



# AGROMETEOROLOGICAL BULLETIN

*December 2010*  
*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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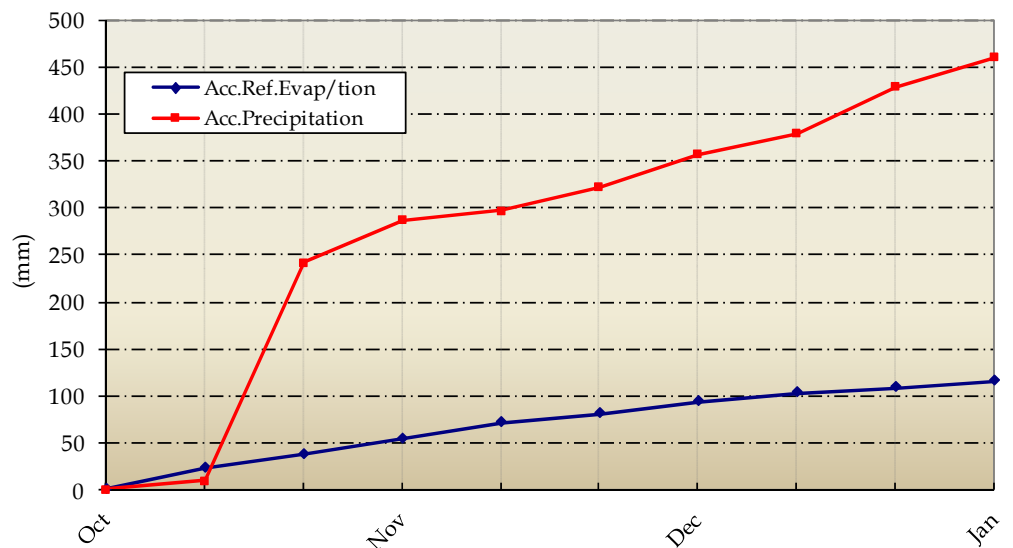
*Web addresses of HNMS*  
[www.hnms.gr](http://www.hnms.gr)  
[www.emy.gov.gr](http://www.emy.gov.gr)  
[www.meteo.gov.gr](http://www.meteo.gov.gr)  
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Agrinio

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	20.0	20.5	18.0	21.0	19.0	17.0	14.0	13.4	13.0	15.4	12.2	16.7	-	14.0
	Min	9.6	0.5	5.4	7.0	10.8	9.2	9.2	5.0	3.8	2.0	2.0	5.9	-	3.8
Relative Humidity	Max	94	100	100	97	92	98	97	100	97	96	96	97	-	-
	Min	47	62	65	45	68	86	86	57	72	49	64	64	-	-
Soil Temperature at 10 cm	06 UTC	11.0	10.0	10.2	10.6	12.4	11.8	11.8	11.0	9.2	9.0	6.6	10.3	-	7.7
	12 UTC	15.0	12.0	11.2	12.2	13.6	12.8	12.6	11.4	10.8	9.8	8.8	11.8	-	9.5
Sunshine Duration		6.5	3.5	5.5	0.5	1.7	0.2	0.0	6.2	3.1	7.4	3.6	3.5	-	3.3
Precipitation						16.7	0.9	13.4	0.5				31.5	-	49.6
Evaporation		1.8	0.8	0.9	1.9	0.3	0.7	2.5	0.2	0.8	0.6	1.2	11.7	-	14.2
Growing Degrees	5	9.8	5.5	6.7	9.0	9.9	8.1	6.6	4.2	3.4	3.7	2.1	69.0	-	43.3
	10	4.8	0.5	1.7	4.0	4.9	3.1	1.6	0.0	0.0	0.0	0.0	20.6	-	7.7

3rd 10-day period (21-31/12/2010)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	6.8	-	8.7
Precipitation - Reference Evapotranspiration	24.7	-	40.9
Number of Rainy Days	4.0	-	4.2
Number of Dry Days	5.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

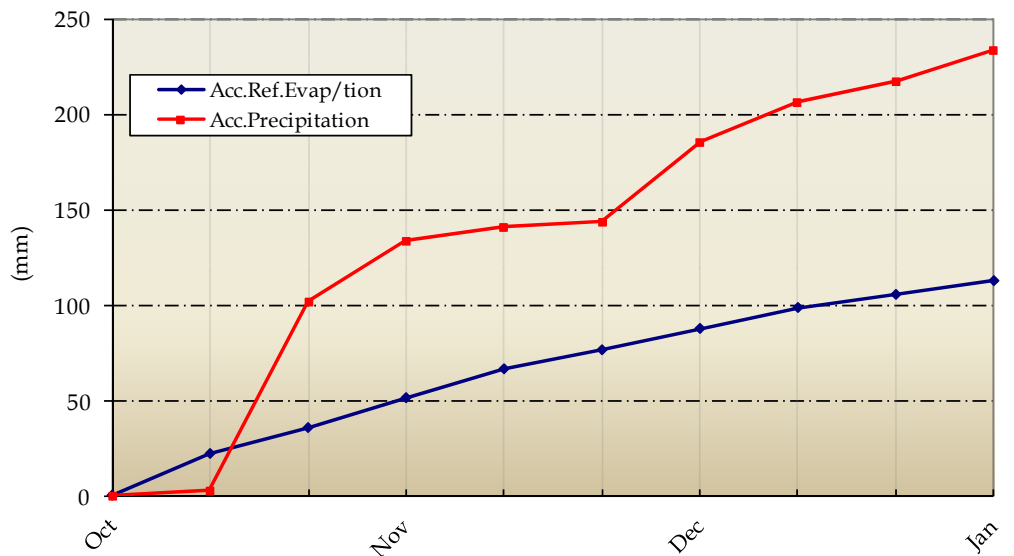


Alexandroupoli

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.8	16.8	15.8	17.0	17.4	16.2	13.6	10.4	4.0	6.4	7.0	12.9	14.7	9.8
	Min	8.6	13.0	9.6	11.6	14.6	12.6	10.4	3.4	2.0	-0.8	-4.4	7.3	7.5	2.4
Relative Humidity	Max	93	97	100	93	89	95	95	94	75	77	96	91	96	-
	Min	74	80	86	72	67	75	79	70	48	39	39	66	74	-
Soil Temperature at 10 cm	06 UTC	8.5	10.4	10.4	10.8	12.0	12.0	12.0	9.6	7.0	4.4	3.6	9.2	9.7	6.0
	12 UTC	10.0	11.0	11.4	11.2	13.8	12.4	12.0	9.2	6.6	5.2	4.0	9.7	10.7	7.2
Sunshine Duration		5.2	0.0	0.0	1.0	0.0	1.0	0.5	0.0	0.4	7.4	8.2	2.2	2.4	2.6
Precipitation					0.0	1.4	1.0	3.4	11.0				16.8	7.1	24.7
Evaporation		0.9	1.0	0.0	1.2	1.4	3.4	0.4	1.5	0.0	0.0	0.0	9.8	13.4	12.0
Growing Degrees	5	8.2	9.9	7.7	9.3	11.0	9.4	7.0	1.9	0.0	0.0	0.0	64.4	68.4	24.9
	10	3.2	4.9	2.7	4.3	6.0	4.4	2.0	0.0	0.0	0.0	0.0	27.5	26.5	4.2

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.2	6.9	8.4
Precipitation - Reference Evapotranspiration	9.6	0.2	16.3
Number of Rainy Days	4.0	4.0	2.9
Number of Dry Days	5.0	0.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	19.8	19.2	20.4	20.6	18.6	15.2	16.2	13.6	14.0	14.8	14.0	16.9	17.6	14.4
	Min	13.0	10.2	6.2	9.8	12.6	9.6	9.8	8.8	4.8	2.8	2.4	8.2	11.2	6.0
Relative Humidity	Max	90	94	94	90	93	95	95	95	94	97	96	94	94	-
	Min	52	61	52	37	73	79	68	57	62	54	59	59	63	-
Soil Temperature at 10 cm	06 UTC	12.0	11.6	11.0	12.2	13.4	12.6	11.8	12.2	9.4	8.6	8.2	11.2	13.3	9.0
	12 UTC	13.6	13.6	13.2	13.8	14.0	13.6	12.0	12.8	12.0	11.6	10.4	12.8	14.4	10.5
Sunshine Duration		3.9	3.5	4.4	0.7	0.0	0.0	1.6	5.5	5.7	6.6	1.2	3.0	3.2	4.0
Precipitation						1.5	1.4	0.8	1.2				4.9	6.9	44.5
Evaporation		0.8	0.4	4.5	1.0	0.4	0.5	0.7	4.2	1.0	0.8	0.6	14.9	16.3	21.9
Growing Degrees	5	11.4	9.7	8.3	10.2	10.6	7.4	8.0	6.2	4.4	3.8	3.2	83.2	103.5	57.7
	10	6.4	4.7	3.3	5.2	5.6	2.4	3.0	1.2	0.0	0.0	0.0	31.8	49.7	13.8

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	10.2	13.1	9.5
Precipitation - Reference Evapotranspiration	-5.3	-6.2	35.0
Number of Rainy Days	4.0	2.0	4.8
Number of Dry Days	6.0	6.0	-

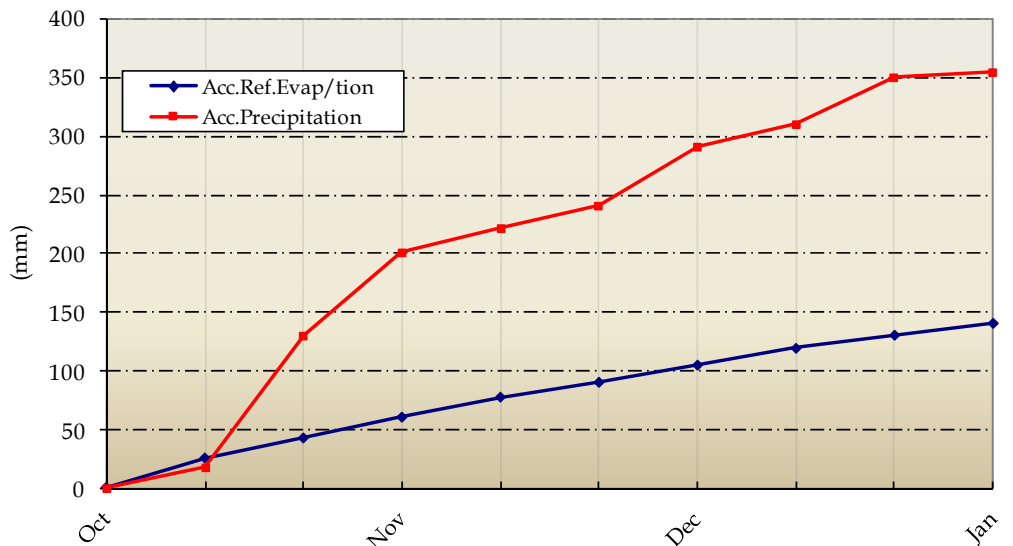


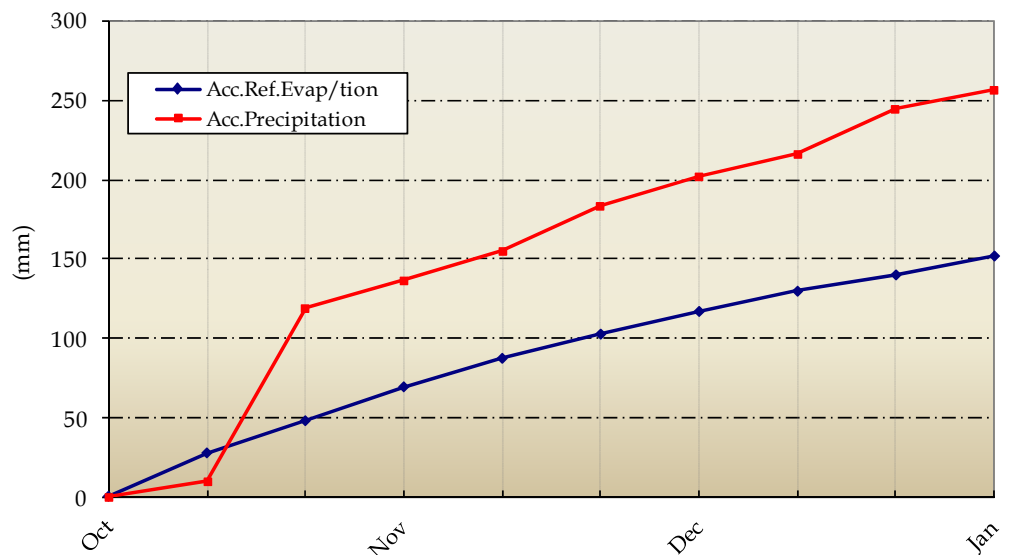
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

Kalamata

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.2	19.2	18.6	20.0	18.6	16.4	13.2	15.8	15.0	16.4	16.6	17.1	17.8	15.2
	Min	15.6	10.2	8.2	7.0	12.2	10.8	9.6	10.0	6.4	6.0	4.2	9.1	8.7	6.1
Relative Humidity	Max	83	95	97	97	95	97	98	97	91	97	97	95	97	-
	Min	63	72	75	56	61	77	95	58	58	55	52	66	68	-
Soil Temperature at 10 cm	06 UTC	13.4	13.4	13.2	13.0	14.4	14.0	13.8	13.4	12.4	12.6	12.2	13.3	12.9	10.0
	12 UTC	13.8	14.0	14.0	14.0	14.8	14.0	14.0	13.6	13.0	13.2	12.2	13.7	13.7	10.9
Sunshine Duration		2.2	5.7	5.4	2.8	3.5	0.0	0.0	5.0	4.1	6.3	6.3	3.8	4.2	3.9
Precipitation							0.6	8.8	1.5			0.6	11.5	11.6	41.5
Evaporation		2.0	1.1	1.1	1.9	0.7	1.3	0.9	2.9	1.3	1.8	0.4	15.4	15.5	22.7
Growing Degrees	5	11.9	9.7	8.4	8.5	10.4	8.6	6.4	7.9	5.7	6.2	5.4	89.1	90.7	62.1
	10	6.9	4.7	3.4	3.5	5.4	3.6	1.4	2.9	0.7	1.2	0.4	34.1	37.4	14.5

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	11.9	10.3	11.8
Precipitation - Reference Evapotranspiration	-0.4	1.3	29.7
Number of Rainy Days	4.0	3.0	4.8
Number of Dry Days	7.0	0.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

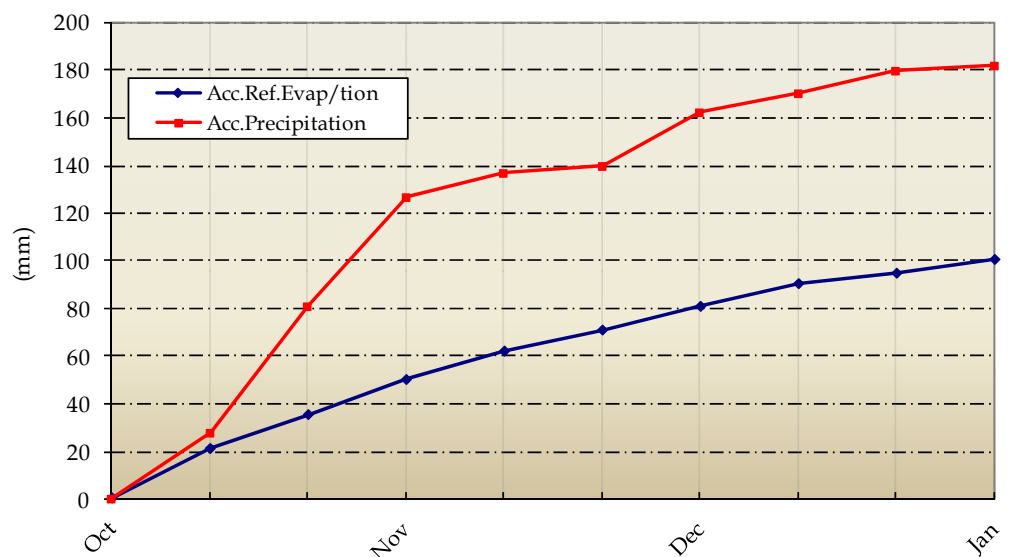


Larisa

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.8	10.4	9.8	12.4	16.2	14.6	13.4	11.0	7.6	10.0	10.0	11.7	15.7	10.0
	Min	0.6	4.0	8.8	7.8	5.0	7.4	8.2	5.6	3.0	0.8	-3.0	4.4	5.8	1.1
Relative Humidity	Max	97	100	97	100	100	95	97	91	84	89	96	95	96	-
	Min	77	92	90	91	63	64	73	66	57	48	54	70	59	-
Soil Temperature at 10 cm	06 UTC	4.8	6.6	8.6	7.6	9.2	9.8	10.0	9.4	8.8	8.0	5.4	8.0	9.2	5.7
	12 UTC	6.4	7.4	8.4	9.4	10.2	10.2	10.4	10.6	9.0	9.2	6.8	8.9	10.2	6.1
Sunshine Duration		5.0	0.0	0.0	0.8	3.7	0.7	1.2	5.4	0.0	3.1	9.8	2.7	4.3	3.0
Precipitation						2.2		0.2					2.4	3.6	14.0
Evaporation		1.0	0.0	0.2	0.8	0.7	0.2	2.2	2.1	1.2	0.0	0.0	8.4	11.6	7.2
Growing Degrees	5	2.2	2.2	4.3	5.1	5.6	6.0	5.8	3.3	0.3	0.4	0.0	35.2	63.4	18.9
	10	0.0	0.0	0.0	0.1	0.6	1.0	0.8	0.0	0.0	0.0	0.0	2.5	19.0	2.2

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.8	7.6	6.4
Precipitation - Reference Evapotranspiration	-3.4	-4.0	7.6
Number of Rainy Days	2.0	2.0	3.0
Number of Dry Days	8.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

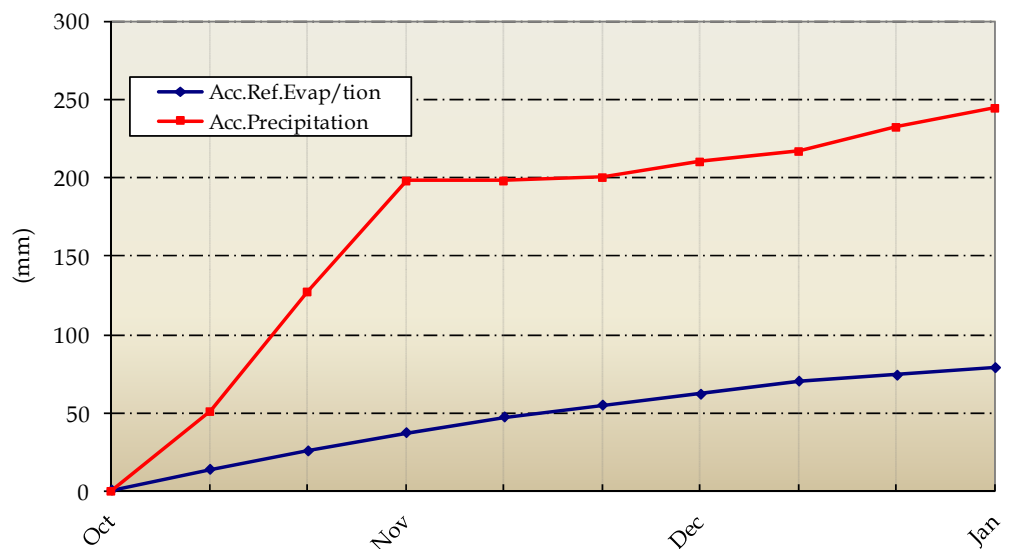


Series

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	16.0	15.0	14.2	13.2	19.4	13.0	11.8	7.6	6.4	7.4	7.4	11.9	11.1	8.5
	Min	6.2	3.8	7.4	5.8	8.4	4.8	7.6	4.6	1.0	-3.6	-4.4	3.8	3.5	0.3
Relative Humidity	Max	97	97	97	97	95	97	97	84	96	96	96	95	93	-
	Min	57	79	86	64	45	62	83	71	67	63	61	67	69	-
Soil Temperature at 10 cm	06 UTC	5.2	6.0	7.0	7.6	9.4	8.2	9.0	8.8	7.4	5.4	4.0	7.1	7.0	4.2
	12 UTC	6.0	6.2	7.6	8.6	9.4	8.6	10.4	8.8	7.6	5.0	4.2	7.5	8.6	4.9
Sunshine Duration		3.2	2.2	0.0	0.3	4.0	1.6	0.0	0.0	1.2	3.5	2.8	1.7	1.9	2.6
Precipitation		0.0				8.2	0.4	4.0	0.0				12.6	8.3	14.1
Evaporation		0.0	0.0	0.4	0.8	0.8	0.1	0.0	1.0	0.0	0.0	0.0	3.1	8.3	3.2
Growing Degrees	5	6.1	4.4	5.8	4.5	8.9	3.9	4.7	1.1	0.0	0.0	0.0	39.4	31.6	12.6
	10	1.1	0.0	0.8	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	5.8	6.4	0.8

3rd 10-day period (21-31/12/2010)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	4.9	5.2	4.2
Precipitation - Reference Evapotranspiration	7.7	3.1	9.9
Number of Rainy Days	3.0	5.0	2.7
Number of Dry Days	8.0	2.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

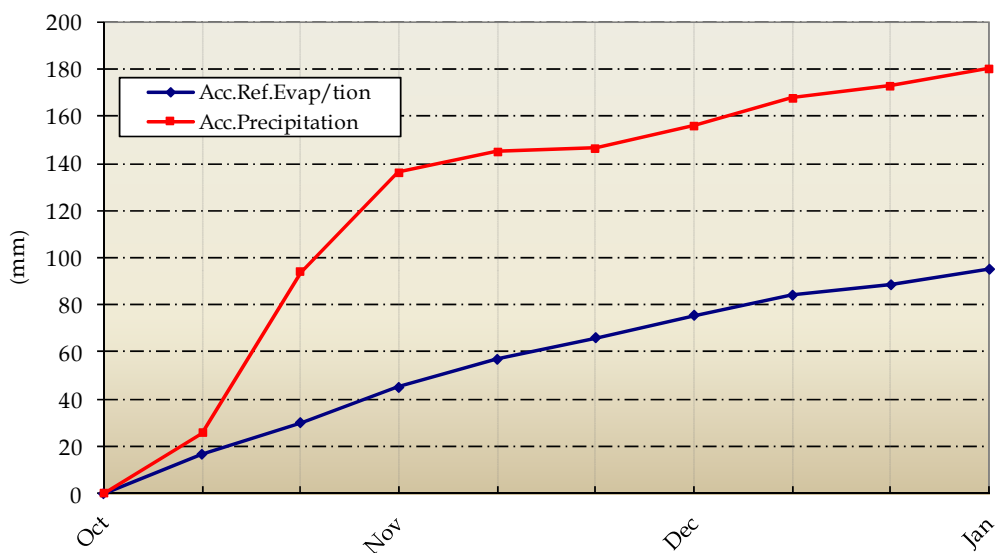




3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.2	14.4	13.4	13.0	-	11.8	9.0	7.0	7.6	7.0	10.2	11.1	12.6	9.2
	Min	8.4	7.6	5.8	10.0	-	7.2	5.0	1.2	-1.0	-3.0	-3.0	3.8	5.5	0.8
Relative Humidity	Max	100	95	95	-	95	95	94	78	88	96	99	94	95	-
	Min	70	87	91	-	35	81	70	53	37	39	49	61	66	-
Soil Temperature at 10 cm	06 UTC	7.4	8.2	8.4	9.8	-	9.8	9.2	7.6	6.8	5.2	4.4	7.7	8.1	5.3
	12 UTC	8.2	9.0	9.0	10.0	-	10.0	9.8	7.8	6.8	5.4	4.4	8.0	8.9	5.5
Sunshine Duration		4.1	0.1	0.0	-	4.3	0.0	2.3	5.2	3.4	8.4	7.9	3.6	2.9	3.5
Precipitation						6.0	0.7	0.7					7.4	11.1	19.3
Evaporation		0.6	0.8	0.8	-	-	0.7	1.4	0.0	0.0	0.0	0.0	-	12.3	5.3
Growing Degrees	5	7.8	6.0	4.6	6.5	-	4.5	2.0	0.0	0.0	0.0	0.0	-	47.8	17.2
	10	2.8	1.0	0.0	1.5	-	0.0	0.0	0.0	0.0	0.0	0.0	-	9.7	2.5

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.6	6.0	5.5
Precipitation - Reference Evapotranspiration	0.8	5.1	13.8
Number of Rainy Days	3.0	4.0	3.0
Number of Dry Days	8.0	4.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



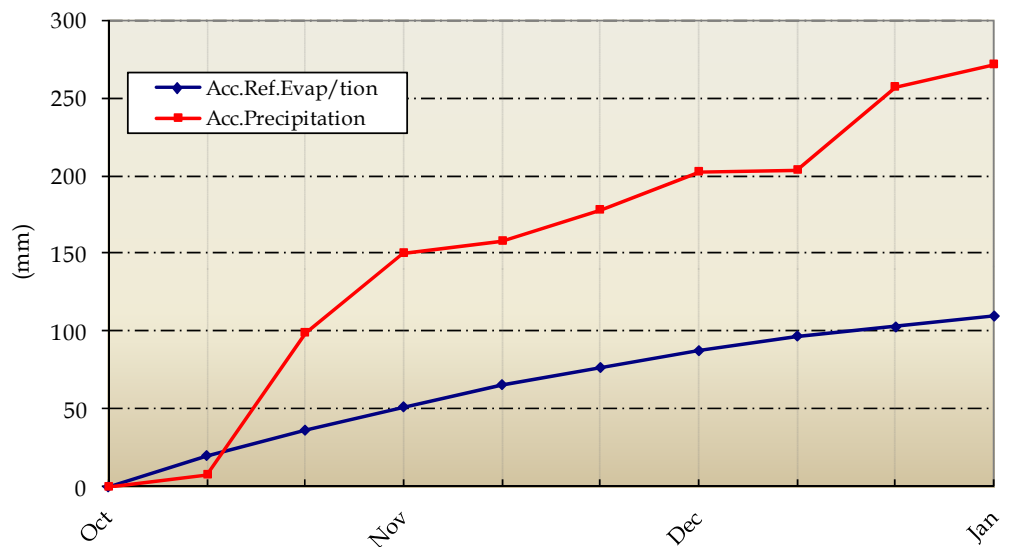


Tripoli

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.4	14.6	16.6	16.4	13.4	12.4	11.4	11.4	10.2	10.0	10.0	12.8	-	9.8
	Min	7.0	4.0	2.6	2.8	10.6	9.0	7.8	6.2	5.6	5.2	0.6	5.6	-	1.5
Relative Humidity	Max	97	97	97	100	80	95	97	100	97	87	96	95	-	-
	Min	65	65	61	63	54	70	75	75	72	68	64	67	-	-
Soil Temperature at 10 cm	06 UTC	7.2	7.0	6.8	6.4	9.0	9.2	8.8	8.4	8.2	8.2	6.2	7.8	-	5.3
	12 UTC	9.4	9.2	9.2	10.2	10.8	10.6	9.6	10.4	10.0	9.0	8.4	9.7	-	6.0
Sunshine Duration		0.7	2.3	5.5	4.4	4.8	0.0	0.7	2.6	1.6	3.7	5.5	2.9	-	3.7
Precipitation							0.6	11.7	2.3				14.6	-	36.8
Evaporation		0.0	1.0	0.0	1.0	0.6	0.0	0.9	1.0	0.0	1.0	1.0	6.5	-	9.0
Growing Degrees	5	5.7	4.3	4.6	4.6	7.0	5.7	4.6	3.8	2.9	2.6	0.3	46.1	-	18.6
	10	0.7	0.0	0.0	0.0	2.0	0.7	0.0	0.0	0.0	0.0	0.0	3.4	-	1.8

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.0	-	8.4
Precipitation - Reference Evapotranspiration	7.6	-	28.4
Number of Rainy Days	3.0	-	4.5
Number of Dry Days	5.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

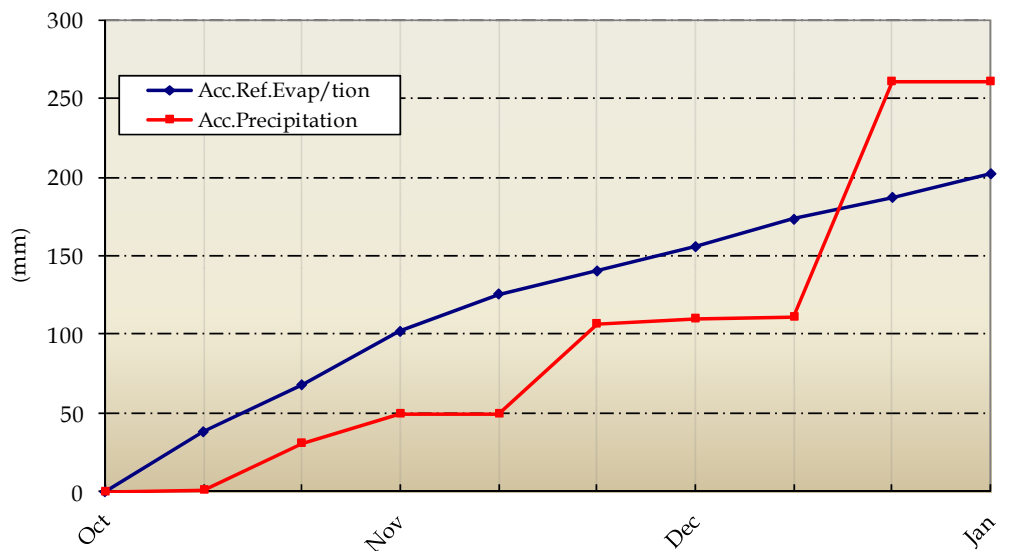


Tympaki

3rd 10-day period (21-31/12/2010)		21	22	23	24	25	26	27	28	29	20	31	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	20.0	20.8	20.6	21.8	22.0	21.4	20.0	21.0	19.0	16.0	15.0	19.8	19.7	16.4
	Min	11.4	11.4	9.0	9.4	12.8	10.6	12.4	11.4	10.6	11.0	7.6	10.7	10.9	8.1
Relative Humidity	Max	94	95	95	95	90	91	94	95	95	71	83	91	97	-
	Min	39	63	64	39	38	46	52	46	54	35	35	46	53	-
Soil Temperature at 10 cm	06 UTC	13.2	13.2	12.8	13.0	13.6	14.0	14.2	13.6	13.6	13.6	11.0	13.3	13.8	11.9
	12 UTC	15.6	15.8	16.2	15.4	16.8	16.6	15.4	16.4	16.6	15.2	13.6	15.8	16.3	13.5
Sunshine Duration		2.5	5.1	7.5	2.1	4.3	5.9	0.0	4.9	6.9	7.6	8.0	5.0	4.3	4.2
Precipitation														4.0	31.9
Evaporation		1.6	1.8	1.1	1.9	1.9	1.8	0.8	1.4	2.8	4.6	3.4	23.1	22.2	30.0
Growing Degrees	5	10.7	11.1	9.8	10.6	12.4	11.0	11.2	11.2	9.8	8.5	6.3	112.6	113.0	79.7
	10	5.7	6.1	4.8	5.6	7.4	6.0	6.2	6.2	4.8	3.5	1.3	57.6	58.0	26.8

3rd 10-day period (21-31/12/2010)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	15.0	13.9	14.3
Precipitation - Reference Evapotranspiration	-15.0	-9.9	17.6
Number of Rainy Days	0.0	1.0	4.1
Number of Dry Days	12.0	11.0	-

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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ΥΠΗΡΕΣΙΑ

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