

## TABLE OF CONTENTS

<i>Acknowledgment</i> .....	i
List of Figures.....	iv
List of tables .....	vi
Abstract.....	ix
Abbreviations.....	xii
Chapter One: Introduction .....	1
1.1    Background.....	1
1.2    Objectives .....	2
1.3    Agriculture in Palestine .....	3
1.4    Water in Palestine: supply and demand .....	4
1.5    Wastewater in Palestine: quantity and quality .....	9
Chapter Two: Literature Review .....	12
2.1    Wastewater reuse in the world.....	12
2.2    Status of wastewater treatments in Palestine .....	14
2.3    Palestinian policies and strategies.....	17
2.4    Al-Bireh wastewater treatment plant .....	20
2.5    Treated wastewater reuse for irrigation .....	23
2.6    Benefits and constraints of irrigation with treated wastewater .....	24
2.7    Treated wastewater reuse in Palestine .....	26
Chapter Three: Materials and Methods.....	31
3.1    Materials .....	31
3.1.1    Study site.....	31
3.1.2    Soil and pots.....	32
3.1.3    Corn seeds .....	32
3.1.4    Mineral Fertilizer .....	33
3.1.5    Irrigation water.....	33
3.2    Methods .....	34
3.2.1    Experimental design.....	34
3.2.2    Irrigation schemes .....	35
3.2.3    Planting and harvesting .....	36
3.3    Sampling Action and Analysis .....	38
3.3.1    Water sampling and analysis.....	38
3.3.1.1    Tap water .....	39
3.3.1.2    Treated wastewater .....	41
3.3.2    Soil sampling and analysis .....	41
3.3.3    Fertilizer analysis .....	43
3.3.4    Leaves sampling and analysis .....	43
3.3.5    Fruit sampling and analysis.....	44
3.3.5.1    Grains pathogenic <i>E-coli</i> .....	44
3.3.5.2    Grains heavy metals.....	45
Chapter Four: Results and Discussion .....	46
4.1    Characteristics of irrigation water.....	46
4.2    Evaluation of Al-Bireh WWTP treatment efficiency.....	49
4.3    Characteristics of experimental field soils .....	52
4.3.1    Soil pH .....	52
4.3.2    Soil EC .....	54

---

4.3.3	Soil texture .....	56
4.3.4	Soil cation exchange capacity (CEC).....	58
4.3.5	Soil nutrients .....	59
4.3.6	Soil heavy metals .....	61
4.4	Growth parameter .....	76
4.4.1	Plant height.....	77
4.4.2	Number of leaves per plant .....	78
4.4.3	Number and dry weight of fruits per plant .....	79
4.5	Plant analysis .....	81
4.5.1	Grains pathogenic <i>E.coli</i> .....	81
4.5.2	Grains heavy metals .....	82
4.5.3	Leaves analysis.....	85
4.5.3.1	Chlorophyll content .....	85
4.5.3.2	Proline content.....	87
Chapter Five: Conclusions and Recommendations.....		90
5.1	Conclusions .....	90
5.2	Recommendations.....	91
Bibliography .....		92
Appendix A.....		100
Appendix B.....		101
Appendix C.....		102
Appendix D.....		104
Appendix E .....		110