

**INFLUENCE OF MODERATE LEVELS OF NaCl- AND CaCl₂-
SALINITY ON CUCUMBER GROWN IN A CLOSED
HYDROPONIC SYSTEM**

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ABSTRACT

The effects of different levels and sources of salinity on growth, yield and quality of cucumber (*Cucumis sativus* L. cv. Palmera), grown in a closed hydroponic system using perlite as a substrate were studied in a greenhouse experiment. Five different salinity treatments imposed in the nutrient solution supplied to the crop were tested: a control treatment involving a standard nutrient solution for cucumber (EC = 2.1 dS m⁻¹), low NaCl-salinity (EC = 3.0 dS m⁻¹), high NaCl-salinity (EC = 5.0 dS m⁻¹), low CaCl₂-salinity (EC = 3.0 dS m⁻¹) and high CaCl₂-salinity (EC = 4.80 dS m⁻¹). The salinity treatments were obtained by adding as much NaCl or CaCl₂ to the standard nutrient solution as required to increase the EC to 3.0 or 5.0 dS m⁻¹. The corresponding salinity levels in the drainage solutions were 2.4 dS m⁻¹, 4.1 dS m⁻¹ and 6.3 dS m⁻¹. The above EC values are means for the entire growing period; the actual values fluctuated to some extent at each irrigation event, depending on the actual amount and EC of drainage solution that was recycled.

The yield of cucumber was restricted as the electrical conductivity increased from 2.1 to 3.0 and 5.0 dS m⁻¹ by NaCl salinity and from 3.0 to 4.80 dS m⁻¹ by CaCl₂ salinity. The high NaCl-salinity treatment resulted in a yield reduction of 12%, while the high CaCl₂-salinity treatment reduced yield by 6% as compared to the control treatment. The most marked reduction in the vegetative growth of cucumber plants was observed also with the high NaCl-treatment. The N and P tissue concentrations were not affected significantly by the salinity treatments, but the K and Na concentrations in plant tissue revealed a competitive uptake pattern in when NaCl was the source of the salinity stress. The Mg level in tissues of old leaves was significantly affected by the high CaCl₂-salinity treatment. The concentration of Na was significantly increased in the plants under NaCl stress, whilst Ca was increased in the plants when CaCl₂ was the source of salinity. The micronutrient contents (Fe, Cu, Mn, Zn and B) in the different plant fractions either showed no significant differences or no consistent pattern was observed when different salinity sources and concentrations were applied. The different salinity levels imposed either by NaCl or CaCl₂ did not affect the vitamin C and chlorophyll content of cucumber fruits. However, the total soluble solids were significantly enhanced when the EC level in the nutrient solution increased from 3.0 to 5.0 dS m⁻¹ regardless of using NaCl or CaCl₂ to raise salinity.

Keywords: Hydroponics, Perlite, Electrical Conductivity, Salinity, NaCl, CaCl₂

TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
ABSTRACT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	viii
LIST OF FIGURES	x
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	3
2.1 Definition of hydroponic systems.....	3
2.2 Advantages and disadvantages of the hydroponic technique.....	3
2.3 Systems of hydroponics culture.....	4
2.3.1 Perlite substrate characteristics.....	4
2.4 Definition of closed hydroponic systems.....	5
2.4.1 Disinfection systems used in hydroponics.....	6
2.4.2 Methods of recycling used in closed hydroponic systems.....	7
2.4.3 Quality of irrigation water for hydroponic system.....	9
2.5 Cucumber crop.....	10
2.5.1 Botanical description.....	10
2.5.2 Environmental requirements.....	12
2.5.2.1 <i>Temperature</i>	12
2.5.2.2 <i>Humidity</i>	13
2.5.2.3 <i>CO₂</i>	13
2.5.3 Cultural practices.....	14
2.5.3.1 <i>Plant spacing</i>	14
2.5.3.2 <i>Pruning and training</i>	14
2.5.3.3 <i>Harvesting of the crop</i>	15
2.5.3 Nutritional requirements of cucumber grown in hydroponic system.....	15
2.5.3.1 <i>pH values in hydroponic systems</i>	15
2.5.3.2 <i>Nutrient solution requirements of cucumbers grown in hydroponic system</i>	16
2.6 Definition of salinity stress.....	17
2.7 Salinity in greenhouse soil production.....	19

2.8 Salinity effects on plant growth and yield.....	21
2.9 Effects of salinity on crop quality.....	23

CHAPTER 3 MATERIALS AND METHODS..... 24

3.1 Location of the experiment.....	24
3.2 Implemented cultural practice.....	25
3.3 Fertigation system.....	26
3.4 Experimental design.....	27
3.5 Nutrient solution design.....	29
3.6 Nutrient solution and drainage water analyses.....	29
3.7 Fruit yield and yield components.....	30
3.8 Fruit quality parameters.....	31
3.8.1 External quality parameters.....	31
3.8.1.1 <i>Grading</i>	31
3.8.1.2 <i>Length and diameter</i>	31
3.8.1.3 <i>Firmness</i>	32
3.8.2 Internal quality parameters.....	32
3.8.2.1 <i>pH of the fruit juice</i>	32
3.8.2.2 <i>Total soluble solids</i>	32
3.8.2.3 <i>Vitamin C</i>	32
3.8.2.4 <i>Chlorophyll content in cucumber fruit</i>	33
3.9 Determination of the mineral composition of the leaves, fruits and roots.....	34
3.9.1 Determination of the total nitrogen.....	34
3.9.1.1 <i>Digestion</i>	35
3.9.1.2 <i>Distillation</i>	35
3.10.1.3 <i>Titration</i>	36
3.9.2 The dry ashing extraction method for determination of metallic elements, P and B, through the ICP-AES instrument.....	36
3.9.3 Determination of chloride ions in leaf and fruit tissue.....	36
3.9.4 Root mineral content.....	37
3.9.5 Fruit mineral content.....	37
3.10 Fresh and dry weight of different plant fractions.....	38
3.11 Statistical analysis.....	38

CHAPTER 4 RESULTS..... 39

4.1 The evolution of pH and EC in the nutrient solutions.....	39
4.2 The evolution of pH and EC in drainage solutions during crop production.....	40

4.3 Concentrations of Na ⁺ , Cl ⁻ and Ca ²⁺ in the nutrient and drainage solutions during the crop production.....	42
4.3.1 Concentrations of Na ⁺ , Cl ⁻ and Ca ²⁺ in the nutrient solutions during the crop production.....	42
4.3.2 Concentrations of Na ⁺ , Cl ⁻ and Ca ²⁺ in the drainage solutions during the crop production.....	44
4.4 Productivity.....	47
4.4.1 Effects of different salinity treatments on production.....	47
4.5 Growth.....	49
4.5.1 Effects of different NaCl and CaCl ₂ concentrations on growth.....	49
4.6 Tissue elemental content.....	51
4.6.1 Effects of different sources and concentrations of salinity on leaf mineral composition.....	51
4.6.1.1 Nitrogen (N).....	51
4.6.1.2 Phosphorus (P).....	51
4.6.1.3 Potassium (K).....	52
4.6.1.4 Magnesium (Mg).....	52
4.6.1.5 Calcium (Ca).....	52
4.6.1.6 Sodium (Na).....	53
4.6.1.7 Chloride (Cl).....	53
4.6.1.8 Iron (Fe).....	54
4.6.1.9 Copper (Cu).....	54
4.6.1.10 Manganese (Mn).....	54
4.6.1.11 Zink (Zn).....	54
4.6.1.12 Boron (B).....	55
4.6.2 Effects of different sources and concentrations of salinity on root mineral composition.....	55
4.6.2.1 Phosphorus (P).....	55
4.6.2.2 Potassium (K).....	55
4.6.2.3 Magnesium (Mg).....	56
4.6.2.4 Calcium (Ca).....	56
4.6.2.5 Sodium (Na).....	56
4.6.2.6 Iron (Fe).....	56
4.6.2.7 Copper (Cu).....	57
4.6.2.8 Manganese (Mn).....	57
4.6.2.9 Zinc (Zn).....	57
4.6.2.10 Boron (B).....	57
4.6.3 Effects of different sources and concentrations of salinity on fruit mineral composition.....	58
4.6.3.1 Nitrogen (N).....	58
4.6.3.2 Phosphorus (P).....	58
4.6.3.3 Potassium (K).....	58
4.6.3.4 Magnesium (Mg).....	59
4.6.3.5 Calcium (Ca).....	59
4.6.3.6 Sodium (Na).....	59
4.6.3.7 Chloride (Cl).....	60
4.6.3.8 Iron (Fe).....	60

4.6.3.9 <i>Copper (Cu)</i>	60
4.6.3.10 <i>Manganese (Mn)</i>	61
4.6.3.11 <i>Zinc (Zn)</i>	61
4.6.3.12 <i>Boron (B)</i>	61
4.7 Quality parameters.....	61
4.7.1 The effect of different sources and concentrations of salinity on the quality parameters of cucumber fruit.....	61
4.7.1.1 <i>The effect of different sources and concentrations of salinity on the external quality parameters of cucumber fruit.....</i>	61
4.7.1.2 <i>The effect of different sources and concentrations of salinity on the internal quality parameters of cucumber fruit.....</i>	62
CHAPTER 5 GENERAL DISCUSSION	67
CHAPTER 6 CONCLUSION	71
APPENDIX	72
REFERENCES	75

LIST OF TABLES

Table 2.1 Advantages and disadvantages of certain substrates.....	5
Table 2.2 Standard of water quality for soilless culture.....	10
Table 3.1 Composition of standard nutrient solution applied in the experiment.....	28
Table 3.2 Characteristics of the different treatments applied in the experiment.....	29
Table 3.3 Distribution of stock solutions used in the experiment.....	30
Table 4.1 Effects of different salinity sources and concentrations on fruit yield and quality of cucumber crop grown in a closed hydroponic system.....	48
Table 4.2. Effects of different salinity sources and concentrations on total fresh weight (TFW) in different plant fractions (root, stem and leaves) of cucumber crop grown in a closed hydroponic system.....	49
Table 4.3. Effects of different salinity sources and concentrations on total dry weight (TDW) in different plant fractions (root, stem and leaves) of cucumber crop grown in a closed hydroponic system.....	50
Table 4.4 Effects of different salinity sources and concentrations on ratio dry to fresh weight in different plant fractions (root, stem, leaves and fruit) of cucumber crop grown in a closed hydroponic system.....	50
Table 4.5 Effects of different salinity sources and concentrations on the mineral composition of old leaves of cucumber grown in a closed hydroponic system (macronutrients, Na and Cl in % dry weight, micronutrients in ppm dry weight).....	64
Table 4.6 Effects of different salinity sources and concentrations on the mineral composition of young leaves of cucumber grown in a closed hydroponic system (macronutrients, Na and Cl in % dry weight, micronutrients in ppm dry weight).....	64
Table 4.7 Effects of different salinity sources and concentrations on the mineral composition of young leaves of cucumber grown in a closed hydroponic system (macronutrients, Na and Cl in % dry weight, micronutrients in ppm dry weight).....	65

Table 4.8 Effects of different salinity sources and concentrations on the root mineral composition of cucumber grown in a closed hydroponic system (macronutrients and Na in % dry weight, micronutrients in ppm dry weight).....	65
Table 4.9 Effects of different salinity sources and concentrations on the fruit mineral composition of cucumber grown in a closed hydroponic system (macronutrients, Na and Cl in % dry weight, micronutrients in ppm dry weight).....	66
Table 4.10 Effects of different salinity sources and concentrations on the fruit mineral composition of cucumber grown in a closed hydroponic system (macronutrients, Na and Cl in % dry weight, micronutrients in ppm dry weight).....	66
Table 4.11 Effects of different salinity sources and concentrations on external quality parameters (length, diameter and firmness) in fruits of cucumber grown in a closed hydroponic system.....	62
Table 4.12 Effects of different salinity sources and concentrations on internal quality parameters (pH, TSS and vitamin C) in fruits of cucumber grown in a closed hydroponic system.....	63
Table 4.13 Effects of different salinity sources and concentrations on internal quality parameters (chlorophyll a, chlorophyll b and total chlorophyll) in fruits of cucumber grown in a closed hydroponic system.....	63

LIST OF FIGURES

Figure 4.1. Evolution of pH in the nutrient solutions of different treatments during the time course of crop production.....	39
Figure 4.2. Evolution of EC in the nutrient solutions of different treatments during the time course of crop production.....	40
Figure 4.3 Evolution of pH in the drainage solutions of different treatments during the time course of crop production.....	41
Figure 4.4 Evolution of EC in the drainage solutions of different treatments during the time course of crop production.....	41
Figure 4.5 Evolution of Na ⁺ concentrations (mM) in nutrient solutions originating from different treatments during the experiment.....	43
Figure 4.6 Evolution of Cl ⁻ concentrations (mM) in nutrient solutions originating from different treatments during the experiment.....	43
Figure 4.7 Evolution of Ca ²⁺ concentrations (mM) in nutrient solutions originating from different treatments during the experiment.....	44
Figure 4.8 Evolution of Na ⁺ concentrations (mM) in drainage solutions originating from different treatments during the experiment.....	45
Figure 4.9 Evolution of Cl ⁻ concentrations (mM) in drainage solutions originating from different treatments during the experiment.....	46
Figure 4.10. Evolution of Ca ²⁺ concentrations (mM) in drainage solutions originating from different treatments during the experiment.....	46
Figure 4.11. Effects of different salinity sources and concentrations on the percentage allocation of the total production at each treatment.....	48