

RESPONSE OF WATER USE EFFICIENCY TO SOIL MANAGEMENT PRACTICES AND WATER TABLE LEVELS

By

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ABSTRACT

Shereen Ahmed Hamed Saad: Response of Water Use Efficiency to Soil Management Practices and Water Table Levels . Unpublished Ph.D. thesis, Department of Soil Science, Faculty of Agriculture, Ain Shams University, 2014.

Two experiments were carried out in eighteen double wall concrete lysimeters of the size $1.25\text{ m} \times 1.25\text{ m}$ and 1.25 m deep using the cultivar Faba bean (*Vicia Faba* L.) and Corn (*Zea mays* L.) during, 2010 and 2011 seasons, respectively as a test plants to estimate the contribution of water table to meet the water requirements, the impact soil management practices including compost; and the interaction effect of both of them on yield of either faba bean or corn crop. The lysimeters were connected to a tank with Mariotte siphon and a piezometer to maintain the water table level at the desired depths, which consisted of 50, 70 and 90 cm from the soil surface. There were two compost treatments, which consisted without compost and with compost treatments. The amount of compost was 20 Ton per feddan, which mixed with the 30 cm depth from the soil surface.

The results of this study showed that there is no high difference between the values of actual evapotranspiration (E_t_a) for both faba bean and corn crops under the three levels of water table. It slightly increased with increasing water table depth. As well as, 70 cm water table level showed that it can be consider suitable conditions. At this level, the amount of water was meet the requirements of both faba bean and corn crops which cause a significant high values of its water use efficiency (WUE) , water economy (WE), total and available nutrients N, P, K, Fe, Mn and Zn status in the soil profile and different organs of these two crops and also a maximum grain yield. Compared to a high water table level 50 cm or a deep water table level 90 cm where, the crop depends basically on the water irrigation requirements. As well as, compost application is very important, these favorable significant effect ascribed not only for its plant providing by enhancing the growth or by increasing availability of nutrients to its nutritional requirements without any undesirable impacts on the environment but also, for improving physical, chemical and biological soil properties consequently that can led to the enhances soil water storage in the rooting zone which led to enhancing the yield,

water use from water table , water use from irrigation water, E_{ta} , WUE and WE of faba bean and corn crops.

We should put into considerations also that, the effect of interaction between both the water table levels and compost treatments, where there are significant differences between the treatments. 70 cm water table level with compost showed the highest values, while 90 cm water table level without compost treatments showed the lowest values of all the parameters under study.

Key Words: Water table contribution, Compost, Crop water requirements, Faba bean, Corn, Nutrient content.

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CONTENTS

	LIST OF TABLES.....	iii
	LIST OF FIGURES.....	x
1	INTRODUCTION.....	1
2	REVIEW OF LITERATURE.....	4
2.1	Water table.....	4
2.2	Compost.....	13
2.3	The interaction effect between water table and compost in the soil...	22
3.	MATERIALS AND METHODS.....	24
3.1	The experimental layout.....	24
3.2	The experimental treatments	26
3.3	Determination of E_{t_0}	28
3.4	Determination of actual evapotranspiration	28
3.5	Calculation of crop coefficient (K_c).....	30
3.6	Water economy	31
3.7	Water use efficiency (WUE).....	31
3.8	Plant Analysis.....	31
3.9	Yield	33
3.10	and statistical analysis..... Experimental design	33
4.	RESULTS AND DISCUSSION.....	34
4.1	Climatic conditions and reference evapotranspiration (E_{t_0}).....	34
4.2.	Water used from water table.....	38
4.3	Water used from Irrigation water.....	45
4.4	Actual evapotranspiration (E_{t_a}).....	58
4.5	Crop coefficient (K_c).....	76
4.6	Water economy of faba bean and corn crops.....	87
4.7	Water use efficiency (WUE) of faba bean and corn crops.....	92
4.8	Nutritional status in the soil profile.....	97
4.9	Nutritional status in the faba bean and corn crops.....	125

4.10	Grain yield (g /plant):-.....	148
5	SUMMARY AND CONCLUSION	165
6	REFERENCES	171
7	ARABIC SUMMARY	

LIST OF TABLES

Table (1)	Some physical properties of the soil.....	25
Table (2)	Some chemical properties of the soil.....	25
Table (3)	Chemical, physical and biological composition of compost	27
Table (4)	Weekly climatic conditions and reference evapotranspiration (Eto) (mm/day) in Ain shams university site during faba bean crop season of (2009-2010).....	36
Table (5)	Weekly climatic conditions and reference evapotranspiration (Eto) (mm/day) in Ain shams university site during corn crop season of 2010-2011.....	37
Table (6)	Water use from water table (liter/period) for faba bean crop under different water table levels with and without compost treatments.....	41
Table (7)	Water use from water table (liter/period) for corn crop under different water table levels with and without compost treatments.....	42
Table (8)	Water use from irrigation water (liter/period) for faba bean crop under 50 cm level of water table with and without compost treatments through the soil profile layers.....	51
Table (9)	Water use from irrigation water (liter/period) for faba bean crop under 70 cm level of water table with and without compost treatments through the soil profile layers.....	52
Table (10)	Water use from irrigation water (liter/period) for faba bean crop under 90 cm level of water table with and without compost treatments through the soil profile layers.....	53

Table (11)	Water use from irrigation water (liter/period) for corn crop under 50 cm level of water table with and without compost treatments through the soil profile layers.....	54
Table (12)	Water use from irrigation water (liter/period) for corn crop under 70 cm level of water table with and without compost treatments through the soil profile layers.....	55
Table (13)	Water use from irrigation water (liter/period) for corn crop under 90 cm level of water table with and without compost treatments through the soil profile layers.....	56
Table (14)	Actual evapotranspiration (E_t_a) of faba bean crop under 50 cm water table level with and without compost treatments.....	66
Table (15)	Actual evapotranspiration (E_t_a) of faba bean crop under 70 cm water table level with and without compost treatments.....	67
Table (16)	Actual Actual evapotranspiration (E_t_a) of faba bean crop under 90 cm water table level with and without compost treatments.....	68
Table (17)	Actual evapotranspiration (E_t_a) of corn crop under 50 cm level of water table with and without compost treatments.....	70
Table (18)	Actual evapotranspiration (E_t_a) of corn crop under 70 cm level of water table with and without compost treatments.....	71
Table (19)	Actual evapotranspiration (E_t_a) of corn crop under 90 cm level of water table with and without compost treatments.....	72
Table (20)	Crop coefficient (K_c) for faba bean crop under different water table levels with and without compost treatments.....	81
Table (21)	Crop coefficient(K_c) for corn under different water table levels with and without compost treatments.....	83
Table (22)	Seasonal total nitrogen content (%) and its distribution in the soil profile of faba bean plant under different water table levels with and without compost treatment.....	99

Table	Seasonal total nitrogen content (%) and its distribution in the soil	
(23)	profile of corn plant under different water table levels with and without compost treatment.....	99
Table	Seasonal total phosphorus content (%) and its distribution in the soil	
(24)	profile of faba bean plant under different water table levels with and without compost treatment.....	101
Table	Seasonal total phosphorus content (%) and its distribution in the soil	
(25)	profile of corn plant under different water table levels with and without compost treatment.....	101
Table	Seasonal total potassium content (%) and its distribution in the soil	
(26)	profile of faba bean plant under different water table levels with and without compost treatment.....	104
Table	Seasonal total potassium content (%) and its distribution in the soil	
(27)	profile of corn plant under different water table levels with and without compost treatment.....	104
Table	Seasonal total Fe content (ppm) and distribution in the soil profile of	
(28)	faba bean plant under different water table levels with and without compost treatment.....	106
Table	Seasonal total Fe content (ppm) and distribution in the soil profile of	
(29)	corn plant under different water table levels with and without compost treatment.....	106
Table	Seasonal total Mn content (ppm) and its distribution in the soil profile	
(30)	of faba bean plant under different water table levels with and without compost treatment.....	108
Table	Seasonal total Mn content (ppm) and its distribution in the soil profile	
(31)	of corn plant under different water table levels with and without compost treatment.....	108

Tabl	Seasonal total Zn content (ppm) and its distribution in the soil	
e	profile of faba bean plant under different water table levels with and	
(32)	without compost	11
	treatment.....	0
Tabl	Seasonal total Zn content (ppm) and its distribution in the soil	
e	profile of corn plant under different water table levels with and	
(33)	without compost	11
	treatment.....	0
Tabl	Available N (ppm) and its distribution in the soil profile of faba	
e	bean plant under different water table levels with and without	
(34)	compost	
	treatment.....	11
	..	2
Tabl	Available N (ppm) and its distribution in the soil profile of corn	
e	plant under different water table levels with and without compost	11
(35)	treatment.....	2
Tabl	Table (36) Available P (ppm) and its distribution in the soil profile	
e	of faba bean plant under different water table levels with and	
(36)	without compost	11
	treatment.....	4
Tabl	Available P (ppm) and its distribution in the soil profile of corn	
e	plant under different water table levels with and without compost	11
(37)	treatment.....	4
Tabl	Available K (ppm) and its distribution in the soil profile of faba	
e	bean plant under different water table levels with and without	
(38)	compost	11
	treatment.....	6
Tabl	Available K (ppm) and its distribution in the soil profile of corn	
e	plant under different water table levels with and without compost	11
(39)	treatment.....	6

Table (40)	Available Fe (ppm) and its distribution in the soil profile of faba bean plant under different water table levels with and without compost treatment.....	118
Table (41)	Available Fe (ppm) and its distribution in the soil profile of corn plant under different water table levels with and without compost treatment.....	118
Table (42)	Available Mn (ppm) and its distribution in the soil profile of faba bean plant under different water table levels with and without compost treatment.....	120
Table (43)	Available Mn (ppm) and its distribution in the soil profile of corn plant under different water table levels with and without compost treatment.....	120
Table (44)	Available Zn (ppm) and its distribution in the soil profile of faba bean plant under different water table levels with and without compost treatment.....	122
Table (45)	Available Zn (ppm) and its distribution in the soil profile of corn plant under different water table levels with and without compost treatment.....	122
Table (46)	Nitrogen content (%) and its distribution in the different parts of faba bean plant under different water table levels with and without compost treatment.....	127
Table (47)	Nitrogen content (%) and its distribution in the different parts of corn plant under different water table levels with and without compost treatment.....	128

Table (48)	Phosphorus content (%) and its distribution in the different parts of faba bean plant under different water table levels with and without compost treatment.....	131
Table (49)	Phosphorus content (%) and its distribution in the different parts of corn plant under different water table levels with and without compost treatment.....	132
Table (50)	Potassium content (%) and its distribution in the different parts of faba bean plant under different water table levels with and without compost treatment.....	135
Table (51)	Potassium content (%) and its distribution in the different parts of corn plant under different water table levels with and without compost treatment.....	136
Table (52)	Fe content (ppm) and its distribution in the different parts of faba bean plant under different water table levels with and without compost treatment.....	139
Table (53)	Fe content (ppm) and distribution in the different parts of corn plant under different water table levels with and without compost treatment.....	140
Table (54)	Mn content (ppm) and its distribution in the different parts of faba bean plant under different water table levels with and without compost treatment.....	143
Table (55)	Mn content (ppm) and its distribution in the different parts of corn plant under different water table levels with and without compost treatment.....	144

Table	Zn content (ppm) and its distribution in the different parts of faba	
(56)	bean plant under different water table levels with and without compost treatment.....	146
Table	Zn content (ppm) and its distribution in the different parts of corn	
(57)	plant under different water table levels with and without compost treatment.....	147