



AGROMETEOROLOGICAL BULLETIN

December 2018
2nd 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



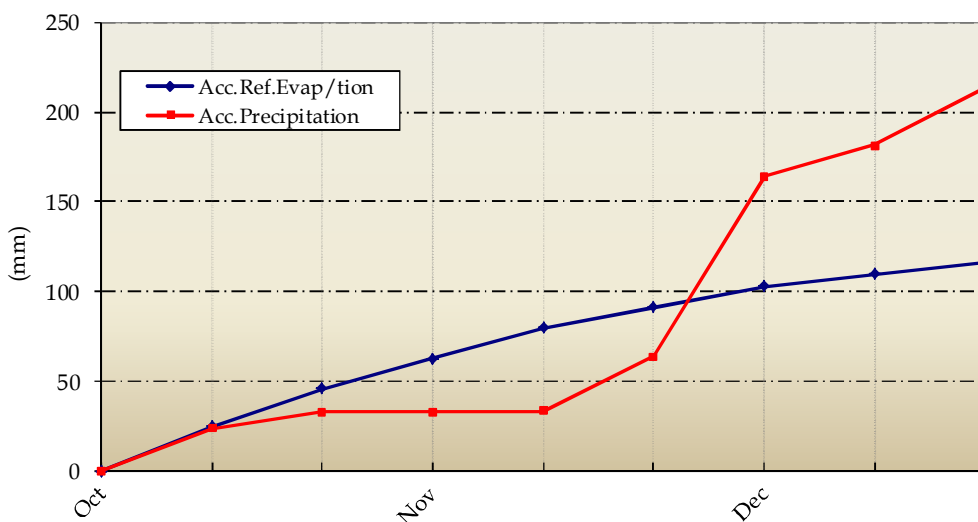
Hellenic National Meteorological Service
Division of Climatology-Applications
El. Venizelou Street 14, 16777
Helliniko, Athens

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

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	7.4	9.0	9.0	8.4	13.4	15.4	12.0	8.0	4.2	4.8	9.2	14.0	10.6
	Min	4.8	1.0	-0.6	2.0	5.2	10.0	7.8	3.2	1.2	-1.0	3.4	5.6	3.1
Relative Humidity	Max	90	85	91	91	97	96	92	88	79	85	89	94	-
	Min	62	46	59	70	88	74	82	74	60	56	67	70	-
Soil Temperature at 10 cm	06 UTC	7.2	6.0	4.4	5.8	7.6	9.8	9.8	8.6	5.6	3.2	6.8	9.2	6.3
	12 UTC	6.0	7.6	6.6	6.6	9.6	11.0	9.6	8.0	5.6	4.4	7.5	11.1	7.5
Sunshine Duration		0.6	7.5	1.3	0.0	0.7	3.5	0.0	0.0	0.0	1.9	1.6	5.6	2.5
Precipitation		3.6		0.5	0.3	8.0	6.0	7.9	5.7	0.0		32.0	51.4	23.7
Evaporation		0.8	0.7	0.9	0.5	2.2	0.8	0.2	0.4	0.0	0.0	6.5	10.3	11.7
Growing Degrees	5	1.1	0.0	0.0	0.2	4.3	7.7	4.9	0.6	0.0	0.0	18.8	49.7	26.7
	10	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	2.7	15.3	5.3

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.4	7.4	8.1
Precipitation - Reference Evapotranspiration	25.6	44.0	15.6
Number of Rainy Days	7.0	4.0	2.9
Number of Dry Days	0.0	5.0	-

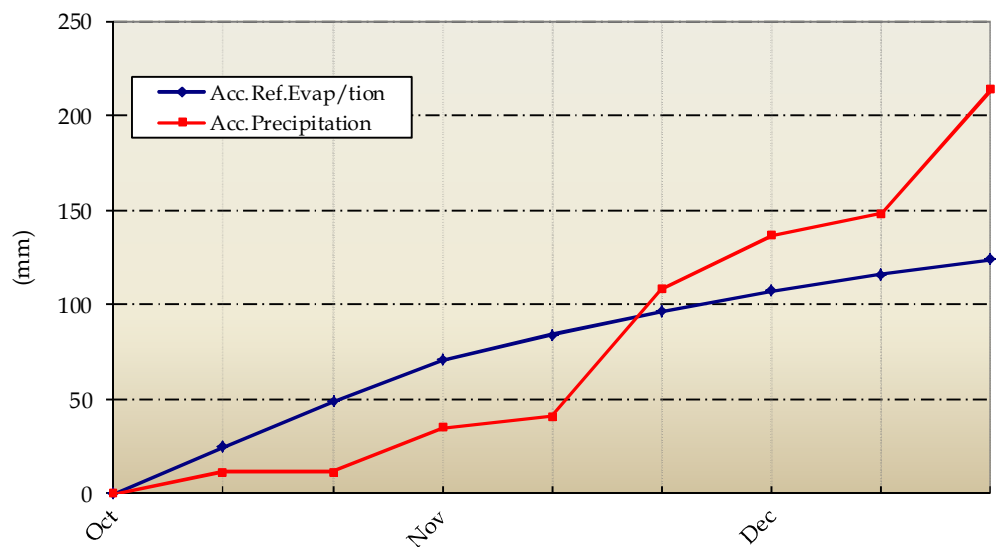
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.2	15.2	12.4	18.0	20.5	15.4	15.2	13.3	14.6	16.4	15.5	15.9	15.1
	Min	4.6	3.6	6.2	9.6	10.6	8.3	7.6	9.8	5.4	2.0	6.8	8.4	6.8
Relative Humidity	Max	100	97	100	100	97	97	98	100	89	100	98	88	-
	Min	56	39	64	66	41	54	52	55	48	44	52	58	-
Soil Temperature at 10 cm	06 UTC	11.0	10.6	9.8	11.6	12.4	12.4	11.8	12.0	11.0	10.0	11.3	11.9	9.7
	12 UTC	12.6	11.4	11.6	13.2	14.0	12.6	12.8	13.2	11.6	11.2	12.4	12.6	11.2
Sunshine Duration		0.2	5.4	0.4	4.4	4.9	1.8	2.2	0.0	6.5	6.1	3.2	3.2	4.1
Precipitation		6.3	3.6	12.6	5.1	17.0	1.6	0.2	19.1			65.5	68.4	43.9
Evaporation		2.2	3.5	0.1	2.1	1.5	1.0	0.5	1.8	2.0	3.2	17.9	16.6	19.6
Growing Degrees	5	4.4	4.4	4.3	8.8	10.6	6.9	6.4	6.6	5.0	4.2	61.5	71.2	59.8
	10	0.0	0.0	0.0	3.8	5.6	1.9	1.4	1.6	0.0	0.0	14.2	25.5	16.6

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	8.0	9.4	9.0
Precipitation - Reference Evapotranspiration	57.5	59.0	34.9
Number of Rainy Days	8.0	4.0	4.7
Number of Dry Days	0.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

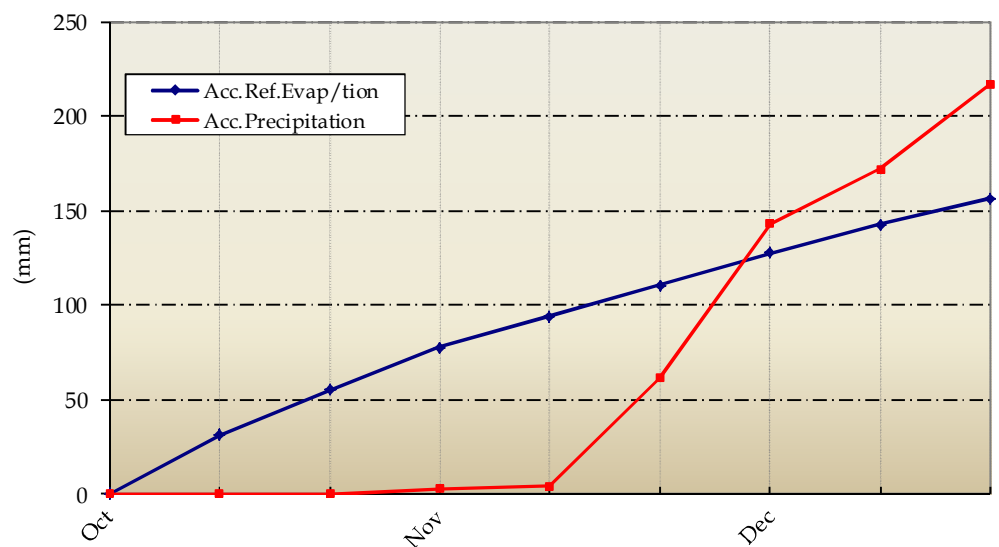


Iraklio

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.0	14.0	17.0	21.0	21.0	18.0	17.0	15.2	12.8	13.0	16.5	18.5	16.6
	Min	12.2	8.6	7.2	11.6	14.4	14.4	9.8	12.6	11.4	11.6	11.4	11.9	10.5
Relative Humidity	Max	90	94	95	84	86	88	93	95	92	87	90	86	-
	Min	74	70	62	64	55	67	73	78	73	74	69	55	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		3.8	4.3	1.6	8.0	5.3	3.6	6.8	2.7	0.2	0.0	3.6	4.3	3.8
Precipitation		2.0	3.7	0.1	1.4		21.0		11.1	5.6		44.9	0.2	23.4
Evaporation		1.4	2.8	2.5	1.5	3.8	1.2	2.8	5.1	3.2	0.0	24.3	18.9	25.9
Growing Degrees	5	9.1	6.3	7.1	11.3	12.7	11.2	8.4	8.9	7.1	7.3	89.4	101.7	85.7
	10	4.1	1.3	2.1	6.3	7.7	6.2	3.4	3.9	2.1	2.3	39.4	51.7	36.5

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.6	15.6	-
Precipitation - Reference Evapotranspiration	31.3	-15.4	23.4
Number of Rainy Days	7.0	1.0	3.8
Number of Dry Days	1.0	13.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

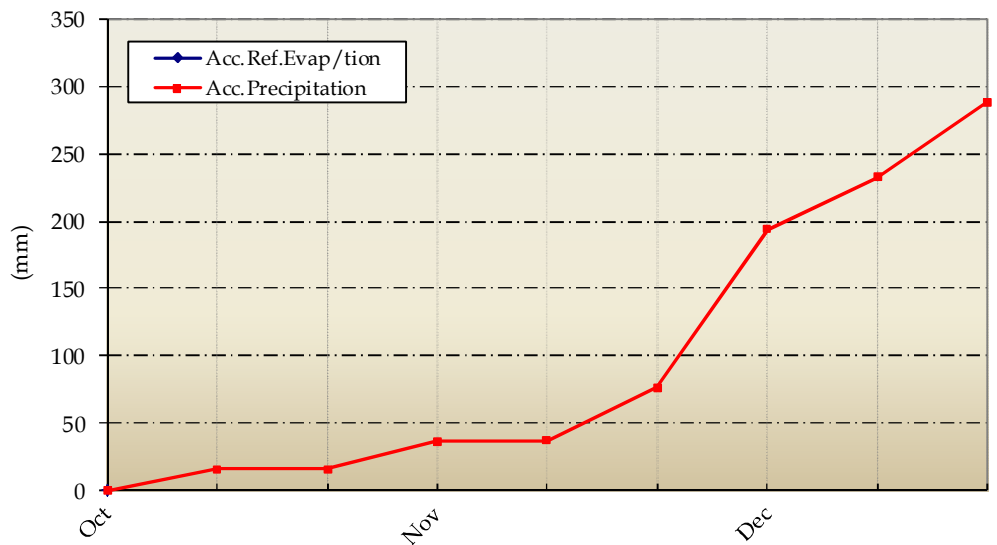


Ioannina

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	8.0	7.2	3.8	11.0	10.6	10.2	8.4	10.2	8.8	8.0	8.6	9.8	9.6
	Min	-4.0	-5.6	0.8	3.0	7.0	3.8	0.8	4.0	-2.0	-1.8	0.6	2.4	1.6
Relative Humidity	Max	100	100	100	100	100	97	100	100	100	100	100	100	-
	Min	62	42	84	85	95	51	71	64	57	64	68	76	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	4.9
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	5.7
Sunshine Duration		2.7	5.1	0.0	0.7	0.0	2.5	0.7	1.9	6.0	2.8	2.2	1.3	2.5
Precipitation				3.4	5.8	27.1	0.1		20.0			56.4	38.6	54.5
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	5.5
Growing Degrees	5	0.0	0.0	0.0	2.0	3.8	2.0	0.0	2.1	0.0	0.0	9.9	21.2	16.0
	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	0.8

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	-	5.7
Precipitation - Reference Evapotranspiration	-	-	48.8
Number of Rainy Days	5.0	6.0	4.4
Number of Dry Days	2.0	1.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

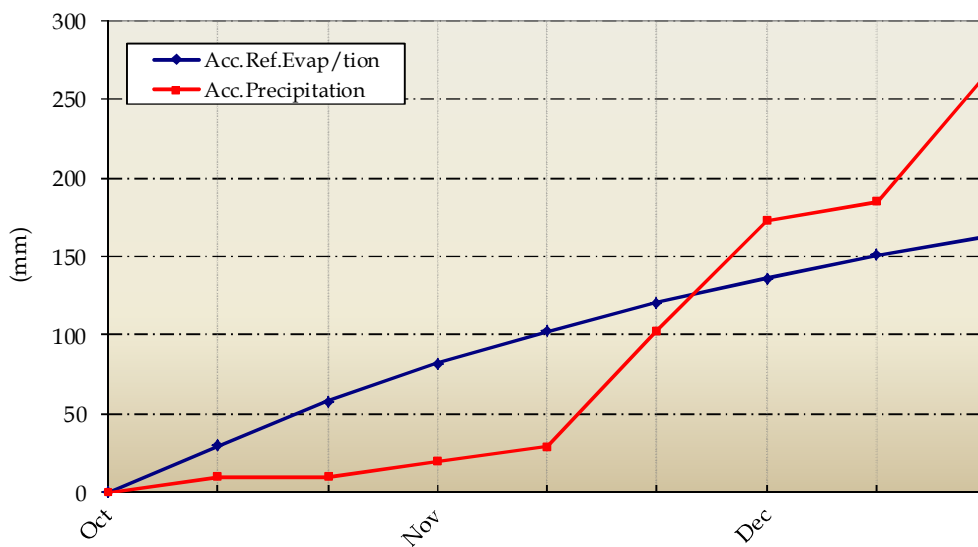


Kalamata

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.2	14.2	13.1	19.4	19.4	18.4	15.4	14.4	16.2	16.8	16.0	16.9	15.9
	Min	6.8	2.5	3.9	8.7	12.0	9.3	6.3	10.3	6.6	3.6	7.0	6.4	6.6
Relative Humidity	Max	90	92	93	94	91	86	89	94	89	91	91	92	-
	Min	64	34	80	62	55	51	51	67	43	44	55	53	-
Soil Temperature at 10 cm	06 UTC	12.4	11.0	11.0	11.4	13.0	12.4	12.4	12.4	12.0	11.0	11.9	-	10.6
	12 UTC	12.6	11.6	10.6	12.6	13.8	13.6	12.6	13.0	12.6	11.6	12.5	-	11.5
Sunshine Duration		2.4	6.3	0.0	6.4	3.5	7.1	2.9	1.5	7.1	6.7	4.4	3.7	3.9
Precipitation		7.9	1.1	27.0	1.2	11.1	14.3	0.0	19.2			81.8	30.4	53.6
Evaporation		0.0	0.2	0.4	2.4	2.0	2.3	2.1	0.1	2.4	2.8	14.7	17.1	23.9
Growing Degrees	5	5.0	3.4	3.5	9.1	10.7	8.9	5.9	7.4	6.4	5.2	65.3	66.9	62.3
	10	0.0	0.0	0.0	4.1	5.7	3.9	0.9	2.4	1.4	0.2	18.4	21.8	17.2

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	12.5	10.8	10.5
Precipitation - Reference Evapotranspiration	69.3	19.6	43.1
Number of Rainy Days	7.0	3.0	4.7
Number of Dry Days	0.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

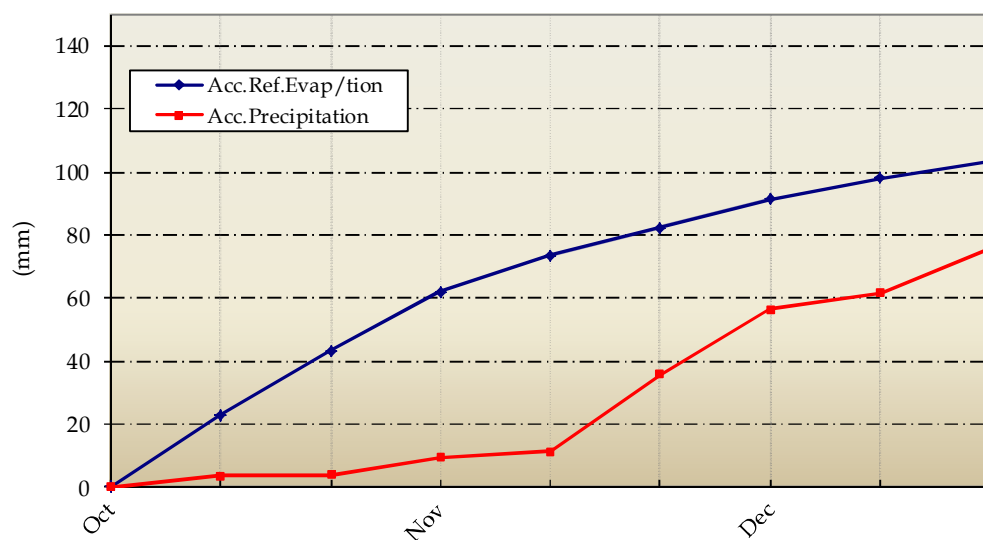


Larisa

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.0	9.6	4.4	7.0	9.7	12.6	8.8	7.0	9.9	10.0	8.9	14.3	11.0
	Min	-0.2	-1.9	-0.9	3.6	6.4	6.4	1.6	4.3	2.8	-1.8	2.0	2.0	1.7
Relative Humidity	Max	89	85	96	99	99	99	93	97	97	98	95	95	-
	Min	44	32	82	84	92	81	60	72	51	58	66	52	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	6.9
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	7.3
Sunshine Duration		3.2	7.0	0.0	0.0	0.0	2.2	0.6	0.0	4.1	6.1	2.3	4.0	3.1
Precipitation				2.3	0.3	1.0	0.4		10.2	0.0		14.2	6.7	14.0
Evaporation		0.4	0.6	0.2	0.3	0.0	0.5	2.2	0.2	0.2	0.3	4.9	10.5	6.0
Growing Degrees	5	0.0	0.0	0.0	0.3	3.1	4.5	0.2	0.7	1.4	0.0	10.1	36.6	20.8
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	2.1

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.2	7.3	5.8
Precipitation - Reference Evapotranspiration	9.0	-0.6	8.2
Number of Rainy Days	5.0	3.0	3.3
Number of Dry Days	2.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

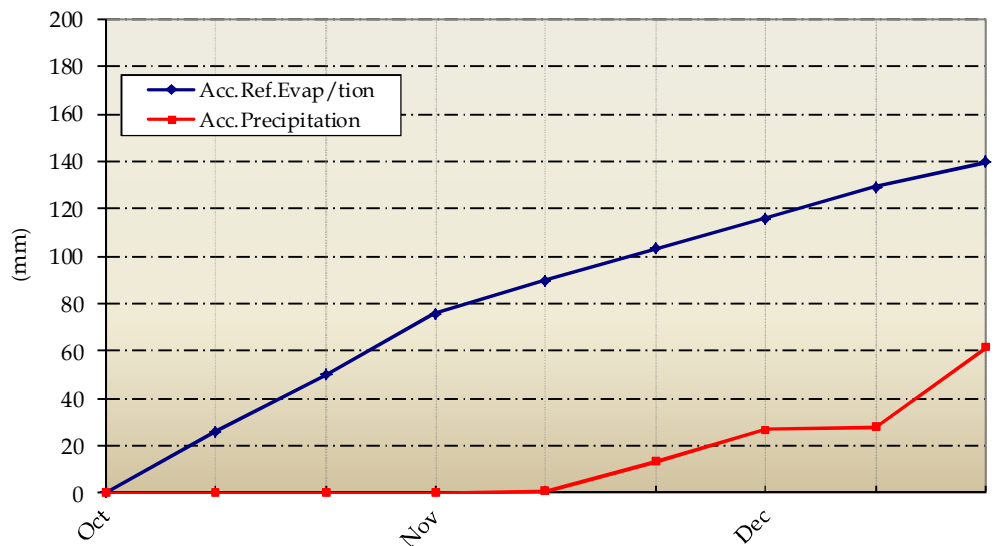


Mikra

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.6	10.5	6.8	7.6	10.0	13.4	8.6	7.3	7.8	7.9	9.0	13.2	10.6
	Min	7.3	2.8	-0.8	5.2	7.2	5.8	2.8	3.4	2.2	-1.2	3.5	4.0	3.0
Relative Humidity	Max	52	65	91	97	93	94	88	84	88	92	84	79	-
	Min	33	29	63	90	91	56	51	63	51	64	59	46	-
Soil Temperature at 10 cm	06 UTC	7.2	6.0	4.8	7.0	8.0	9.8	6.0	7.4	5.2	4.0	6.5	7.7	6.2
	12 UTC	8.6	8.8	5.8	7.4	8.8	10.0	10.0	6.8	5.8	5.6	7.8	8.7	7.7
Sunshine Duration		6.8	8.1	0.0	0.0	0.0	0.6	1.2	0.0	6.6	3.2	2.6	5.4	2.8
Precipitation				1.9	0.5	0.8	12.2		17.6	0.5		33.5	0.7	12.5
Evaporation		4.0	0.0	0.0	0.6	0.2	0.4	0.0	1.3	0.0	0.0	6.5	15.2	10.6
Growing Degrees	5	4.0	1.7	0.0	1.4	3.6	4.6	0.7	0.4	0.0	0.0	16.3	38.4	24.9
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	2.8

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	10.8	11.7	8.4
Precipitation - Reference Evapotranspiration	22.7	-11.0	4.1
Number of Rainy Days	6.0	1.0	2.9
Number of Dry Days	2.0	7.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

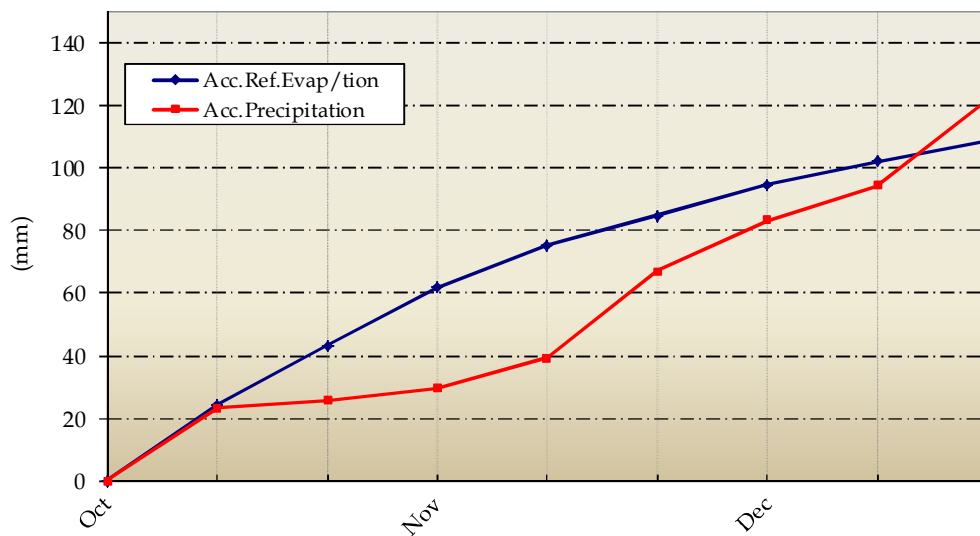


Tanagra

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.8	10.2	5.1	12.6	17.9	15.4	12.8	8.2	8.0	9.8	11.1	16.3	13.4
	Min	1.8	0.7	0.0	5.0	7.4	8.6	5.7	4.4	5.9	5.9	4.5	6.2	5.0
Relative Humidity	Max	95	86	100	100	100	100	100	100	87	100	97	87	-
	Min	56	41	78	31	55	58	49	87	70	69	59	45	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		1.9	7.0	0.0	0.8	1.6	1.8	4.3	0.0	0.6	1.6	2.0	5.4	
Precipitation		1.2		14.5			1.4	4.3	4.1	2.1		27.6	0.7	25.9
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-
Growing Degrees	5	1.3	0.5	0.0	3.8	7.7	7.0	4.3	1.3	2.0	2.9	30.6	62.8	
	10	0.0	0.0	0.0	0.0	2.7	2.0	0.0	0.0	0.0	0.0	4.7	24.4	

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.6	11.9	
Precipitation - Reference Evapotranspiration	21.0	-11.2	25.9
Number of Rainy Days	6.0	3.0	4.3
Number of Dry Days	0.0	11.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

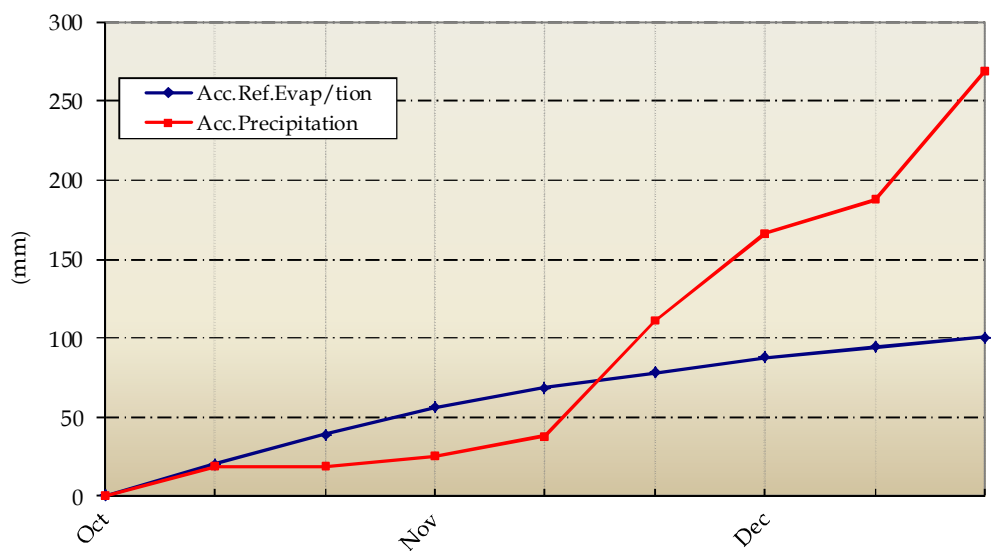


Tripoli

2nd 10-day period (11-20/12/2018)		11	12	13	14	15	16	17	18	19	20	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	8.7	8.6	5.2	15.5	10.9	14.2	12.0	10.7	9.5	11.1	10.6	11.9	10.8
	Min	1.9	-2.0	-0.8	4.8	6.6	2.7	0.0	4.9	0.9	-2.2	1.7	2.5	1.8
Relative Humidity	Max	100	100	100	100	100	100	100	100	100	100	100	97	-
	Min	81	35	87	55	80	52	47	65	59	53	61	55	-
Soil Temperature at 10 cm	06 UTC	6.2	4.8	4.8	6.6	7.6	-	5.6	7.2	-	-	6.1	5.6	6.0
	12 UTC	7.2	6.6	5.2	8.8	-	-	7.4	9.2	-	-	7.4	7.2	6.7
Sunshine Duration		0.0	5.4	0.0	5.6	6.1	6.1	5.3	3.1	7.3	7.3	4.6	3.8	3.6
Precipitation		10.8	0.0	14.3	13.8	8.8	15.2	0.0	18.5		0.0	81.4	21.4	40.9
Evaporation		0.0	0.0	0.0	0.7	-	-	0.8	-	-	0.0	-	-	10.0
Growing Degrees	5	0.3	0.0	0.0	5.2	3.8	3.5	1.0	2.8	0.2	0.0	16.7	27.8	19.6
	10	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	4.0	1.5

2nd 10-day period (11-20/12/2018)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.6	7.0	7.6
Precipitation - Reference Evapotranspiration	75.8	14.4	33.3
Number of Rainy Days	6.0	3.0	4.3
Number of Dry Days	0.0	5.0	-

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_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

© HELLENIC NATIONAL METEOROLOGICAL SERVICE

Reproduction is prohibited without written permission

El. Venizelou street 14, Zip Code 16777

Helliniko, Athens



ΕΘΝΙΚΗ
ΜΕΤΕΩΡΟΛΟΓΙΚΗ
ΥΠΗΡΕΣΙΑ

HELLENIC NATIONAL METEOROLOGICAL SERVICE

Division of Climatology-Applications

Issue Editors :

Papakrivou Anastasia

The present bulletin was designed and implemented under the support of Water Resources Management Division of Agriculture University of Athens