



AGROMETEOROLOGICAL BULLETIN

December 2015
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



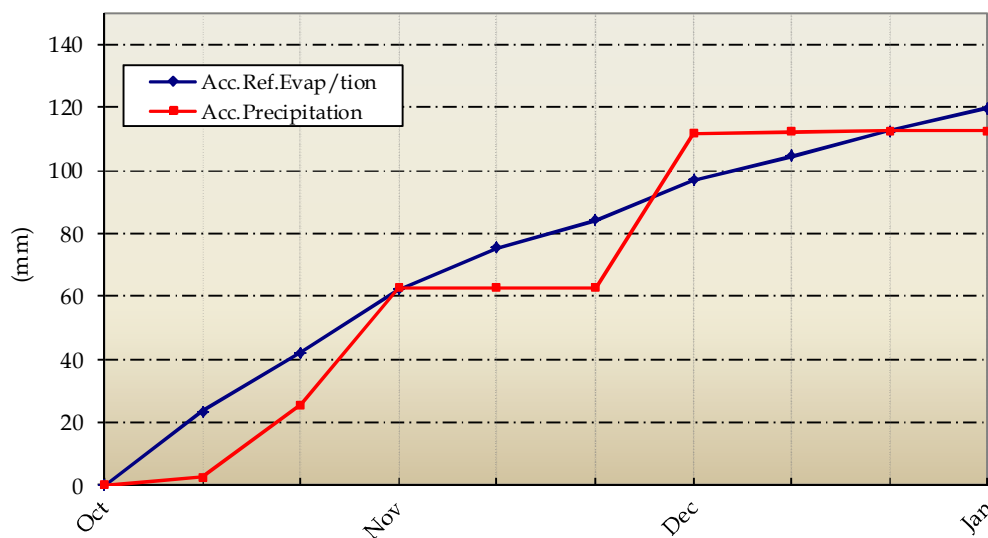
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Web addresses of HNMS
www.hnms.gr
www.emy.gov.gr
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3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.4	12.4	15.6	16.6	15.4	13.8	15.2	14.8	14.8	8.8	1.0	12.8	10.6	9.8
	Min	-1.4	-1.8	-1.4	0.0	0.4	0.4	-0.6	-0.4	1.2	-0.2	-4.0	-0.7	2.1	2.4
Relative Humidity	Max	93	97	96	89	92	96	92	96	97	75	58	89	92	-
	Min	59	70	54	49	57	49	45	52	38	30	33	49	65	-
Soil Temperature at 10 cm	06 UTC	3.2	3.4	3.6	4.2	4.6	4.8	4.0	4.2	4.8	6.0	2.2	4.1	5.8	6.0
	12 UTC	6.0	6.0	5.8	7.2	9.2	7.0	6.6	6.8	6.8	5.6	2.0	6.3	7.3	7.2
Sunshine Duration		7.2	6.8	7.4	7.2	6.9	7.3	7.5	7.6	7.4	3.1	8.0	6.9	3.2	2.6
Precipitation														29.8	24.7
Evaporation		0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.4	3.4	0.0	0.0	6.6	2.9	12.0
Growing Degrees	5	0.5	0.3	2.1	3.3	2.9	2.1	2.3	2.2	3.0	0.0	0.0	18.7	25.8	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	0.0	0.8	4.2

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.2	8.8	8.4
Precipitation - Reference Evapotranspiration	-7.2	21.0	16.3
Number of Rainy Days	0.0	5.0	2.9
Number of Dry Days	20.0	2.0	-

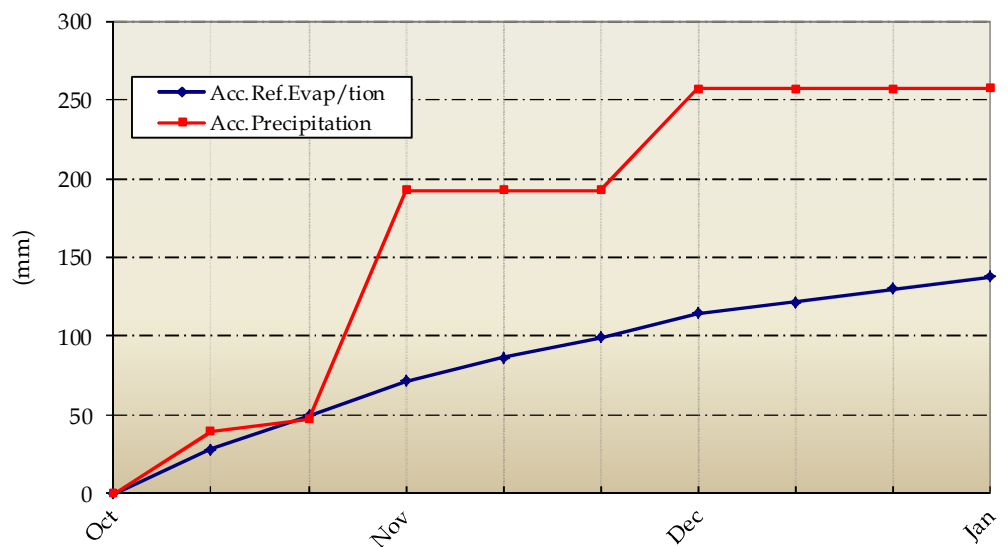
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	15.8	16.8	16.6	17.0	16.6	18.0	16.8	17.0	17.8	16.3	10.7	16.3	14.3	14.4
	Min	-0.2	2.9	2.2	4.4	7.0	3.8	2.0	2.9	6.9	5.0	3.0	3.6	5.6	6.0
Relative Humidity	Max	90	91	91	91	90	88	90	89	90	91	87	90	88	-
	Min	43	59	50	60	62	50	44	49	60	53	41	52	57	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	10.9	9.0
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	12.5	10.5
Sunshine Duration		7.6	7.4	7.5	7.4	7.3	7.9	5.0	6.6	4.7	1.2	4.3	6.1	3.8	4.0
Precipitation												0.1	0.1	23.4	44.5
Evaporation		1.0	3.0	0.6	1.2	2.2	7.0	4.0	1.0	0.0	0.2	0.0	20.2	21.9	21.9
Growing Degrees	5	2.8	4.9	4.4	5.7	6.8	5.9	4.4	5.0	7.4	5.7	1.9	54.7	54.9	57.7
	10	0.0	0.0	0.0	0.7	1.8	0.9	0.0	0.0	2.4	0.7	0.0	6.4	11.0	13.8

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.9	9.8	9.5
Precipitation - Reference Evapotranspiration	-7.8	13.6	35.0
Number of Rainy Days	1.0	5.0	4.8
Number of Dry Days	32.0	7.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

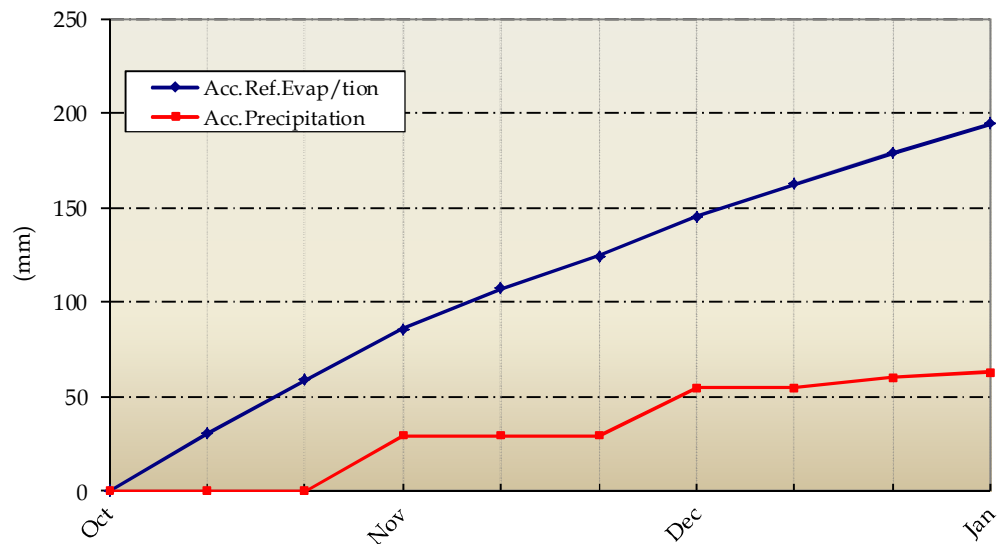


Iraklio

3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.2	16.0	17.0	18.0	18.0	17.4	16.4	16.0	17.8	16.4	7.2	16.0	17.0	15.9
	Min	14.0	11.6	9.8	11.8	8.6	11.4	13.4	8.4	9.8	12.0	7.0	10.7	10.5	10.0
Relative Humidity	Max	81	87	83	92	88	87	81	91	94	78	87	86	87	-
	Min	63	61	64	63	51	59	56	68	64	56	53	60	60	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		0.3	2.8	1.6	4.8	7.9	4.0	1.0	3.8	6.2	4.0	0.0	3.3	4.9	3.8
Precipitation												2.7	2.7	58.5	34.5
Evaporation		2.1	2.1	0.9	0.7	1.5	2.2	1.9	0.5	1.4	1.1	2.9	17.3	23.4	28.1
Growing Degrees	5	10.1	8.8	8.4	9.9	8.3	9.4	9.9	7.2	8.8	9.2	2.1	92.1	95.9	87.3
	10	5.1	3.8	3.4	4.9	3.3	4.4	4.9	2.2	3.8	4.2	0.0	40.0	41.1	33.4

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	15.5	16.2	-
Precipitation - Reference Evapotranspiration	-12.8	42.3	34.5
Number of Rainy Days	1.0	5.0	4.5
Number of Dry Days	18.0	1.0	-

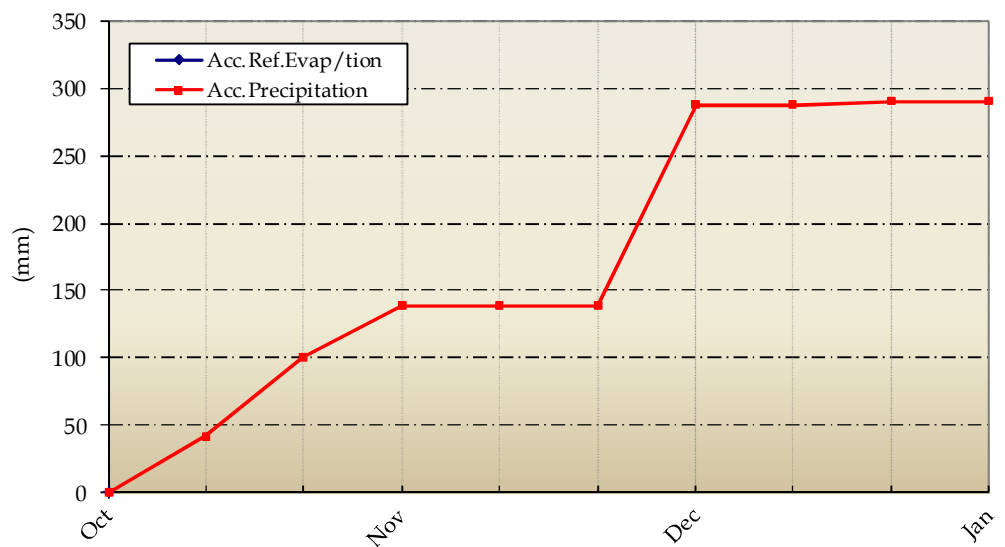
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.8	11.5	14.6	15.2	13.2	11.1	12.3	12.8	12.5	7.1	7.4	11.9	9.3	8.8
	Min	-5.6	-5.5	-5.4	-5.6	-4.4	-3.8	-5.8	-4.8	-4.8	-3.6	-6.0	-5.0	-1.8	0.9
Relative Humidity	Max	100	100	100	100	82	100	87	100	100	100	-	97	99	-
	Min	46	50	45	42	71	65	50	51	60	91	27	54	-	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	4.0
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	4.7
Sunshine Duration		5.1	3.7	3.4	-	3.0	-	4.6	5.3	3.8	0.7	-	3.7	-	2.4
Precipitation								0.0			0.0		0.0	74.7	50.6
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	-	9.0
Growing Degrees	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	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	-	0.9

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	-	6.2
Precipitation - Reference Evapotranspiration	-	-	44.4
Number of Rainy Days	0.0	4.0	4.3
Number of Dry Days	12.0	7.0	-

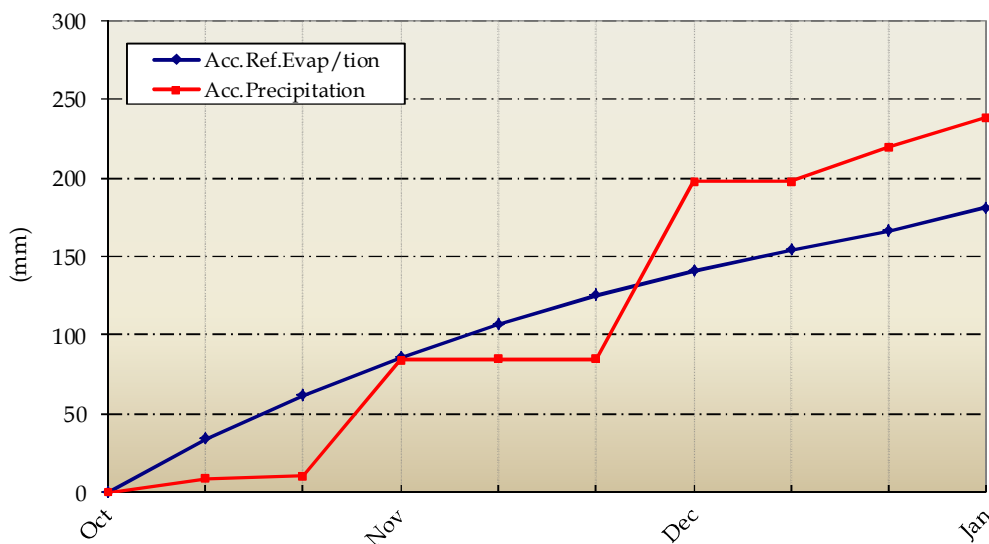
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.8	18.9	19.0	20.2	18.4	19.8	17.2	18.4	18.9	14.7	10.0	17.6	15.2	15.2
	Min	2.5	3.4	1.7	2.6	6.8	4.4	5.6	2.7	3.3	4.4	3.6	3.7	5.5	6.1
Relative Humidity	Max	89	91	93	89	91	91	89	92	93	94	90	91	89	-
	Min	38	44	28	29	49	35	45	40	50	66	53	43	54	-
Soil Temperature at 10 cm	06 UTC	10.6	10.4	10.0	10.0	10.8	10.6	10.6	10.6	10.2	10.8	10.6	10.5	10.8	10.0
	12 UTC	10.6	10.8	11.2	11.4	11.6	11.4	11.6	12.2	11.0	11.0	10.6	11.2	11.2	10.9
Sunshine Duration		8.3	8.3	7.9	8.0	7.7	7.6	5.4	5.9	7.7	0.5	0.1	6.1	3.1	3.9
Precipitation											8.3	10.4	18.7	64.0	41.5
Evaporation		1.3	1.1	1.7	5.5	2.6	2.2	0.6	2.4	1.2	1.0	1.4	21.0	-	22.7
Growing Degrees	5	5.2	6.2	5.4	6.4	7.6	7.1	6.4	5.6	6.1	4.6	1.8	62.2	59.0	62.1
	10	0.2	1.2	0.4	1.4	2.6	2.1	1.4	0.6	1.1	0.0	0.0	10.8	12.7	14.5

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	14.8	12.8	11.8
Precipitation - Reference Evapotranspiration	3.9	51.2	29.7
Number of Rainy Days	2.0	6.0	4.8
Number of Dry Days	18.0	7.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

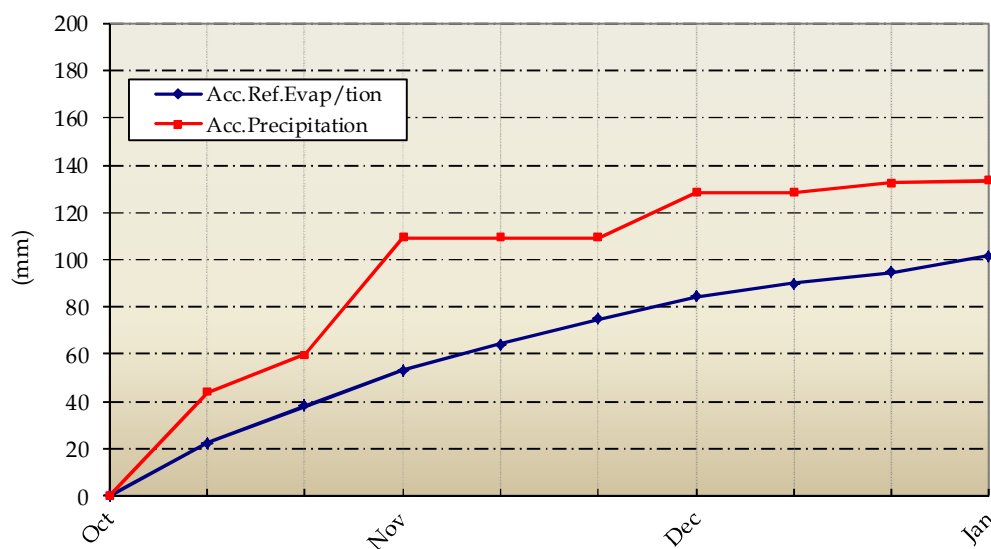


Larisa

3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	30	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	11.8	12.8	14.0	15.1	14.6	15.0	14.6	15.2	15.0	9.6	4.0	12.9	9.8	10.0
	Min	-3.0	-3.0	-2.6	-1.3	-2.6	-2.0	-2.0	-1.8	-1.8	3.5	0.7	-1.4	-0.4	1.1
Relative Humidity	Max	100	100	100	100	100	100	100	100	100	100	100	100	100	-
	Min	51	51	46	47	50	45	45	43	45	62	49	49	49	-
Soil Temperature at 10 cm	06 UTC	7.2	7.0	7.0	7.0	7.2	7.0	7.2	5.0	6.0	7.2	7.0	6.8	-	5.7
	12 UTC	7.2	6.8	7.0	7.0	7.0	7.0	7.2	7.0	6.8	7.2	7.2	7.0	-	6.1
Sunshine Duration		6.4	6.5	6.7	5.0	6.4	5.2	6.6	6.8	6.9	0.0	2.0	5.3	4.1	3.0
Precipitation											1.0	0.0	1.0	8.4	14.0
Evaporation		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4	21.5	7.2
Growing Degrees	5	0.0	0.0	0.7	1.9	1.0	1.5	1.3	1.7	1.6	1.6	0.0	11.3	10.4	18.9
	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	2.2

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.0	8.4	6.4
Precipitation - Reference Evapotranspiration	-6.0	0.0	7.6
Number of Rainy Days	1.0	4.0	3.0
Number of Dry Days	12.0	9.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

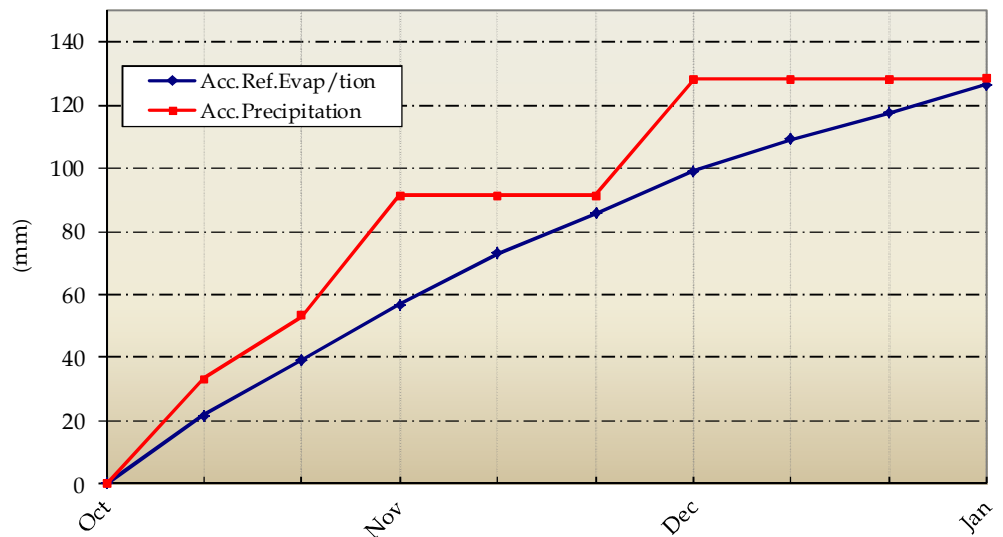


Mikra

3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.7	16.5	16.9	14.5	15.8	14.8	14.8	17.0	17.4	10.2	3.2	14.0	9.2	10.2
	Min	0.2	-0.2	1.8	1.8	1.4	1.6	0.4	1.0	1.0	2.6	-2.0	0.9	1.2	2.2
Relative Humidity	Max	92	95	91	94	95	94	95	94	95	83	76	91	86	-
	Min	57	40	39	47	54	49	46	46	36	54	33	46	48	-
Soil Temperature at 10 cm	06 UTC	5.4	5.2	6.0	6.4	6.4	6.4	6.2	6.2	6.4	8.2	5.6	6.2	5.4	5.3
	12 UTC	7.0	7.0	8.0	8.0	8.0	12.0	8.0	7.8	8.4	8.2	5.8	8.0	7.5	6.8
Sunshine Duration		8.3	7.8	10.2	7.8	7.6	7.3	8.9	7.9	8.1	0.0	3.5	7.0	4.2	3.0
Precipitation											0.2	0.0	0.2	5.2	14.9
Evaporation		0.2	1.0	1.9	2.0	1.6	0.8	2.2	0.4	0.3	0.3	0.0	10.7	10.8	13.5
Growing Degrees	5	1.5	3.2	4.4	3.2	3.6	3.2	2.6	4.0	4.2	1.4	0.0	31.1	15.4	22.3
	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	3.0

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	9.0	15.7	8.7
Precipitation - Reference Evapotranspiration	-8.8	-10.5	6.2
Number of Rainy Days	1.0	2.0	3.0
Number of Dry Days	32.0	9.0	-

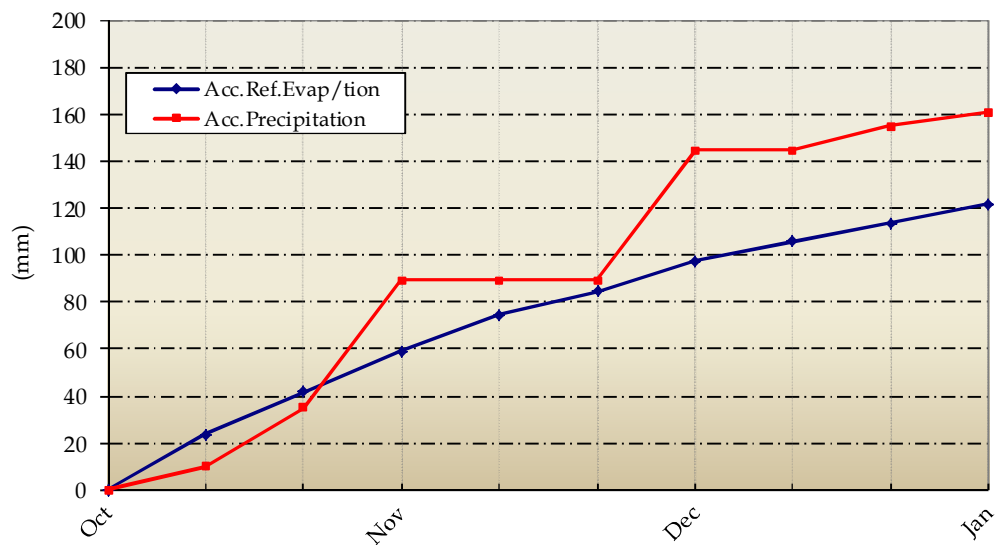
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	15.0	17.2	16.9	18.6	16.0	14.6	15.8	16.7	18.2	8.1	2.4	14.5	12.8	13.1
	Min	1.4	1.6	3.0	1.6	1.3	4.4	4.6	1.6	2.0	5.4	1.6	2.6	2.9	4.6
Relative Humidity	Max	95	96	85	98	100	98	95	95	96	98	100	96	98	-
	Min	38	32	36	37	47	60	45	42	39	58	59	45	54	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunshine Duration		7.4	7.3	7.4	7.5	6.7	3.0	7.0	7.2	7.2	0.0	0.4	5.6	4.3	
Precipitation											6.1	0.1	6.2	3.7	24.3
Evaporation		1.5	2.0	1.0	2.0	1.0	1.2	2.3	2.5	2.5	1.0	1.5	18.5	21.5	4.8
Growing Degrees	5	3.2	4.4	5.0	5.1	3.7	4.5	5.2	4.2	5.1	1.8	0.0	42.0	36.4	
	10	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.4	3.3	

3rd 10-day period (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.9	9.9	
Precipitation - Reference Evapotranspiration	-1.7	-6.2	24.3
Number of Rainy Days	2.0	2.0	
Number of Dry Days	12.0	12.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

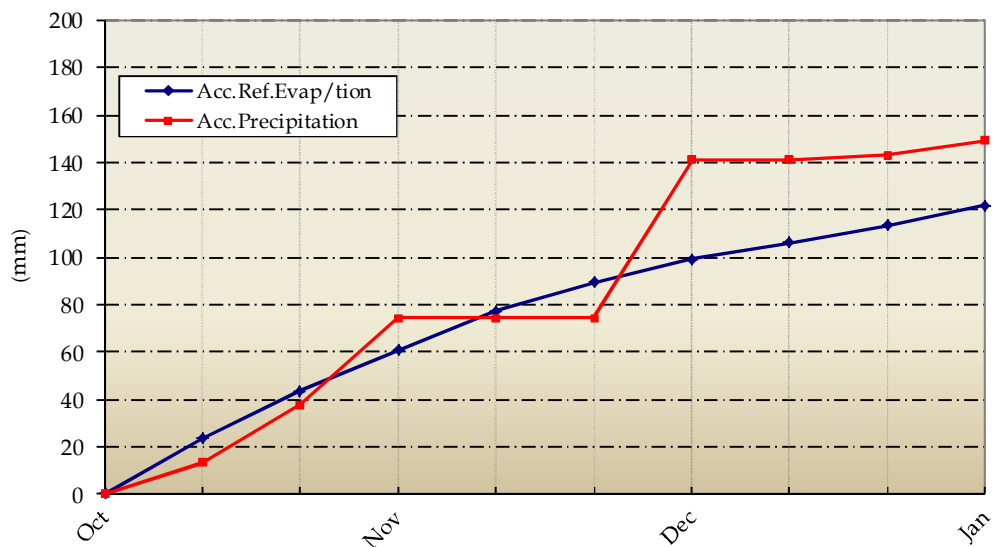


Tripoli

3rd 10-day period (21-31/12/2015)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.5	15.9	18.0	18.4	16.7	13.8	15.1	14.7	17.6	9.3	3.0	14.3	11.0	9.8
	Min	-6.3	-5.6	-5.4	-4.3	-4.2	-3.2	-4.2	-3.2	-4.3	-2.5	-1.7	-4.1	-0.1	1.5
Relative Humidity	Max	100	100	98	100	100	100	100	100	100	100	100	100	100	-
	Min	26	20	22	26	26	51	34	33	26	73	71	37	51	-
Soil Temperature at 10 cm	06 UTC	2.2	2.0	2.0	2.2	-	-	-	3.0	2.4	2.8	3.4	2.5	5.1	5.3
	12 UTC	4.6	-	-	4.8	-	-	-	5.2	5.2	4.6	3.4	4.6	6.6	6.0
Sunshine Duration		6.4	6.7	7.4	-	-	-	5.5	6.9	6.9	0.2	0.0	5.0	4.4	3.7
Precipitation											3.0	3.2	6.2	65.5	36.8
Evaporation		0.0	0.0	0.0	-	-	-	0.0	0.0	-	-	-	-	3.9	9.0
Growing Degrees	5	0.0	0.2	1.3	2.1	1.3	0.3	0.5	0.8	1.7	0.0	0.0	7.9	16.5	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 (21-31/12/2015)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	8.5	8.9	8.4
Precipitation - Reference Evapotranspiration	-2.3	56.6	28.4
Number of Rainy Days	2.0	6.0	4.5
Number of Dry Days	18.0	7.0	-

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

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