



# AGROMETEOROLOGICAL BULLETIN

*December 2013*  
*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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[www.hnms.gr](http://www.hnms.gr)  
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[www.meteo.gov.gr](http://www.meteo.gov.gr)  
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Agrinio

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	-	-	14.0	13.8	-	-	-	-	-	-	-	13.9	-	14.0
	Min	-	-	-2.6	5.2	-	-	-	-	-	-	-	1.3	2.4	3.8
Relative Humidity	Max	-	93	92	81	-	-	-	-	-	-	-	89	97	-
	Min	-	45	42	33	-	-	-	-	-	-	-	40	54	-
Soil Temperature at 10 cm	06 UTC	-	-	-	5.0	-	-	-	-	-	-	-	5.0	7.8	7.7
	12 UTC	-	-	-	7.0	-	-	-	-	-	-	-	7.0	8.4	9.5
Sunshine Duration		-	7.8	8.0	8.5	-	-	-	-	-	-	-	8.1	4.1	3.3
Precipitation														-	49.6
Evaporation		-	0.7	2.0	-	-	-	-	-	-	-	-	-	-	14.2
Growing Degrees	5	-	-	0.7	4.5	-	-	-	-	-	-	-	-	-	43.3
	10	-	-	0.0	0.0	-	-	-	-	-	-	-	-	-	7.7

3rd 10-day period (21-31/12/2013)	Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	8.7
Precipitation - Reference Evapotranspiration	-	40.9
Number of Rainy Days	0.0	4.2
Number of Dry Days	29.0	-

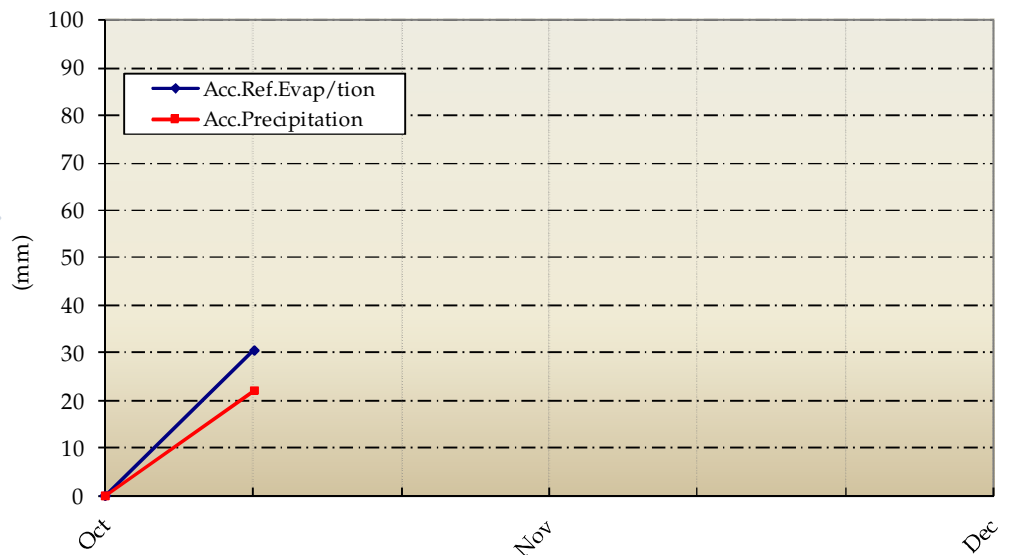


Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

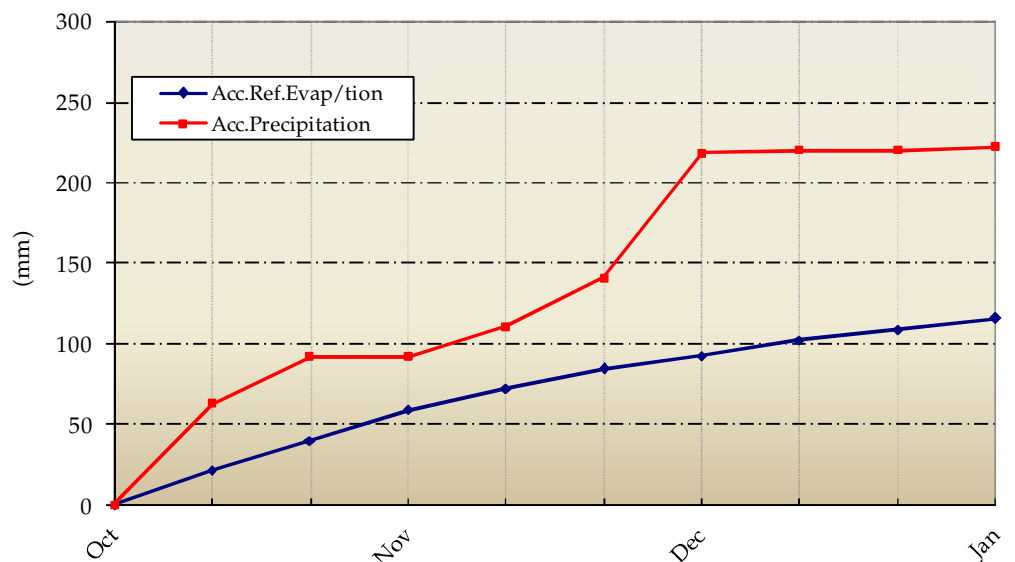
This station is not fully operated

Alexandroupoli

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	8.6	9.6	6.2	4.0	11.8	11.0	14.0	15.2	12.2	8.0	5.4	9.6	9.5	9.8
	Min	-2.0	-5.2	-1.2	-3.0	0.6	0.4	0.0	10.6	1.2	1.8	2.8	0.5	2.1	2.4
Relative Humidity	Max	96	100	100	96	100	96	90	74	89	97	90	93	85	-
	Min	70	64	82	84	61	67	52	37	58	76	65	65	61	-
Soil Temperature at 10 cm	06 UTC	3.8	3.2	3.6	3.4	4.2	5.4	7.0	8.6	5.8	5.8	5.8	5.1	5.3	6.0
	12 UTC	6.0	4.2	5.2	4.8	5.6	5.6	8.6	9.4	7.8	7.2	6.6	6.5	6.3	7.2
Sunshine Duration		7.0	6.3	0.4	1.6	5.9	0.5	0.0	0.4	5.0	4.5	0.0	2.9	2.3	2.6
Precipitation								1.5	0.5				2.0	2.6	24.7
Evaporation		0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.4	1.6	0.1	0.1	3.7	12.6	12.0
Growing Degrees	5	0.0	0.0	0.0	0.0	1.2	0.7	2.0	7.9	1.7	0.0	0.0	13.5	20.2	24.9
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	2.9	2.7	4.2

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.8	8.8	8.4
Precipitation - Reference Evapotranspiration	-4.8	-6.2	16.3
Number of Rainy Days	2.0	1.0	2.9
Number of Dry Days	13.0	9.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

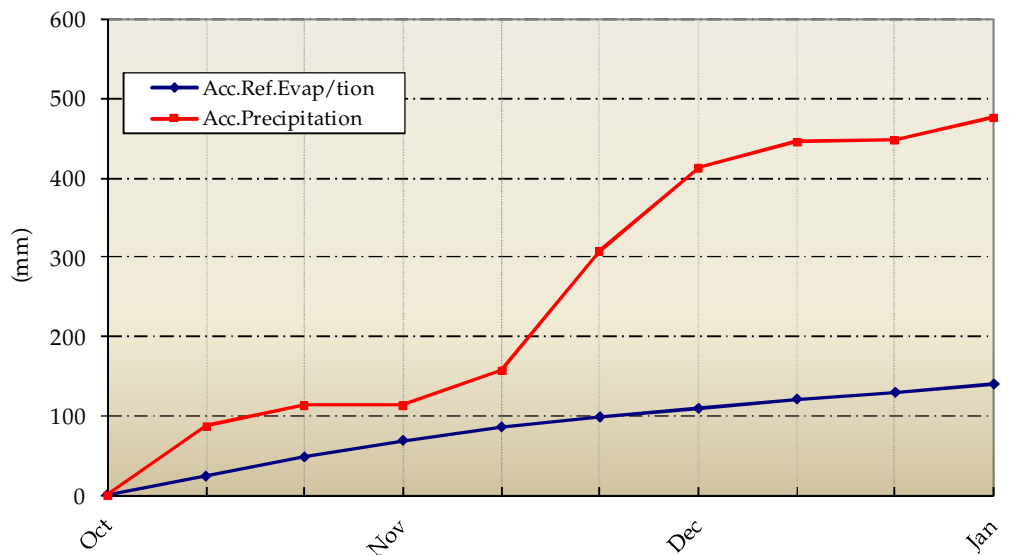


Andravida

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.6	16.5	15.5	12.6	19.2	14.8	15.8	16.6	16.9	18.0	16.2	16.1	15.0	14.4
	Min	0.6	0.9	0.8	6.5	6.7	4.5	10.8	9.1	5.3	5.1	6.9	5.2	5.4	6.0
Relative Humidity	Max	89	87	88	89	91	91	91	92	90	91	88	90	90	-
	Min	53	43	50	70	47	66	69	62	55	48	63	57	56	-
Soil Temperature at 10 cm	06 UTC	7.0	7.0	6.5	8.8	8.6	8.6	11.4	10.6	10.0	9.6	10.4	9.0	9.7	9.0
	12 UTC	9.8	9.8	9.6	9.4	9.6	10.0	11.8	12.0	12.2	12.0	12.2	10.8	11.5	10.5
Sunshine Duration		7.7	7.4	6.1	0.0	6.4	0.2	0.0	3.4	7.6	7.8	0.0	4.2	5.1	4.0
Precipitation					0.3		1.2	27.2	0.1				28.8	34.2	44.5
Evaporation		0.6	0.0	0.7	0.0	5.9	1.3	7.3	0.9	0.5	2.0	0.0	19.2	-	21.9
Growing Degrees	5	2.6	3.7	3.2	4.6	8.0	4.7	8.3	7.9	6.1	6.6	6.6	62.0	57.1	57.7
	10	0.0	0.0	0.0	0.0	3.0	0.0	3.3	2.9	1.1	1.6	1.6	13.3	10.0	13.8

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	10.4	9.3	9.5
Precipitation - Reference Evapotranspiration	18.4	24.9	35.0
Number of Rainy Days	4.0	5.0	4.8
Number of Dry Days	7.0	2.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

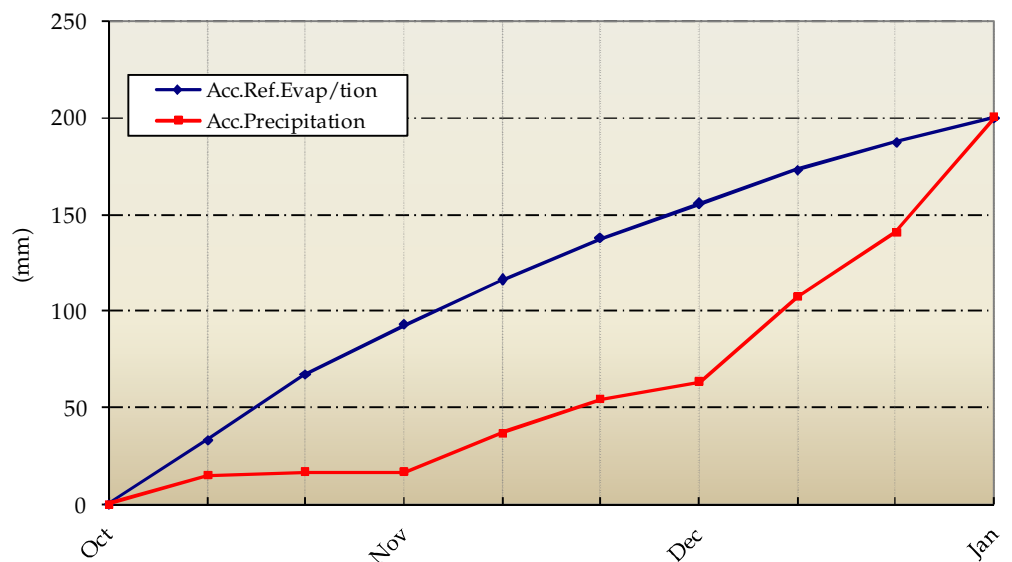


Iraklio

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.4	16.2	16.5	15.4	18.5	18.4	18.0	15.0	15.2	16.5	15.5	16.5	15.8	15.9
	Min	10.0	9.8	8.0	8.6	9.8	9.0	13.0	10.6	10.0	11.8	13.8	10.4	10.4	10.0
Relative Humidity	Max	92	92	90	85	92	85	93	95	88	88	88	90	90	-
	Min	75	63	68	70	67	64	62	71	68	68	65	67	69	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		6.7	6.9	6.5	0.1	3.8	6.7	0.9	0.6	0.2	4.5	0.4	3.4	3.0	3.8
Precipitation		1.1				0.9		1.6	24.6	30.8	0.5		59.5	44.3	34.5
Evaporation		2.5	0.2	9.6	3.4	0.8	0.6	2.1	0.0	0.0	2.2	0.6	22.0	-	28.1
Growing Degrees	5	8.2	8.0	7.3	7.0	9.2	8.7	10.5	7.8	7.6	9.2	9.7	93.0	89.1	87.3
	10	3.2	3.0	2.3	2.0	4.2	3.7	5.5	2.8	2.6	4.2	4.7	38.0	34.1	33.4

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	12.8	13.4	-
Precipitation - Reference Evapotranspiration	46.7	30.9	34.5
Number of Rainy Days	6.0	6.0	4.5
Number of Dry Days	0.0	0.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

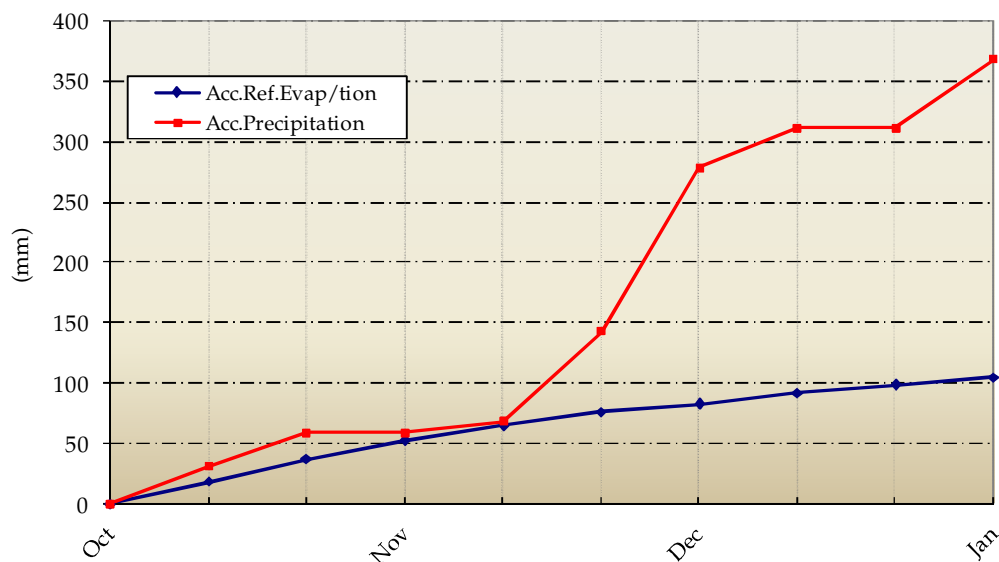


Ioannina

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	10.1	6.2	12.6	5.4	6.6	9.6	9.6	14.6	11.6	9.7	12.6	9.9	9.4	8.8
	Min	-8.8	-8.2	-7.1	-3.8	-0.9	2.7	7.1	5.1	-1.5	-1.5	0.4	-1.5	1.3	0.9
Relative Humidity	Max	94	94	94	89	96	97	97	97	98	98	92	95	95	-
	Min	39	33	30	30	93	82	76	44	48	45	55	52	68	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7
Sunshine Duration		4.7	4.7	4.7	0.0	0.0	0.0	0.0	3.8	4.6	4.7	0.0	2.5	2.2	2.4
Precipitation					0.5	12.3	1.4	42.6	0.0				56.8	35.4	50.6
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-	9.0
Growing Degrees	5	0.0	0.0	0.0	0.0	0.0	1.2	3.4	4.9	0.1	0.0	1.5	10.9	12.5	14.1
	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	0.0	0.9

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.6	6.4	6.2
Precipitation - Reference Evapotranspiration	50.2	29.0	44.4
Number of Rainy Days	4.0	3.0	4.3
Number of Dry Days	16.0	8.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

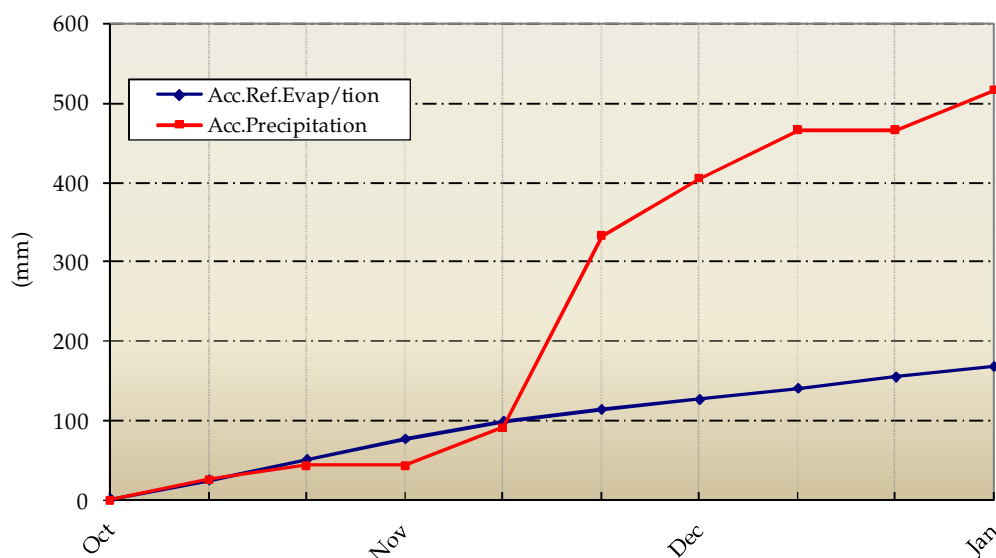


Kalamata

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.9	17.8	16.4	15.6	19.7	17.5	16.8	16.0	19.5	18.8	16.5	17.6	16.9	15.2
	Min	2.9	2.5	2.0	7.6	9.4	6.5	10.1	6.7	6.0	5.9	7.6	6.1	5.3	6.1
Relative Humidity	Max	93	89	88	83	87	89	94	94	93	93	93	91	90	-
	Min	29	36	48	61	36	59	70	52	48	59	58	51	48	-
Soil Temperature at 10 cm	06 UTC	7.2	8.4	8.0	8.8	9.4	9.6	11.2	10.4	9.8	9.0	9.0	9.2	10.6	10.0
	12 UTC	8.6	8.6	8.6	9.2	10.0	10.0	11.2	10.6	10.4	10.4	10.6	9.8	11.3	10.9
Sunshine Duration		8.0	8.3	6.5	0.3	5.3	2.9	0.0	0.5	7.8	7.0	2.1	4.4	5.9	3.9
Precipitation					0.2		0.9	45.9	3.5				50.5	13.0	41.5
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	19.4	22.7
Growing Degrees	5	5.9	5.2	4.2	6.6	9.6	7.0	8.5	6.4	7.8	7.4	7.1	75.4	67.2	62.1
	10	0.9	0.2	0.0	1.6	4.6	2.0	3.5	1.4	2.8	2.4	2.1	21.2	15.0	14.5

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.5	13.4	11.8
Precipitation - Reference Evapotranspiration	37.0	-0.4	29.7
Number of Rainy Days	4.0	2.0	4.8
Number of Dry Days	20.0	2.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

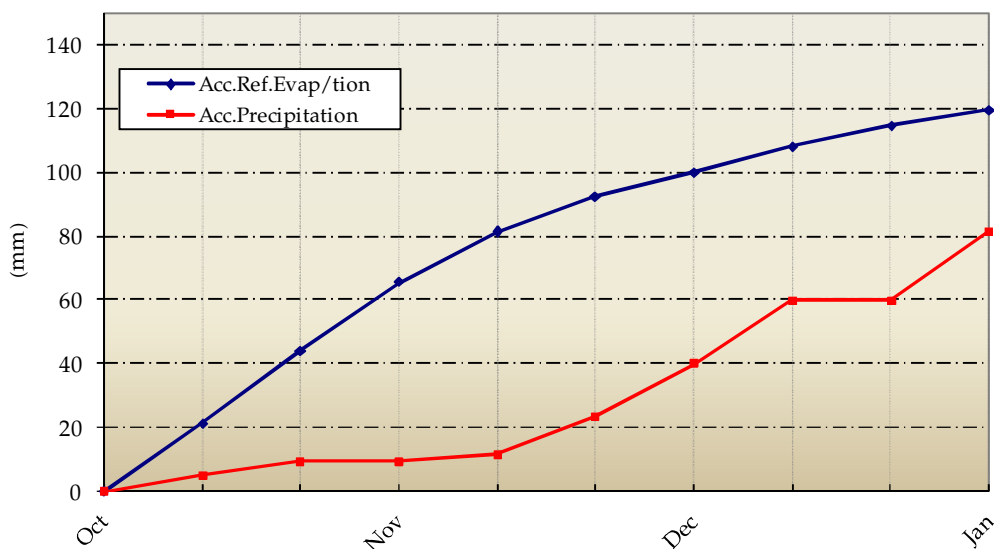


Larisa

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	11.8	11.9	11.2	5.8	6.4	9.3	13.0	14.6	14.6	11.0	9.0	10.8	10.2	10.0
	Min	-5.6	-5.9	-5.8	-2.7	4.2	6.0	6.5	9.4	1.6	1.0	2.1	1.0	1.1	1.1
Relative Humidity	Max	95	93	94	98	99	100	100	100	100	100	100	98	98	-
	Min	38	36	42	68	97	96	92	70	64	92	94	72	62	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	7.2	5.7
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	7.4	6.1
Sunshine Duration		6.3	6.3	7.1	0.0	0.0	0.0	0.0	0.0	6.0	3.6	0.0	2.7	2.9	3.0
Precipitation					0.2	3.5		6.3	11.6			0.1	21.7	30.7	14.0
Evaporation		1.0	10.0	3.0	0.1	0.0	1.0	0.0	0.8	0.0	0.0	6.3	22.2	-	7.2
Growing Degrees	5	0.0	0.0	0.0	0.0	0.3	2.7	4.8	7.0	3.1	1.0	0.6	19.4	13.8	18.9
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.0	0.0	2.2

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.0	6.7	6.4
Precipitation - Reference Evapotranspiration	16.7	24.0	7.6
Number of Rainy Days	5.0	2.0	3.0
Number of Dry Days	16.0	9.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



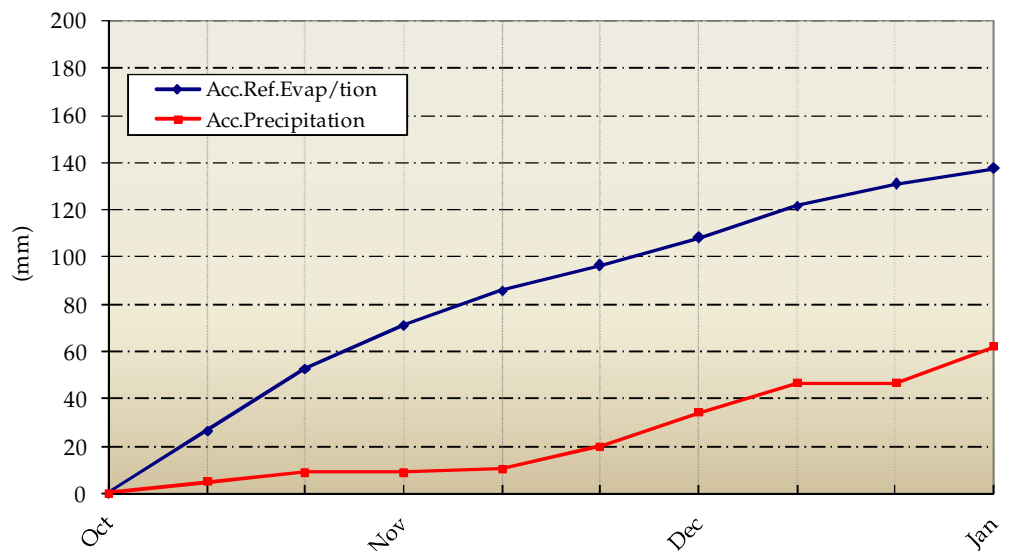


Mikra

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.2	11.8	10.6	7.1	8.4	10.6	14.8	13.5	15.3	13.1	10.2	11.7	9.7	10.2
	Min	-3.6	-2.0	-2.0	-1.4	4.4	7.8	10.0	11.0	3.8	2.8	6.6	3.4	2.1	2.2
Relative Humidity	Max	91	85	91	92	92	93	86	93	95	95	91	91	91	-
	Min	43	54	54	73	78	82	75	74	63	67	78	67	60	-
Soil Temperature at 10 cm	06 UTC	3.4	3.6	3.6	4.0	6.2	7.8	10.0	10.4	8.6	7.4	8.2	6.7	6.7	5.3
	12 UTC	6.0	5.8	6.0	5.3	7.2	7.4	11.2	11.4	10.4	9.8	9.4	8.2	8.9	6.8
Sunshine Duration		7.6	7.8	5.2	0.0	0.0	0.0	0.0	0.6	7.3	4.1	0.0	3.0	3.0	3.0
Precipitation						1.1	0.4	8.1	5.7			0.0	15.3	1.8	14.9
Evaporation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.9	3.7	-	13.5
Growing Degrees	5	0.0	0.0	0.0	0.0	1.4	4.2	7.4	7.3	4.6	3.0	3.4	31.2	15.2	22.3
	10	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.3	0.0	0.0	0.0	4.7	0.2	3.0

3rd 10-day period (21-31/12/2013)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.5	7.6	8.7
Precipitation - Reference Evapotranspiration	8.8	-5.8	6.2
Number of Rainy Days	4.0	1.0	3.0
Number of Dry Days	21.0	9.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

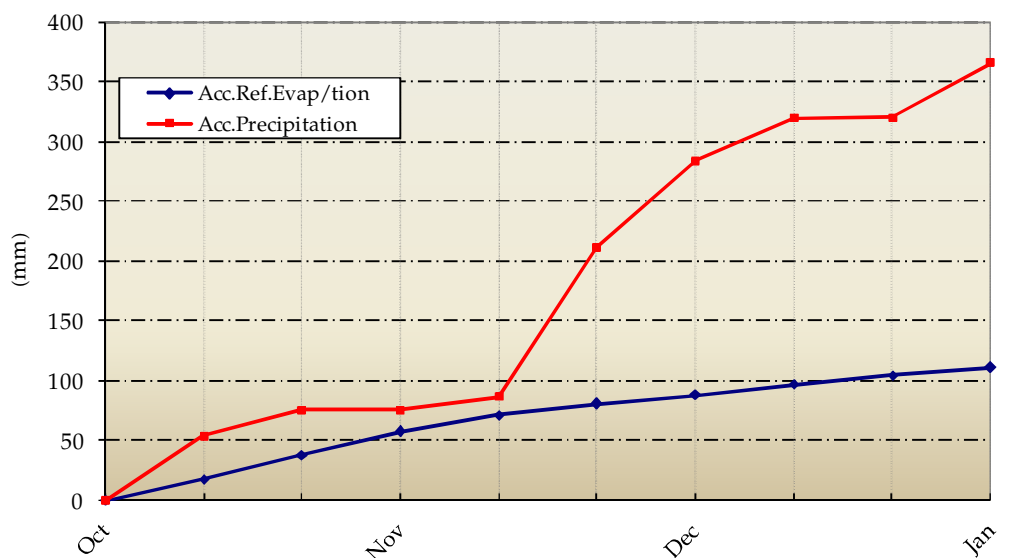


Tripoli

3rd 10-day period (21-31/12/2013)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.3	15.2	13.0	8.8	11.2	12.5	9.0	9.3	15.1	14.4	8.7	12.0	11.5	9.8
	Min	-5.0	-6.3	-6.8	2.7	5.2	1.1	6.2	5.6	0.3	-2.1	-0.7	0.0	0.4	1.5
Relative Humidity	Max	100	100	92	94	94	100	100	100	100	100	100	98	96	-
	Min	21	-	24	74	90	71	93	80	80	40	65	64	70	-
Soil Temperature at 10 cm	06 UTC	2.2	-	1.4	3.6	6.0	5.0	7.4	7.2	5.6	4.2	4.0	4.7	4.4	5.3
	12 UTC	4.4	-	3.0	5.2	-	-	8.0	8.2	-	6.8	5.8	5.9	7.3	6.0
Sunshine Duration		-	6.5	5.7	0.0	0.7	0.7	0.0	0.0	7.2	6.9	0.0	2.8	3.8	3.7
Precipitation					0.9	2.4	0.3	35.3	6.7	0.1			45.7	26.5	36.8
Evaporation		-	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.6	0.0	0.0	-	-	9.0
Growing Degrees	5	0.0	0.0	0.0	0.8	3.2	1.8	2.6	2.5	2.7	1.2	0.0	14.7	15.8	18.6
	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	0.0	1.8

3rd 10-day period (21-31/12/2013)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	6.6	6.8	8.4
Precipitation - Reference Evapotranspiration	39.1	19.7	28.4
Number of Rainy Days	6.0	4.0	4.5
Number of Dry Days	12.0	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.

**Mesurements 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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