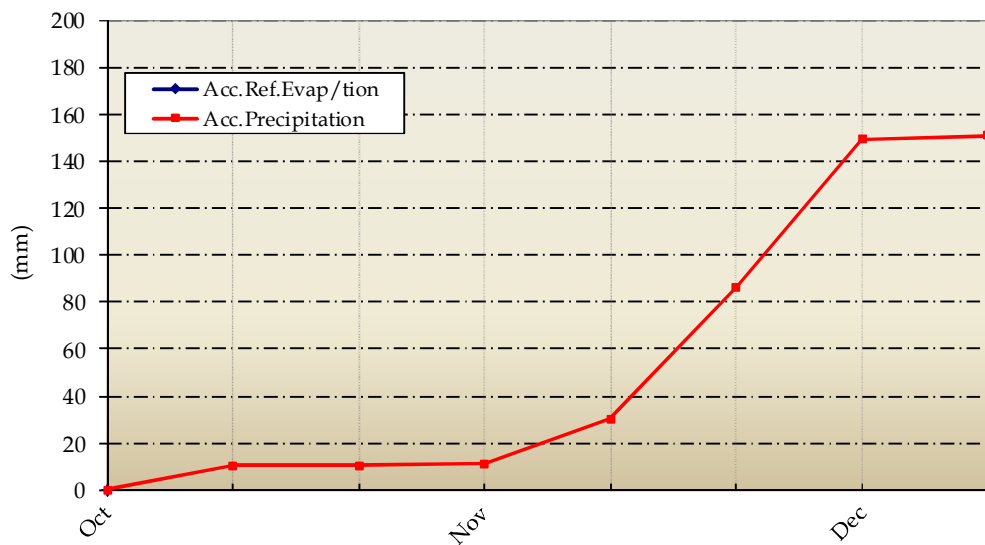
Tanagra

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.3	14.3	18.3	11.8	11.6	11.7	15.6	17.0	15.9	14.6	14.4	12.8	14.0
	Min	8.9	4.0	4.6	9.2	6.6	8.8	5.2	6.0	4.2	7.8	6.5	4.4	5.7
Relative Humidity	Max	82	97	99	99	98	97	100	100	99	100	97	96	-
	Min	38	43	54	65	55	68	67	45	57	84	58	58	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		7.7	5.6	7.3	0.0	1.7	0.0	4.2	7.5	5.9	0.0	4.0	4.1	
Precipitation					0.7						0.7	1.4	11.1	28.6
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-
Growing Degrees	5	6.1	4.2	6.5	5.5	4.1	5.3	5.4	6.5	5.1	6.2	54.7	35.8	
	10	1.1	0.0	1.5	0.5	0.0	0.3	0.4	1.5	0.1	1.2	6.5	1.7	

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	7.4	
Precipitation - Reference Evapotranspiration	-	3.7	28.6
Number of Rainy Days	2.0	2.0	4.4
Number of Dry Days	7.0	5.0	-

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

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



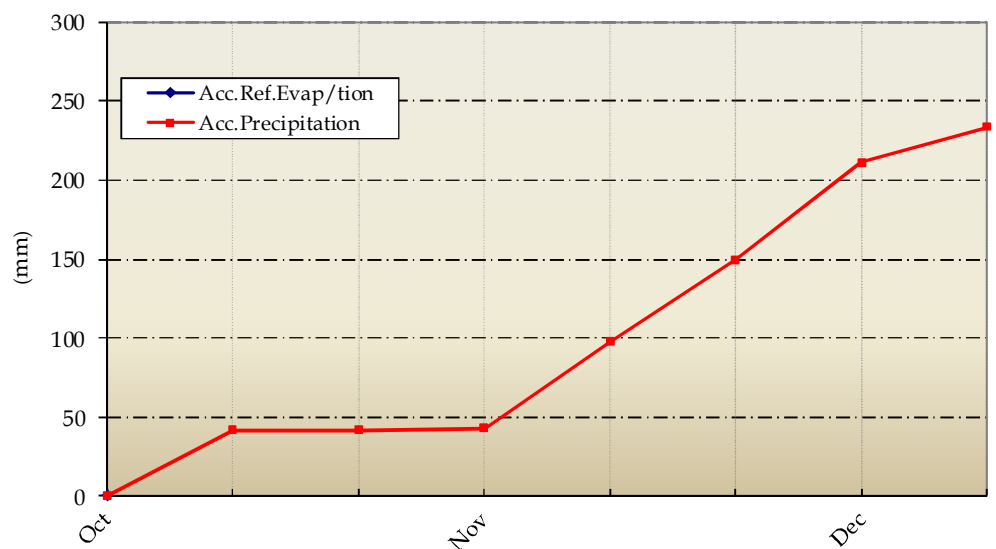
Tripoli

1st 10-day period (1-10/12/2019)		1	2	3	4	5	6	7	8	9	10	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.2	12.4	15.5	8.7	7.9	14.6	16.2	15.5	14.0	12.1	12.9	11.3	11.6
	Min	1.7	0.4	5.2	3.6	6.2	6.0	2.6	2.0	-1.4	5.9	3.2	0.3	2.8
Relative Humidity	Max	100	100	100	100	89	100	100	100	100	100	99	99	-
	Min	41	62	66	81	72	65	50	40	47	70	59	50	-
Soil Temperature at 10 cm	06 UTC	-	8.2	9.2	9.2	9.2	-	-	-	6.8	8.6	8.5	5.7	7.1
	12 UTC	-	10.0	11.4	10.2	9.4	-	-	-	-	10.6	10.3	7.9	7.9
Sunshine Duration		7.2	2.2	1.6	0.1	0.0	3.1	5.1	6.9	6.7	1.7	3.5	5.0	3.7
Precipitation					2.9			0.2	0.0	0.0	19.5	22.6	21.3	38.8
Evaporation		-	1.0	0.3	0.4	-	-	-	-	0.6	0.7	-	5.4	9.1
Growing Degrees	5	2.0	1.4	5.4	1.2	2.1	5.3	4.4	3.8	1.3	4.0	30.7	14.0	26.1
	10	0.0	0.0	0.4	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.7	0.0	2.6

1st 10-day period (1-10/12/2019)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.9	6.8	8.4
Precipitation - Reference Evapotranspiration	16.7	14.5	30.4
Number of Rainy Days	3.0	2.0	4.3
Number of Dry Days	4.0	9.0	-

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_n 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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