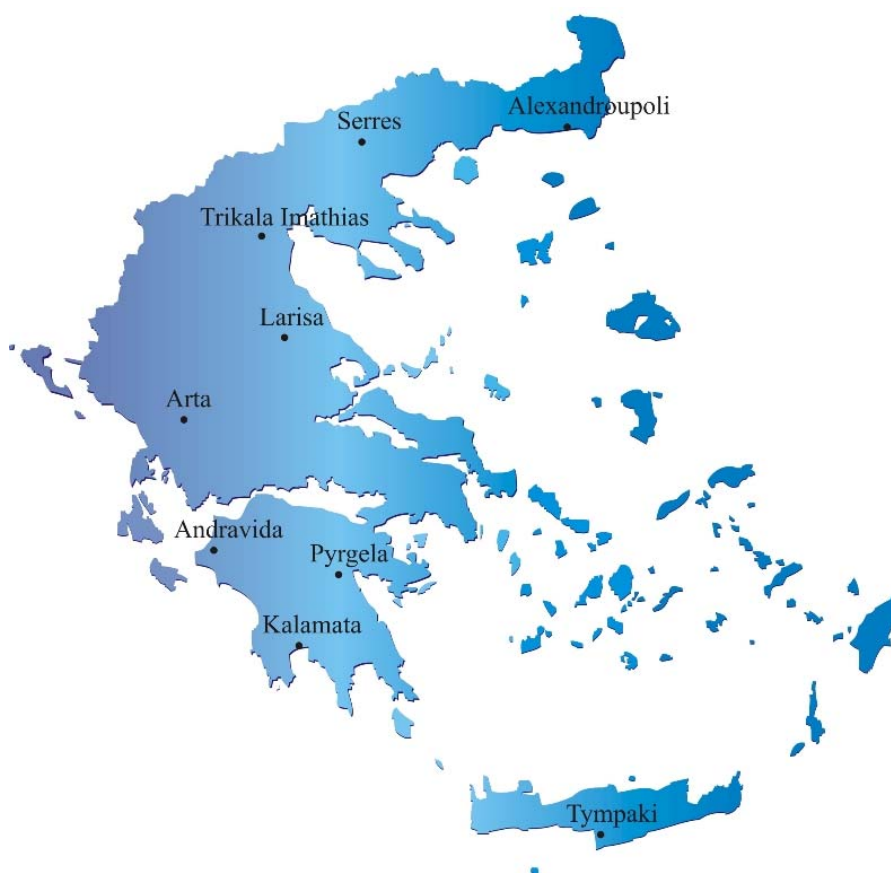




# AGROMETEOROLOGICAL BULLETIN

*November 2009*  
*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



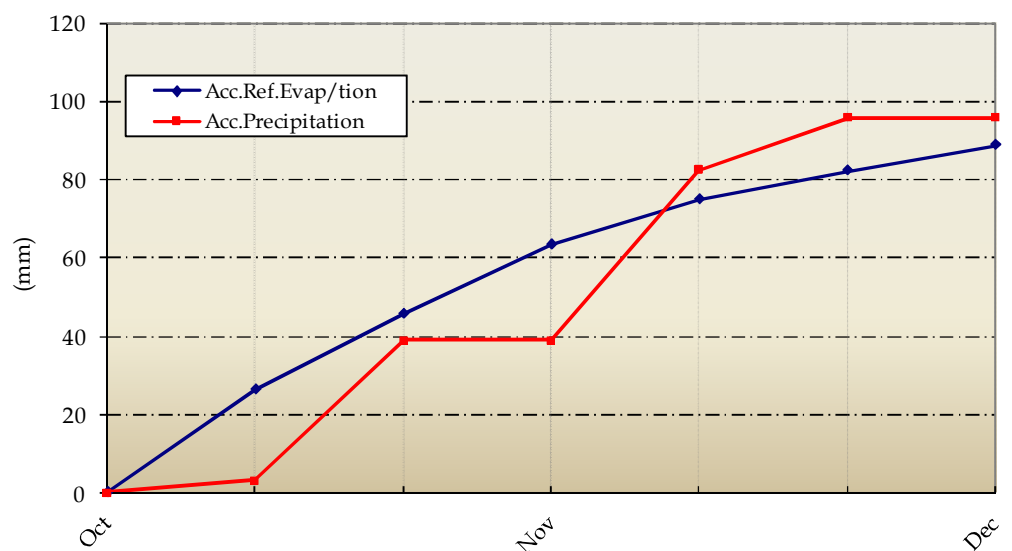
Hellenic National Meteorological Service  
Division of Climatology-Applications  
El. Venizelou Street 14, 16777  
Helliniko, Athens

*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)  
[www.meteohellas.gr](http://www.meteohellas.gr)

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.0	15.4	16.6	14.4	14.6	16.2	16.6	16.4	17.4	16.6	16.1	-	12.8
	Min	4.6	3.0	4.0	4.4	4.0	3.0	4.0	8.8	9.6	6.6	5.2	-	5.0
Relative Humidity	Max	94	100	100	97	97	94	97	100	95	95	97	-	-
	Min	63	65	79	82	68	71	74	72	61	74	71	-	-
Soil Temperature at 10 cm	06 UTC	10.6	10.2	10.0	10.4	10.0	9.6	9.6	11.0	11.6	11.2	10.4	-	8.6
	12 UTC	12.4	11.6	11.4	11.6	11.6	11.2	11.6	12.2	13.2	12.8	12.0	-	10.3
Sunshine Duration		8.8	8.3	7.1	5.4	7.4	8.0	5.7	4.4	7.9	2.4	6.5	-	3.2
Precipitation													-	32.9
Evaporation		1.0	0.0	0.2	1.3	0.8	1.6	1.2	1.0	1.3	0.5	8.9	-	16.3
Growing Degrees	5	5.8	4.2	5.3	4.4	4.3	4.6	5.3	7.6	8.5	6.6	56.6	-	42.5
	10	0.8	0.0	0.3	0.0	0.0	0.0	0.3	2.6	3.5	1.6	9.1	-	11.5

3rd 10-day period (21-30/11/2009)	Previous Year Value	Past Years Mean Value	
Reference Evapotranspiration	6.5	-	9.6
Precipitation - Reference Evapotranspiration	-6.5	-	23.3
Number of Rainy Days	0.0	-	3.3
Number of Dry Days	17.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

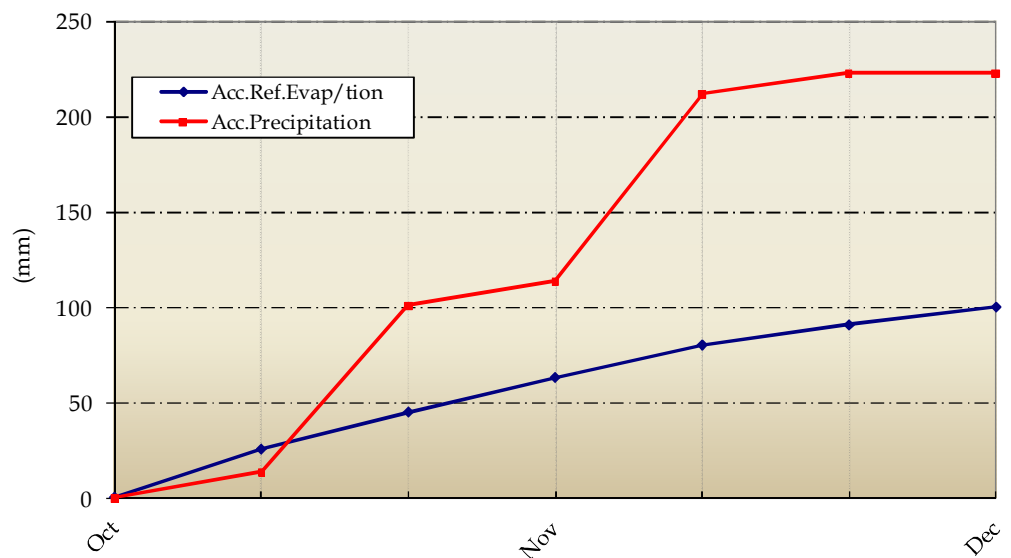


Andravida

3rd 10-day period (21-30/11/2009)		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	18.2	17.0	18.6	19.8	18.2	18.8	19.8	20.2	20.0	18.9	-	17.0
	Min	8.8	5.4	6.8	12.2	7.6	5.4	8.2	9.6	14.0	11.8	9.0	-	8.6
Relative Humidity	Max	100	98	97	97	97	97	97	97	98	95	97	-	-
	Min	68	68	72	65	49	52	68	67	74	69	65	-	-
Soil Temperature at 10 cm	06 UTC	13.6	12.2	13.0	14.6	13.6	12.6	12.6	13.6	15.0	14.6	13.5	-	11.7
	12 UTC	16.6	15.6	15.2	16.8	16.0	16.2	15.4	16.0	16.0	16.0	16.0	-	13.4
Sunshine Duration		7.4	7.8	3.3	4.8	7.1	7.7	4.5	6.6	7.4	0.8	5.7	-	4.6
Precipitation													-	62.9
Evaporation		1.6	0.8	0.2	2.3	0.7	0.8	0.4	1.2	0.6	0.6	9.2	-	20.2
Growing Degrees	5	8.8	6.8	6.9	10.4	8.7	6.8	8.5	9.7	12.1	10.9	89.6	-	78.3
	10	3.8	1.8	1.9	5.4	3.7	1.8	3.5	4.7	7.1	5.9	39.6	-	31.1

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	9.3	-	10.9
Precipitation - Reference Evapotranspiration	-9.3	-	52.0
Number of Rainy Days	0.0	-	5.0
Number of Dry Days	18.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

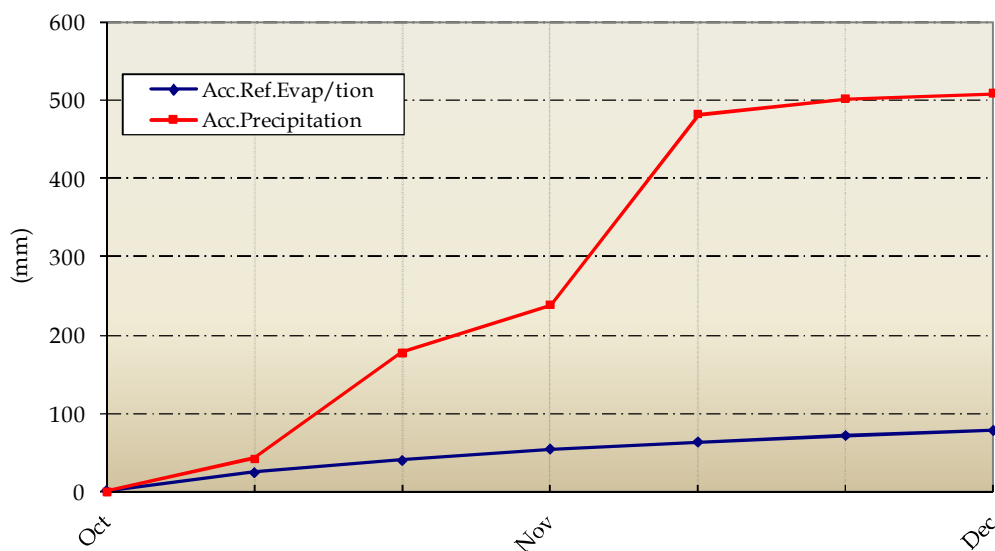




3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	22.4	20.2	19.0	19.0	21.2	20.8	19.0	16.6	20.6	19.8	19.9	-	16.8
	Min	6.2	2.8	6.4	6.2	3.6	3.4	4.2	10.6	11.2	8.4	6.3	-	6.8
Relative Humidity	Max	98	97	100	97	100	93	97	98	98	97	98	-	-
	Min	22	28	60	61	31	46	40	85	51	65	49	-	-
Soil Temperature at 10 cm	06 UTC	11.4	10.4	10.6	11.2	10.6	10.2	10.8	11.8	12.8	11.2	11.1	-	10.4
	12 UTC	13.0	11.0	11.6	12.2	11.8	11.0	11.0	11.6	13.8	12.8	12.0	-	12.0
Sunshine Duration		8.3	7.8	7.2	6.1	7.1	8.5	5.8	0.2	5.7	2.2	5.9	-	4.0
Precipitation									4.5	2.8		7.3	-	74.1
Evaporation		2.0	1.1	0.9	1.3	1.0	2.2	0.0	0.4	1.3	0.7	10.9	-	-
Growing Degrees	5	9.3	6.5	7.7	7.6	7.4	7.1	6.6	8.6	10.9	9.1	80.8	-	68.1
	10	4.3	1.5	2.7	2.6	2.4	2.1	1.6	3.6	5.9	4.1	30.8	-	22.4

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.6	-	7.8
Precipitation - Reference Evapotranspiration	0.7	-	66.3
Number of Rainy Days	2.0	-	4.8
Number of Dry Days	16.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

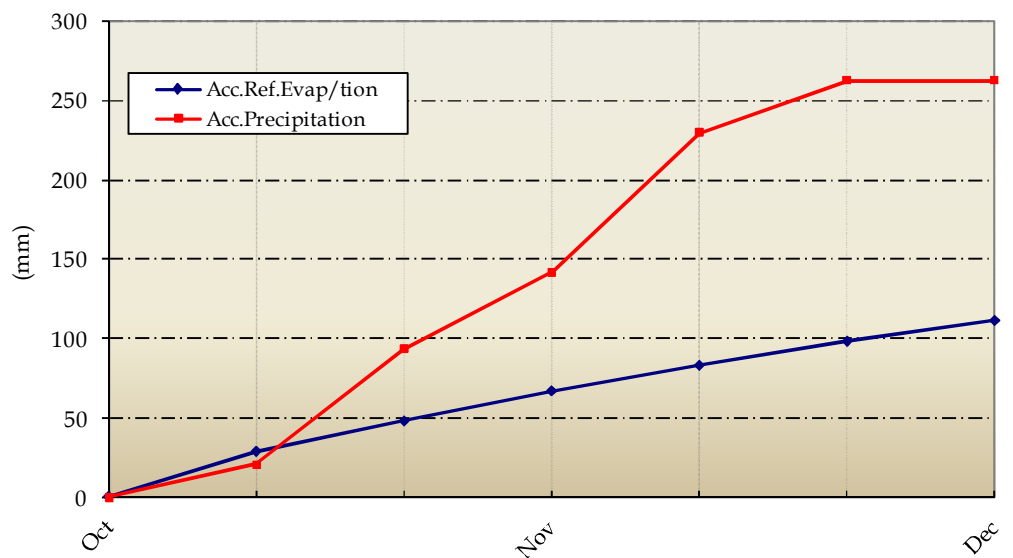


Kalamata

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	21.2	21.0	19.0	18.8	20.2	20.0	19.4	20.0	21.4	20.2	20.1	-	18.0
	Min	6.6	6.0	5.2	8.6	8.4	6.4	6.0	8.0	11.0	10.0	7.6	-	8.3
Relative Humidity	Max	97	94	94	92	97	95	94	95	98	98	95	-	-
	Min	47	44	56	59	56	51	60	61	62	66	56	-	-
Soil Temperature at 10 cm	06 UTC	14.0	13.4	12.6	12.6	13.6	13.0	12.6	13.0	14.4	14.2	13.3	-	12.7
	12 UTC	-	14.6	14.0	14.2	14.4	14.0	13.6	14.2	15.4	15.0	14.4	-	13.9
Sunshine Duration		6.8	8.8	7.8	7.9	7.7	8.3	7.3	6.7	7.6	2.5	7.1	-	4.3
Precipitation													-	54.0
Evaporation		2.2	2.0	2.1	3.1	4.0	1.7	1.1	0.8	1.1	0.4	18.5	-	26.0
Growing Degrees	5	8.9	8.5	7.1	8.7	9.3	8.2	7.7	9.0	11.2	10.1	88.7	-	81.4
	10	3.9	3.5	2.1	3.7	4.3	3.2	2.7	4.0	6.2	5.1	38.7	-	33.0

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	13.2	-	12.1
Precipitation - Reference Evapotranspiration	-13.2	-	41.9
Number of Rainy Days	0.0	-	4.8
Number of Dry Days	18.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

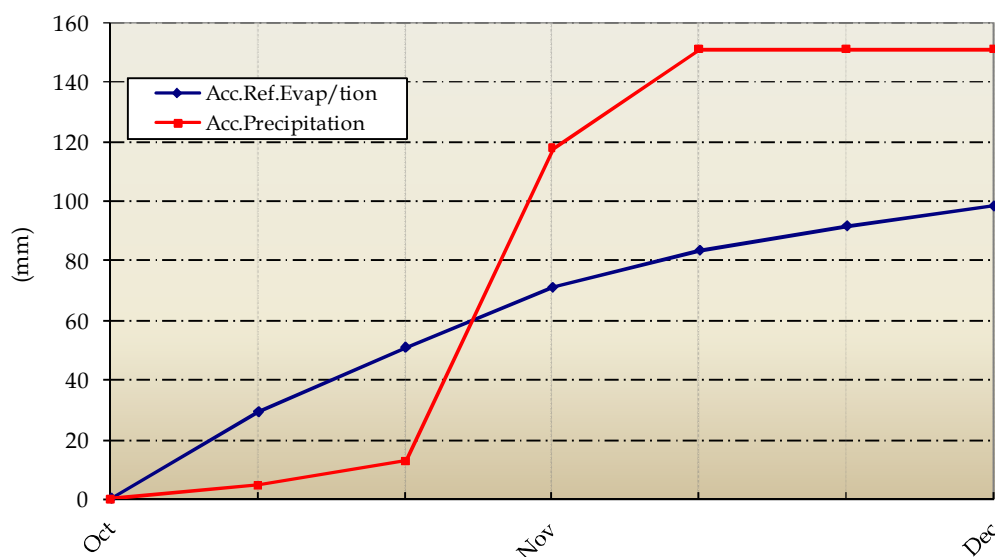


Larisa

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	18.6	17.8	17.8	17.0	18.4	18.0	16.4	17.6	21.6	16.0	17.9	-	13.6
	Min	2.2	2.0	2.2	3.4	2.8	2.0	1.0	2.4	6.8	4.0	2.9	-	4.1
Relative Humidity	Max	97	100	97	97	100	97	97	97	94	97	97	-	-
	Min	48	48	46	59	45	48	52	50	40	60	50	-	-
Soil Temperature at 10 cm	06 UTC	11.0	10.4	9.8	9.8	10.0	9.6	9.2	9.4	10.8	10.2	10.0	-	9.5
	12 UTC	12.0	11.4	11.0	10.8	11.0	10.4	10.4	10.6	11.0	11.2	11.0	-	10.2
Sunshine Duration		7.7	7.6	7.5	6.7	7.2	7.8	6.8	5.5	7.3	2.2	6.6	-	3.5
Precipitation													-	21.8
Evaporation		1.1	0.6	1.0	1.4	1.0	1.1	1.3	1.0	2.6	0.8	11.9	-	10.2
Growing Degrees	5	5.4	4.9	5.0	5.2	5.6	5.0	3.7	5.0	9.2	5.0	54.0	-	40.6
	10	0.4	0.0	0.0	0.2	0.6	0.0	0.0	0.0	4.2	0.0	5.4	-	8.0

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.7	-	7.3
Precipitation - Reference Evapotranspiration	-6.7	-	14.5
Number of Rainy Days	0.0	-	3.5
Number of Dry Days	19.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

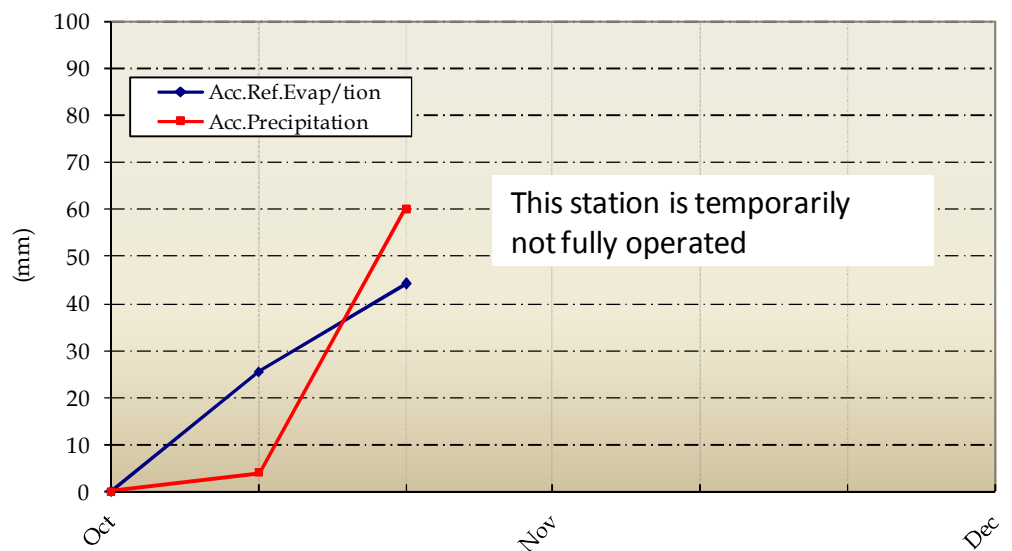


Pyrgela

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	-	-	-	-	-	-	-	-	-	-	-	-	17.7
	Min	4.0	0.8	0.2	1.8	6.0	-	-	-	-	6.0	3.1	-	6.9
Relative Humidity	Max	93	93	93	93	-	-	-	-	93	91	93	-	-
	Min	25	23	25	45	-	-	-	-	25	55	33	-	-
Soil Temperature at 10 cm	06 UTC	10.6	9.6	9.0	9.0	10.2	-	-	-	-	11.2	9.9	-	10.2
	12 UTC	15.0	14.0	13.4	13.4	14.0	-	-	-	-	14.0	14.0	-	13.4
Sunshine Duration		7.2	7.6	7.3	6.4	-	-	-	-	-	0.2	5.7	-	4.1
Precipitation												-	-	36.9
Evaporation		1.0	0.2	3.8	1.2	-	-	-	-	2.0	2.0	-	-	13.4
Growing Degrees	5	-	-	-	-	-	-	-	-	-	-	-	-	72.9
	10	-	-	-	-	-	-	-	-	-	-	-	-	26.2

3rd 10-day period (21-30/11/2009)	Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	-	8.8
Precipitation - Reference Evapotranspiration	-	28.1
Number of Rainy Days	-	3.9
Number of Dry Days	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

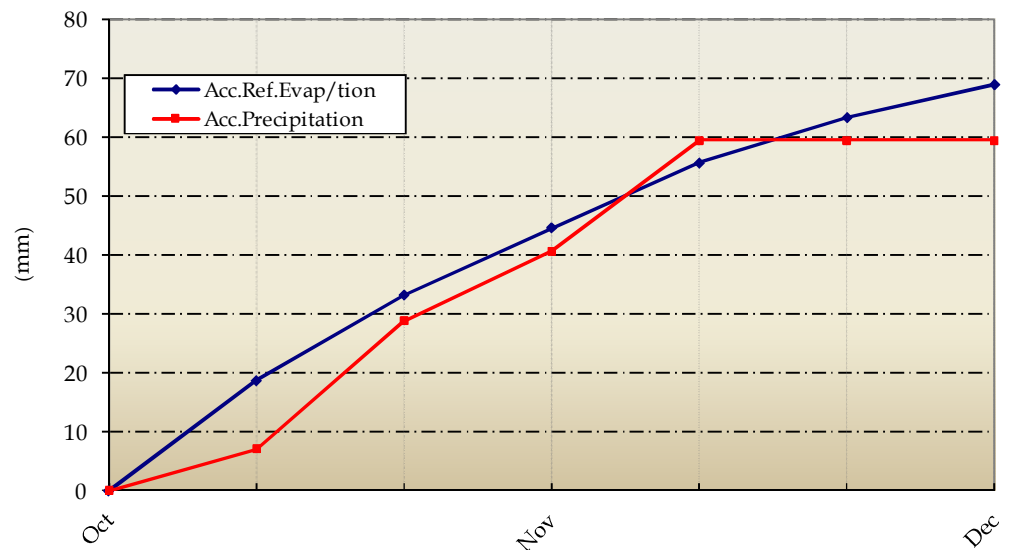


Series

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	17.0	17.0	16.8	16.0	18.2	17.4	16.0	16.0	20.4	15.2	17.0	-	12.0
	Min	3.0	1.4	1.4	2.0	2.4	2.0	0.4	4.0	4.0	2.6	2.3	-	3.6
Relative Humidity	Max	93	92	96	97	93	93	100	91	97	93	94	-	-
	Min	52	49	52	53	55	45	53	57	33	60	51	-	-
Soil Temperature at 10 cm	06 UTC	8.8	8.0	7.4	7.4	7.4	7.0	6.6	7.8	8.2	7.2	7.6	-	7.5
	12 UTC	11.8	9.2	8.2	8.0	8.8	8.8	7.2	8.4	9.2	8.0	8.8	-	8.5
Sunshine Duration		5.1	6.3	4.5	3.3	4.3	4.9	4.2	3.7	4.7	4.4	4.5	-	3.3
Precipitation													-	18.2
Evaporation		1.0	1.1	0.9	0.8	0.4	0.4	0.4	0.6	1.0	0.4	7.0	-	7.3
Growing Degrees	5	5.0	4.2	4.1	4.0	5.3	4.7	3.2	5.0	7.2	3.9	46.6	-	32.8
	10	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	2.2	0.0	2.5	-	5.9

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	5.6	-	5.6
Precipitation - Reference Evapotranspiration	-5.6	-	12.6
Number of Rainy Days	0.0	-	3.3
Number of Dry Days	20.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration



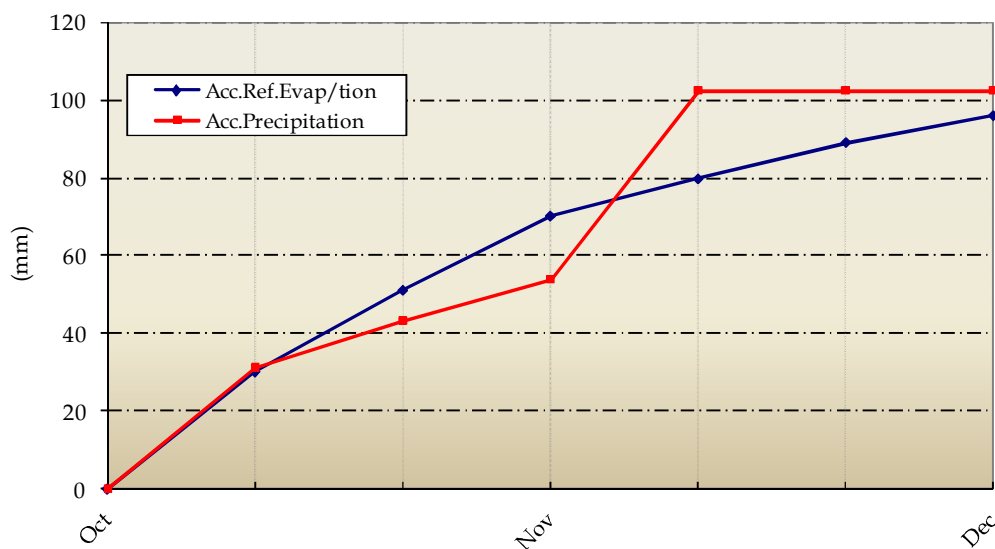


Trikala Imathias

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	21.4	21.0	20.0	17.4	19.4	19.0	17.0	17.2	21.8	13.6	18.8	-	12.8
	Min	4.0	3.6	4.0	3.0	3.4	3.6	4.2	4.4	4.0	5.6	4.0	-	4.4
Relative Humidity	Max	99	98	99	98	99	99	99	100	96	96	98	-	-
	Min	45	48	49	43	31	44	61	68	36	70	50	-	-
Soil Temperature at 10 cm	06 UTC	10.4	9.4	9.2	9.0	9.0	8.4	8.6	9.0	10.0	9.6	9.3	-	9.2
	12 UTC	12.0	12.2	11.0	11.8	10.8	10.8	10.4	10.0	12.2	10.8	11.2	-	9.5
Sunshine Duration		8.8	8.2	7.0	7.0	7.4	8.4	4.9	5.6	7.2	0.0	6.4	-	3.6
Precipitation													-	30.6
Evaporation		1.4	1.4	0.6	2.4	0.8	1.7	1.3	1.9	0.9	0.4	12.8	-	7.1
Growing Degrees	5	7.7	7.3	7.0	5.2	6.4	6.3	5.6	5.8	7.9	4.6	63.8	-	39.1
	10	2.7	2.3	2.0	0.2	1.4	1.3	0.6	0.8	2.9	0.0	14.2	-	7.8

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	6.9	-	6.9
Precipitation - Reference Evapotranspiration	-6.9	-	23.7
Number of Rainy Days	0.0	-	3.4
Number of Dry Days	20.0	-	-

Diagram of Accumulated Precipitation and Accumulated Reference Evapotranspiration

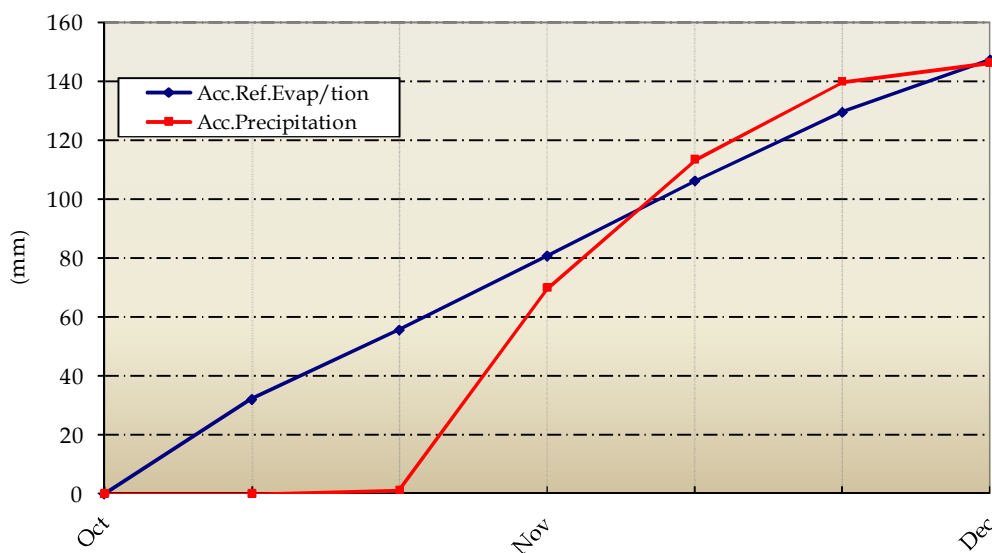


Tympaki

3rd 10-day period (21-30/11/2009)		21	22	23	24	25	26	27	28	29	30	Mean Value or Sum	Previous Year Value	Past Years Mean Value
Temperature	Max	24.0	23.0	20.4	21.6	22.0	22.0	20.4	20.0	20.6	20.8	21.5	-	19.5
	Min	12.2	11.0	10.0	10.6	10.6	11.2	9.0	10.8	13.0	12.8	11.1	-	11.0
Relative Humidity	Max	96	97	99	100	96	98	98	99	97	99	98	-	-
	Min	39	39	64	49	42	42	36	63	62	66	50	-	-
Soil Temperature at 10 cm	06 UTC	15.6	15.4	15.0	14.6	15.2	15.2	14.2	15.4	15.6	15.6	15.2	-	14.6
	12 UTC	20.0	19.2	17.6	18.6	19.0	19.2	18.6	19.0	19.0	18.8	18.9	-	16.9
Sunshine Duration		5.9	6.7	0.3	5.7	2.7	5.5	6.8	5.0	5.1	0.8	4.4	-	5.0
Precipitation									0.6	5.7		6.3	-	38.6
Evaporation		2.2	2.3	1.6	0.6	2.9	3.3	3.0	1.1	3.4	1.6	22.0	-	30.7
Growing Degrees	5	13.1	12.0	10.2	11.1	11.3	11.6	9.7	10.4	11.8	11.8	113.0	-	102.1
	10	8.1	7.0	5.2	6.1	6.3	6.6	4.7	5.4	6.8	6.8	63.0	-	52.3

3rd 10-day period (21-30/11/2009)		Previous Year Value	Past Years Mean Value
Reference Evapotranspiration	17.7	-	15.8
Precipitation - Reference Evapotranspiration	-11.4	-	22.8
Number of Rainy Days	2.0	-	3.4
Number of Dry Days	15.0	-	-

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.

**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 :

Charalabopoulos Christos

Filiou Anna

The present bulletin was designed and implemented under the support of Water Resources Management Division of Agriculture University of Athens (Professor A. Liakatas)