



Ίδρυμα
Προώθησης
Έρευνας



Date: 27/10/2017

Project Protocol Number: KOINA/ERANETMED/1114/02

Project Title: “Cr(VI) Impacted water bodies in the Mediterranean: Transposing management options for Efficient water Resources use through an Interdisciplinary Approach” (Ρυπασμένα με εξασθενές χρώμιο υδατικά σώματα στη Μεσόγειο: μεταφορά διαχειριστικών επιλογών για την αποδοτική χρήση των υδατικών πόρων μέσω μιας διεπιστημονικής προσέγγισης).

Acronym of the Project: CrITERIA

D7 -Report: Estimation the crop water requirements (ET_c) and the net irrigation requirements (NIR) of 17 major Mediterranean cultivated crops for the three studied sites in Cyprus, as well as for the studied sites in other partner countries. Also, the agricultural water demand in the study areas in Cyprus has been determined.

Delivered by Cyprus Agricultural Research Institute (ARI) & Cyprus Geological Survey Department (GSD)

SUMMARY

A. Estimation of the crop water requirements (ETc) and the net irrigation requirements (NIR) of 17 major Mediterranean cultivated crops for the three studied sites in Cyprus, as well as for the studied sites in other partner countries

The water needs of plants is of predominant importance for the appropriate design and operation of irrigation systems, as well as the programming of irrigation. These needs are determined mainly by the climatic conditions as well as the kind of plant and its stage of growth.

Agricultural Research Institute has estimated the crop water requirements (ETc), the Eff. Rainfall and the net irrigation requirement (Net Irr. Req. or Irr. Req.) of 17 major Mediterranean cultivated crops, for the three studied sites in Cyprus, in medium (loam) soil, as well as for the studied sites in other partner countries (Greece, Turkey, Jordan, Italy, Oman). A comparative determination of the irrigation needs of the cultivations and the difference between the evapotranspiration of the cultivations and the rain fall took place. The water needs of the plants can be satisfied with irrigation, with the rain fall and the combination of irrigation and rainfall. In the case that there is no rainfall, the water will come from irrigation. Therefore, the irrigation needs in water are equivalent to the water needs of the plant ETc. In the case of waterfall where irrigation is not needed, the irrigation water needs are equal to zero. The water needs or part of them can be supplemented by waterfall. In this case, the irrigation needs (Irr. Req.) is the difference between ETc and the part of the rainfall that was used effectively from the plants (Eff. rainfall). Therefore:

$$\text{Irr. Req.} = \text{ETc} - \text{Eff. Rainfall}$$

The estimated crop water requirements (ETc), the Eff. Rainfall and the net irrigation requirement (Net Irr. Req. or Irr. Req.) are in the attached excel files.

B. Estimation of the agricultural water demand in the study areas in Cyprus

The agricultural water demand in the study areas in Cyprus has been determined from public stakeholders (Water Development Department). **Table 1** shows the area in 1000 square meters (m²) of irrigation sections (permanent cultivations, green houses, seasonal cultivations, fodder plants, ornamental plants and green areas) in Kokkinochoria and Kiti – Mazotos for 2017. The

priority of the sections of irrigation in water needs are green houses, permanent cultivations, seasonal cultivations, fodder plants and green areas. Continuing, **Table 2** shows the water needs in quantities (m^3) in every section of irrigation of every area (Kokkinochoria and Kiti – Mazotos) of investigation for 2017. Furthermore, in Kokkinochoria we have the maximum consumption in the period September – October in the year 2005 while in Kiti – Mazotos the maximum consumption is in the period August – September 2013 (**Table 3**). Finally, **Table 4** presents the water needs in State Water projects in cubic meters (m^3) per 1000 square meters (m^2).

The agricultural water demands for Troodos cannot be served from public stakeholders (such as the Water Development Department and the Water Board) and are thus served by private sources, surface waters, and water drillings.

We are expecting inputs from public stakeholders with regard to the civil water demand.

Table 1. The area in 1000 square meters (m^2) of irrigation sections (permanent cultivations, green houses, seasonal cultivations, fodder plants, ornamental plants and green areas) in Kokkinochoria and Kiti – Mazotos of 2017

A/A	AREA KIND OF CULTIVATION	KOKKINOCHORIA	KITI - MAZOTOS
A	PERMANENT CULTIVATIONS		
1	CITRUS	2,227	233
2	DECIDUOUS	2,207	
3	AVOCADO		
4	BANANAS		
5	GRAPES		183
6	OLIVES	3,668	1,209
7	VARIOUS		802
8	AVOCADO		
9	WALNUTS		
	TOTAL	8,102	2,427
B	GREEN HOUSES		
1	GREEN HOUSES HIGH	2,759	466
2	GREEN HOUSES LOW		
3	OGRRN HOUSES ORNAMENTAL PLANTS	200	54
	TOTAL	2,959	520

C	SEASONALCULTIVATIONS		
1	SPRING POTATOES	43,024	1,840
2	SUMMER POTATOES		
3	OCTOBER POTATOES	13,101	1,840
4	SPRING VEGETABLES		
5	SUMMER VEGETABLES		
6	NUTS		
7	BEANS		
8	OTHER PULSES		
9	MELONS		
10	ARTICHOKES		
11	TARO ROOT	1,878	
12	VARIOUS / SEASONALLY	35,424	5,475
	FODDER PLANTS	93,427	9,155
D	MEDICAGO		
	CORN	507	379
	OTHER		
	GREEN AREAS	2348	396
	FIELDS - EXPERIMENTAL PLANTS		
	WHEAT		
	TOTAL	2,855	775
E	ORNAMENTAL PLANTS		
F	EXPERIMENTAL PLANTS		
	ΟΛΙΚΟ		
	ΓΕΝΙΚΟ ΣΥΝΟΛΟ	107,343	12,877
A	PERMANENT CULTIVATIONS	8102	2427
B	GREEN HOUSES	2959	520
C	SEASONAL CULTIVATIONS	93427	9155
D	FODDER PLANTS	2855	775
E	ORNAMENTAL PLANTS		
F	EXPERIMENTAL PLANTS		

Table 2. The water needs in quantities (m³) in every section of irrigation of every area (Kokkinochoria and Kiti – Mazotos) of investigation of 2017

A/A	AREA KIND OF CULTIVATION	KOKKINOCHORIA	KITI - MAZOTOS
A	PERMANENT CULTIVATIONS		
1	CITRUS	1,781,600	186,400
2	DECIDUOUS	1,699,390	
3	AVOCADO		
4	BANANAS		
5	GRAPES		54,900
6	OLIVES	1,577,240	519,870
7	VARIOUS		481,200
8	AVOCADO		
9	WALNUTS		
	TOTAL	5,058,230	1,242,370
B	GREEN HOUSES		
1	GREEN HOUSES HIGH	1,655,400	279,600
2	GREEN HOUSES LOW		
3	OGRRN HOUSES ORNAMENTAL PLANTS	200,000	54,000
	TOTAL	1,855,400	333,600
C	SEASONALCULTIVATIONS		
1	SPRING POTATOES	12,907,200	552,000
2	SUMMER POTATOES		0
3	OCTOBER POTATOES	6,550,500	920,000
4	SPRING VEGETABLES		
5	SUMMER VEGETABLES		
6	NUTS		
7	BEANS		
8	OTHER PULSES		
9	MELONS		
10	ARTICHOKES		
11	TARO ROOT	4,695,000	
12	VARIOUS	15,586,560	2,409,000
	TOTAL	39,739,260	3,881,000
D	FODDER PLANTS		
	MEDICAGO	608,400	454,800

	CORN	0	
	OTHER	1,174,000	198,000
	GREEN AREAS		
	TOTAL	1,782,400	652,800
E	ORNAMENTAL PLANTS		
F	EXPERIMENTAL PLANTS		
	TOTAL	0	0
A	PERMANENT CULTIVATIONS	5,058,230	1,242,370
B	GREEN HOUSES	1,855,400	333,600
C	SEASONAL CULTIVATIONS	39,739,260	3,881,000
D	FODDER PLANTS	1,782,400	652,800
E	ORNAMENTAL PLANTS		
F	EXPERIMENTAL PLANTS		
	IRRIGATION TOTAL	48,435,290	6,109,770
	LIVESTOCK WATER SUPPLY	120,000	100,000
	GENERAL TOTAL	48,555,290	6,209,770
	REAL NEEDS	21,955,000	2,232,000
	MAXIMUM CONSUMPTION		

Table 3. Period of maximum consumption from 2004 to 2017 of Kokkinochoria and Kiti – Mazotos (million m³)

YEAR	KOKKINOCHORIA*	KITI - MAZOTOS**
2004	19.876	1.925
2005	21.955	1.738
2006	11.318	1.384
2007	6.350	1.108
2008	0	0
2009	5.688	0.793
2010	10.988	1.276
2011	11.596	1.436
2012	17.213	1.643
2013	18.333	2.232

2014	13.042	1.486
2015	13.600	1.620
2016	13.845	1.613
2017	10.800	1.129
* September to October, ** August to September		

Table 4. The water needs in State Water projects in cubic meters (m³) per 1000 square meters (m²)

CULTIVATIONS WATER NEEDS IN STATE WATER PROJECTS															
Water need in cubic meter (m ³) per 1000 SQUARE METERS (m ²)															
A/A	AREA KIND OF CULTIVATION	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL NEEDS	AGRICULTURAL RESEARCH INSTITUTE
A	PERMANENT CULTIVATIONS														
1	CITRUS				80	102	131	141	134	117	95			800	800
2	DECIDUOUS				70	110	130	142	133	113	72			770	770
3	AVOCADO				80	112	131	141	134	117	85			800	800
4	BANANAS			63	78	125	145	200	210	190	149	90		1250	1250
5	GRAPES				72	105	123							300	300
6	OLIVES				25	52	74	90	85	64	40			430	430
7	ALMOND TREES													350	350
8	LOQUATS													550	550
9	WALNUTS													990	990
B	GREEN HOUSES														
1	GREEN HOUSES HIGH													600	600
	TOMATOES	66	95	129	145	120					55	65	75	750	750
	CUCUMBER													570	570
	BEANS													450	450
	ORNAMENTAL PLANTS	47	46	64	91	113	133	143	143	46	63	61	50	1000	
2	GREEN HOUSES LOW														
	TOMATOES		25	45	90	160	140							460	460
	CUCUMBER													300	300
	WATER MELONS													220	220
	MELONS													220	220
C	SEASONAL CULTIVATIONS														

1	SPRING POTATOES	20	40	70	80	90								300	300
2	SUMMER POTATOES														
3	OCTOBER POTATOES						48	98	144	140	70			500	500
4	SPRING VEGETABLES			30	63	151	191	165						600	
5	SUMMER VEGETABLES						36	124	202	150	28			540	
6	NUTS				21	95	155	177	110	52				610	
7	BEANS								66	111	142	31		350	
8	OTHER PULSES			30	70	140	120							360	
9	WATER MELONS					38	63	150	160	56	43			510	510
10	MELONS					38	63	155	165	56	43			520	520
11	TOMATOES													650	650
12	CUCUMBERS													470	470
13	TOBACCO					104	226	210						540	
14	MEDICAGO	33	32	45	70	132	160	190	185	166	101	51	35	1200	1200
15	LEAFY VEGETABLES				23	52	100	127	48					350	350
16	CORN			35	65	150	180	130						560	560
17	CORN								165	136	118	59	22	500	
18	ARTICHOKE			60	100				146	99	75			480	
19	COURT - LAWN													1000-1200	
D	ORNAMENTAL PLANTS				80	170	195	205	190	90	70			1000	
	ROSES													1000	1000-1200
	CARNATIONS													800	800-900
E	EXPERIMENTAL PLANTS				80	102	111	121	114	97	75			700	

Details from the Agricultural Research Institute

A slight differentiation of details has occurred for calculation purposes not to differ one project from the other and to represent as much as possible the real needs