

# AGROMETEOROLOGICAL BULLETIN

*November 2011*  
*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



Hellenic National Meteorological Service  
Division of Climatology-Applications  
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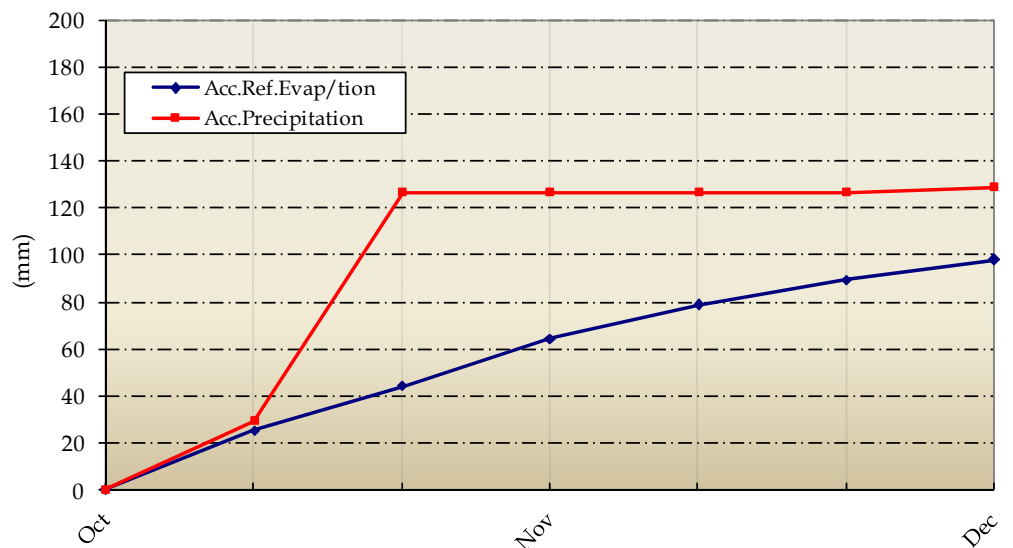
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Agrinio

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.0	15.2	18.2	16.4	16.4	17.2	17.5	18.0	18.2	18.0	17.3	20.1	16.7
	Min	0.0	2.0	7.4	8.6	5.8	1.0	-1.4	-0.4	0.2	1.0	2.4	11.6	6.4
Relative Humidity	Max	93	88	97	71	82	89	96	93	96	96	90	94	-
	Min	46	50	56	47	45	43	30	47	46	45	46	65	-
Soil Temperature at 10 cm	06 UTC	9.0	9.6	11.6	13.0	11.0	9.6	9.2	8.6	9.0	9.2	10.0	15.1	10.6
	12 UTC	10.8	11.4	12.8	12.8	12.2	11.6	11.0	10.6	11.0	10.8	11.5	15.9	12.7
Sunshine Duration		7.6	1.5	3.8	1.8	4.8	6.8	8.2	8.1	5.0	7.8	5.5	1.7	4.2
Precipitation				2.0								2.0	35.2	63.5
Evaporation		2.0	1.8	2.9	2.5	2.6	1.9	3.0	1.6	3.2	1.2	22.7	14.8	15.9
Growing Degrees	5	4.0	3.6	7.8	7.5	6.1	4.1	3.1	3.8	4.2	4.5	48.7	108.6	65.9
	10	0.0	0.0	2.8	2.5	1.1	0.0	0.0	0.0	0.0	0.0	6.4	58.6	21.3

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	8.3	12.8	9.9
Precipitation - Reference Evapotranspiration	-6.3	22.4	53.6
Number of Rainy Days	1.0	5.0	4.9
Number of Dry Days	37.0	4.0	-

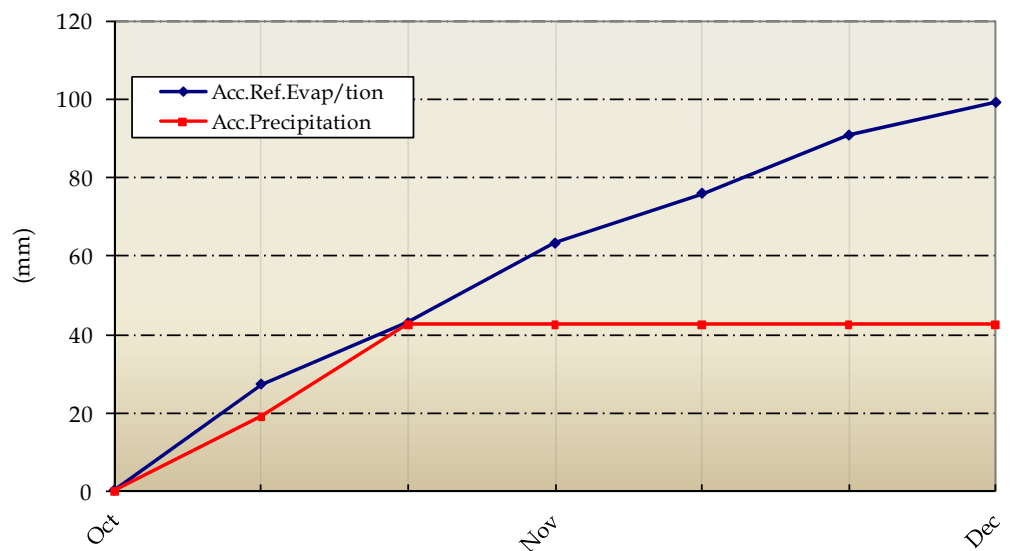
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.0	9.6	12.4	10.4	8.4	9.4	9.8	13.2	13.8	13.8	11.4	17.9	12.8
	Min	-2.0	-2.8	-2.0	7.0	6.6	1.8	-3.4	-3.4	1.6	-1.4	0.2	11.6	5.0
Relative Humidity	Max	96	92	96	80	83	78	82	87	89	90	87	93	-
	Min	52	71	50	54	57	53	50	54	42	48	53	69	-
Soil Temperature at 10 cm	06 UTC	6.2	6.2	6.6	7.6	7.8	8.4	6.2	5.8	6.4	6.2	6.7	13.2	8.6
	12 UTC	7.8	7.8	7.4	9.0	9.0	8.8	7.0	6.2	8.0	7.6	7.9	14.3	10.3
Sunshine Duration		6.7	5.6	6.8	4.4	0.2	1.5	7.3	8.2	7.9	7.3	5.6	2.7	3.2
Precipitation													41.5	32.9
Evaporation		0.0	0.0	0.0	3.0	0.7	0.0	0.0	0.0	1.0	0.0	4.7	17.7	16.3
Growing Degrees	5	0.5	0.0	0.2	3.7	2.5	0.6	0.0	0.0	2.7	1.2	11.4	97.6	42.5
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.6	11.5

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	8.4	11.2	9.6
Precipitation - Reference Evapotranspiration	-8.4	30.3	23.3
Number of Rainy Days	0.0	6.0	3.3
Number of Dry Days	44.0	4.0	-

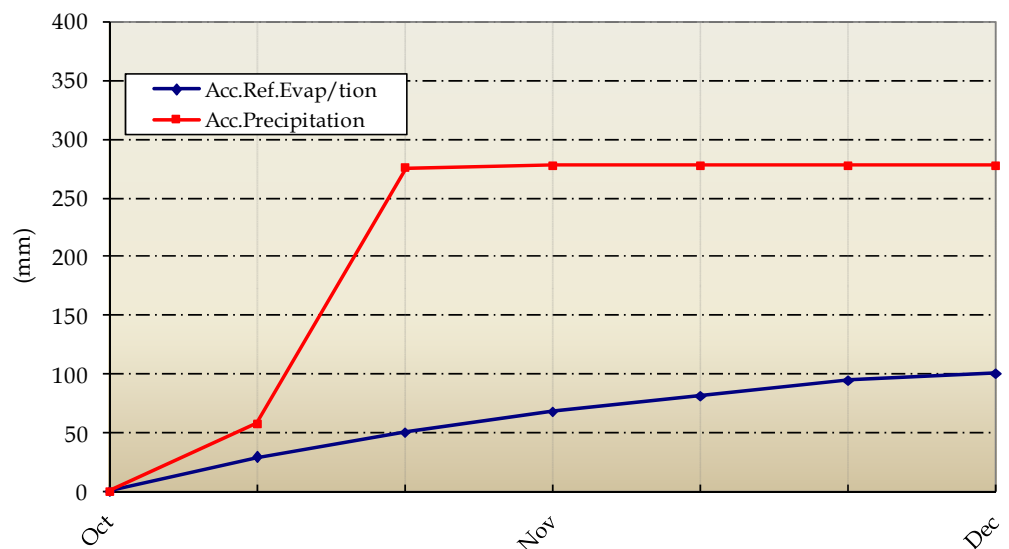
Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.4	16.8	19.4	18.4	16.8	16.2	16.6	17.4	19.6	17.6	17.6	21.0	17.0
	Min	3.4	5.6	7.6	8.4	6.0	6.6	2.0	2.0	3.0	3.8	4.8	13.2	8.6
Relative Humidity	Max	88	92	94	89	91	91	96	90	95	97	92	93	-
	Min	43	61	52	42	44	44	29	50	38	35	44	60	-
Soil Temperature at 10 cm	06 UTC	9.0	10.6	10.6	11.4	10.6	11.0	9.4	8.6	9.2	9.6	10.0	15.3	11.7
	12 UTC	13.4	12.8	15.0	14.4	14.0	14.2	13.4	13.2	13.8	13.0	13.7	17.5	13.4
Sunshine Duration		7.9	0.0	4.9	2.6	2.4	7.9	8.0	8.0	6.9	7.6	5.6	3.1	4.6
Precipitation													49.2	62.9
Evaporation		0.4	1.0	2.6	0.5	12.5	1.4	0.1	0.1	0.2	0.1	18.9	18.3	20.2
Growing Degrees	5	5.4	6.2	8.5	8.4	6.4	6.4	4.3	4.7	6.3	5.7	62.3	120.8	78.3
	10	0.4	1.2	3.5	3.4	1.4	1.4	0.0	0.0	1.3	0.7	13.3	70.8	31.1

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.1	14.7	10.9
Precipitation - Reference Evapotranspiration	-6.1	34.5	52.0
Number of Rainy Days	0.0	5.0	5.0
Number of Dry Days	38.0	4.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

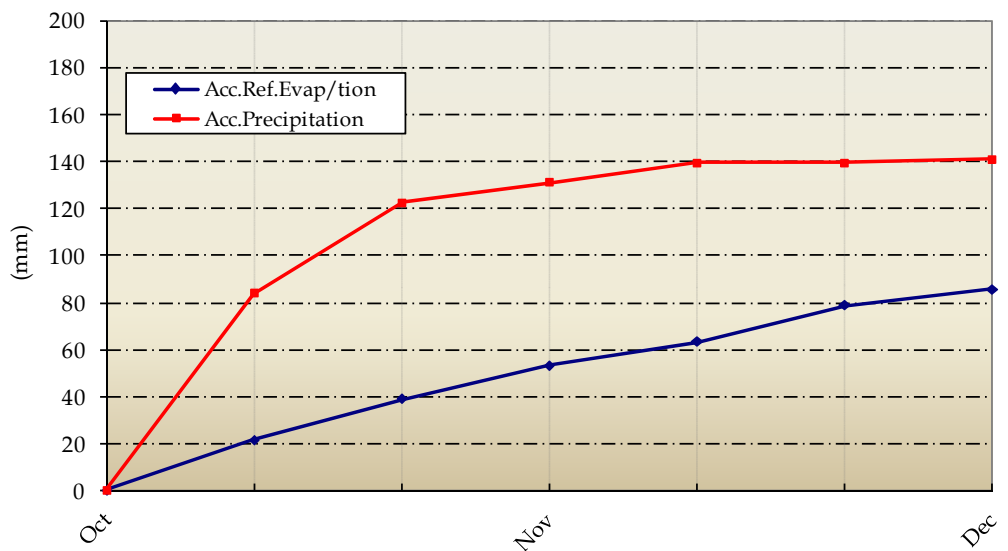


Ioannina

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	12.0	9.8	14.0	16.0	14.0	13.2	11.0	13.0	13.0	13.0	12.9	-	12.0
	Min	-5.6	-0.4	6.2	5.5	3.0	0.4	-1.0	-2.4	-3.0	-2.6	0.0	-	3.6
Relative Humidity	Max	90	100	97	88	84	92	100	100	92	100	94	-	-
	Min	54	62	67	43	39	44	56	46	57	23	49	-	-
Soil Temperature at 10 cm	06 UTC	-	-	-	-	-	-	-	-	-	-	-	-	7.1
	12 UTC	-	-	-	-	-	-	-	-	-	-	-	-	8.3
Sunshine Duration		5.1	0.0	1.3	3.4	6.1	5.5	3.0	5.5	4.5	5.5	4.0	-	2.6
Precipitation			0.3	1.2								1.5	-	57.0
Evaporation		-	-	-	-	-	-	-	-	-	-	-	-	9.5
Growing Degrees	5	0.0	0.0	5.1	5.8	3.5	1.8	0.0	0.3	0.0	0.2	16.7	-	31.9
	10	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	4.7

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.0	-	6.7
Precipitation - Reference Evapotranspiration	-5.5	-	50.3
Number of Rainy Days	2.0	-	5.1
Number of Dry Days	11.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

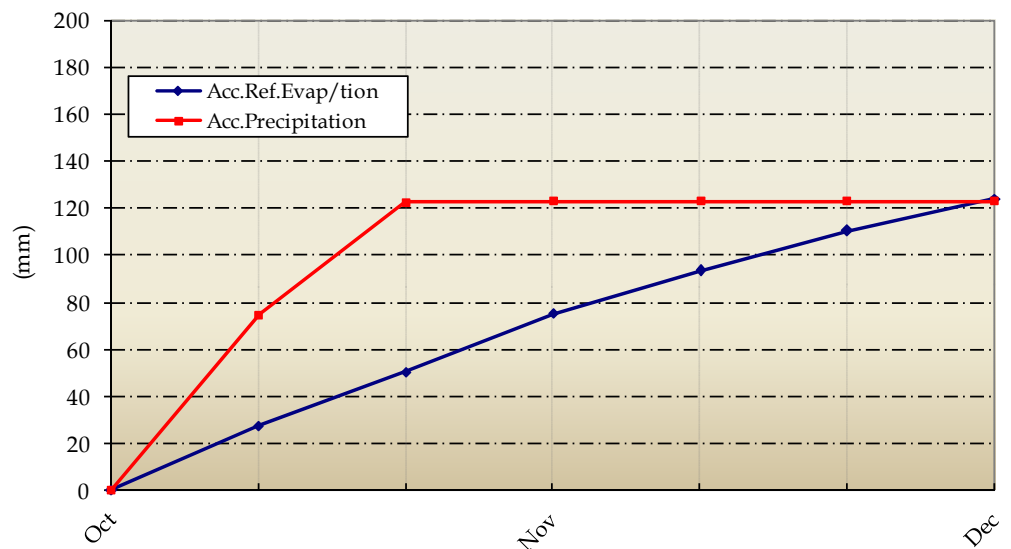


Kalamata

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.8	17.6	20.4	20.4	17.6	15.6	18.0	18.2	18.6	19.0	18.4	21.3	18.0
	Min	3.0	5.0	9.2	8.2	8.2	11.2	5.0	3.0	4.0	5.2	6.2	11.7	8.3
Relative Humidity	Max	100	94	95	95	75	100	97	97	100	92	94	97	-
	Min	48	54	55	39	43	58	30	46	57	45	48	58	-
Soil Temperature at 10 cm	06 UTC	11.6	12.0	12.6	13.0	12.6	13.4	12.4	11.6	11.6	11.8	12.3	16.3	12.7
	12 UTC	13.0	13.8	14.0	14.0	14.0	14.0	14.2	14.0	13.0	13.2	13.7	16.8	13.9
Sunshine Duration		9.7	3.2	7.0	7.2	3.4	0.0	8.2	8.6	5.4	7.7	6.0	3.6	4.3
Precipitation							0.1					0.1	19.0	54.0
Evaporation		1.0	2.0	0.8	1.9	0.5	3.8	2.0	1.0	1.6	2.4	17.0	15.1	26.0
Growing Degrees	5	5.9	6.3	9.8	9.3	7.9	8.4	6.5	5.6	6.3	7.1	73.1	115.0	81.4
	10	0.9	1.3	4.8	4.3	2.9	3.4	1.5	0.6	1.3	2.1	23.1	65.0	33.0

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.6	14.3	12.1
Precipitation - Reference Evapotranspiration	-13.5	4.7	41.9
Number of Rainy Days	1.0	4.0	4.8
Number of Dry Days	8.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

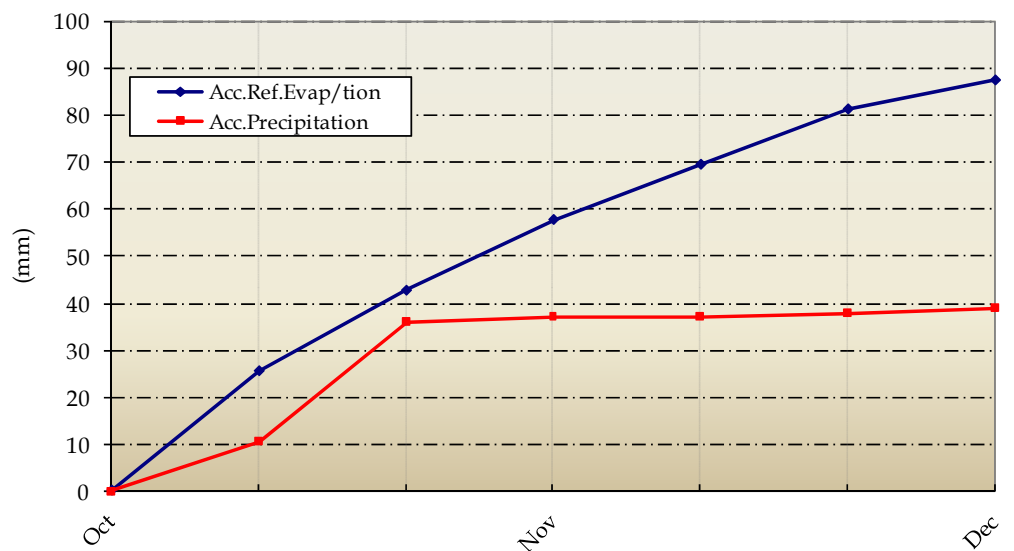


Larisa

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	13.8	12.8	10.2	12.6	10.6	13.4	12.6	13.4	13.6	14.6	12.8	17.9	13.6
	Min	-3.0	-1.2	5.4	8.4	7.8	5.4	-2.2	-2.8	-1.8	-1.0	1.5	7.5	4.1
Relative Humidity	Max	96	92	97	100	87	93	96	96	93	96	95	96	-
	Min	49	57	72	70	62	52	52	54	57	52	58	57	-
Soil Temperature at 10 cm	06 UTC	6.0	7.8	8.6	9.0	10.2	10.0	8.0	7.2	7.8	6.8	8.1	12.4	9.5
	12 UTC	8.1	8.4	9.2	11.2	10.4	11.2	9.2	8.2	8.8	8.6	9.3	13.4	10.2
Sunshine Duration		6.4	3.0	0.0	0.4	0.0	3.1	7.1	7.0	2.3	6.7	3.6	4.1	3.5
Precipitation				0.0	1.0							1.0	22.6	21.8
Evaporation		0.4	0.7	0.0	1.0	0.5	0.6	1.3	0.5	1.0	0.7	6.7	11.1	10.2
Growing Degrees	5	0.4	0.8	2.8	5.5	4.2	4.4	0.2	0.3	0.9	1.8	21.3	76.6	40.6
	10	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	29.3	8.0

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.2	10.0	7.3
Precipitation - Reference Evapotranspiration	-5.2	12.6	14.5
Number of Rainy Days	1.0	5.0	3.5
Number of Dry Days	10.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



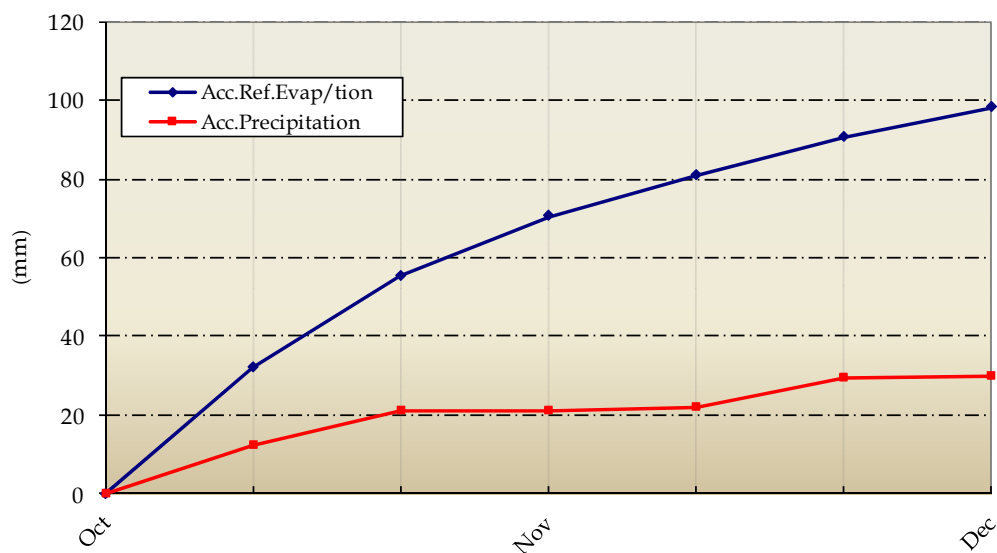


Mikra

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	11.2	10.4	10.2	11.4	10.6	11.0	11.2	13.6	12.6	11.8	11.4	-	13.2
	Min	-0.4	2.8	4.8	7.0	5.8	4.8	-0.4	-0.6	1.6	0.8	2.6	-	5.2
Relative Humidity	Max	92	97	97	97	86	74	96	85	86	90	90	-	-
	Min	52	72	74	60	58	46	43	42	63	64	57	-	-
Soil Temperature at 10 cm	06 UTC	6.0	7.2	8.8	9.8	10.0	9.8	8.0	6.0	7.0	7.4	8.0	-	8.8
	12 UTC	8.2	9.0	9.8	10.8	11.0	10.8	8.8	8.2	9.0	8.6	9.4	-	10.6
Sunshine Duration		7.4	0.0	0.0	1.1	0.0	3.7	8.1	7.9	3.7	6.0	3.8	-	3.5
Precipitation					0.3							0.3	-	21.0
Evaporation		1.3	1.1	0.4	1.7	0.6	0.6	1.6	1.3	1.5	1.4	11.5	-	15.7
Growing Degrees	5	0.4	1.6	2.5	4.2	3.2	2.9	0.4	1.5	2.1	1.3	20.1	-	43.9
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	10.2

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	7.6	-	9.9
Precipitation - Reference Evapotranspiration	-7.3	-	11.1
Number of Rainy Days	1.0	-	3.6
Number of Dry Days	11.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



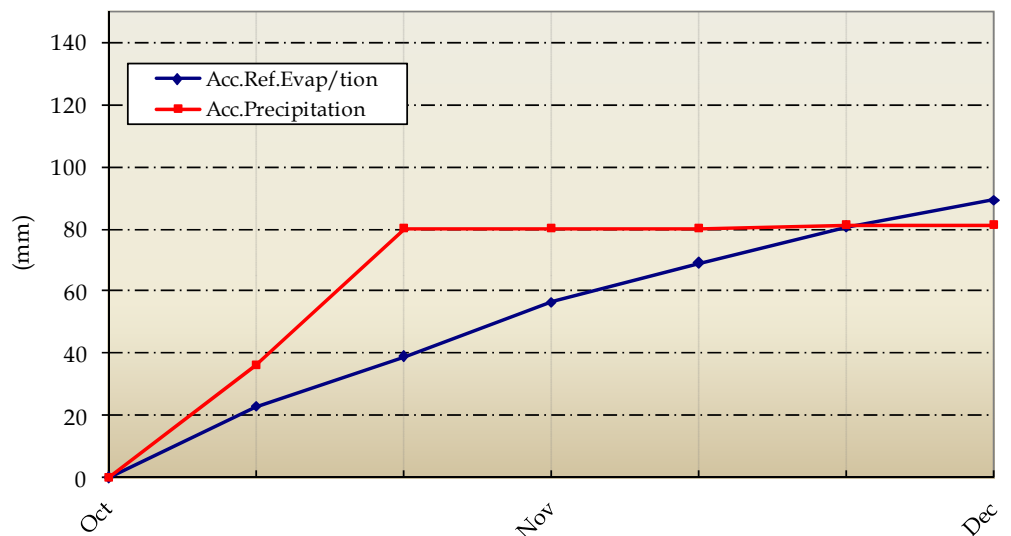


Tripoli

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	14.8	13.2	13.6	12.4	8.0	12.2	13.0	16.2	15.2	15.0	13.4	17.3	12.9
	Min	-5.4	-2.6	5.8	5.8	6.2	4.2	-2.6	-3.8	-2.8	-1.2	0.4	8.4	3.6
Relative Humidity	Max	100	100	97	94	79	87	100	96	96	96	94	91	-
	Min	44	64	66	47	70	58	43	37	32	44	50	56	-
Soil Temperature at 10 cm	06 UTC	3.8	4.4	7.4	8.8	7.6	7.6	6.0	4.4	4.4	5.4	6.0	10.6	8.3
	12 UTC	7.6	7.8	9.8	10.6	8.8	10.4	9.2	8.0	7.8	8.0	8.8	13.0	9.4
Sunshine Duration		7.0	4.5	2.8	6.7	0.0	7.7	7.4	7.3	6.7	6.8	5.7	5.1	4.2
Precipitation													24.9	45.1
Evaporation		0.0	0.0	2.1	7.2	1.0	1.1	0.0	0.0	0.0	0.5	11.9	11.9	13.0
Growing Degrees	5	0.0	0.3	4.7	4.1	2.1	3.2	0.2	1.2	1.2	1.9	18.9	78.3	35.8
	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.3	5.3

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	8.6	10.8	9.3
Precipitation - Reference Evapotranspiration	-8.6	14.1	35.8
Number of Rainy Days	0.0	4.0	4.7
Number of Dry Days	13.0	5.0	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

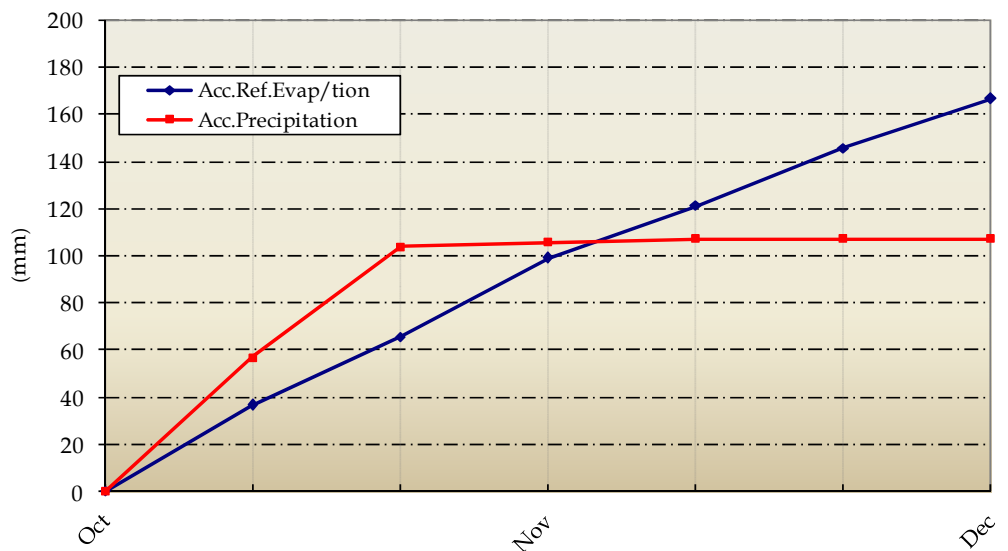


Tympaki

3rd 10-day period (21-30/11/2011)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	20.8	19.4	20.2	19.2	17.2	16.0	16.8	18.8	18.2	18.8	18.5	23.3	19.5
	Min	5.0	7.0	10.6	9.6	8.4	10.4	10.4	3.4	5.8	8.4	7.9	13.7	11.0
Relative Humidity	Max	97	98	98	100	93	65	87	89	97	100	92	96	-
	Min	25	49	49	44	43	42	34	30	38	52	41	48	-
Soil Temperature at 10 cm	06 UTC	11.8	12.2	14.0	14.4	13.4	14.0	14.0	11.4	12.2	13.0	13.0	16.7	14.6
	12 UTC	16.4	16.2	17.6	17.4	16.4	16.2	16.8	15.8	16.2	15.2	16.4	20.3	16.9
Sunshine Duration		8.7	3.6	5.6	8.3	8.7	7.5	8.3	9.1	8.9	1.6	7.0	5.7	5.0
Precipitation													3.3	38.6
Evaporation		2.1	1.3	3.8	4.1	3.4	4.9	5.3	3.5	3.2	1.7	33.3	27.2	30.7
Growing Degrees	5	7.9	8.2	10.4	9.4	7.8	8.2	8.6	6.1	7.0	8.6	82.2	135.3	102.1
	10	2.9	3.2	5.4	4.4	2.8	3.2	3.6	1.1	2.0	3.6	32.2	85.3	52.3

3rd 10-day period (21-30/11/2011)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	21.1	15.4	15.8
Precipitation - Reference Evapotranspiration	-21.1	-12.1	22.8
Number of Rainy Days	0.0	2.0	3.4
Number of Dry Days	28.0	8.0	-

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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