

**PHYTOEXTRACTION POTENTIAL OF *Capsicum annum* L.
(BELL PEPPER) AS INFLUENCED BY VARYING
CONCENTRATIONS OF ZINC**



An Undergraduate Thesis Presented to
The Faculty of the Biological Sciences Department
College of Science
De La Salle University – Dasmariñas
Dasmariñas, Cavite

In Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science Major in Human Biology

JAYMIE M. FERNANDEZ
DIANNE VICTORIA T. GOROSPE
January 2007

ABSTRACT

The phytoextraction potential of *Capsicum annuum* was investigated by exposing the plant to different concentrations of zinc sulfate. The study aims to determine the sensitivity limit situation that the plant was able to respond as exposed to various ranges of zinc which is indicated by change in height and biomass and to determine the effects of different zinc concentration on the phytoextraction potential of *C. annuum*. The study used four treatments (0, 50 mg/kg of Zn, 500 mg/kg of Zn, and 1000 mg/kg of Zn) with three replicates each. After three weeks of exposure to zinc, plants were harvested, and height was measured. The harvested plant was weighed and oven dried and ashed using a furnace to prepare for digestion. Digested samples were analyzed using atomic absorption spectrophotometer to determine the zinc concentration accumulated by the plant. Results show that growth of *C. annuum* was highly affected by the increase of zinc concentration as indicated by decrease in height and biomass accompanied by other toxicity symptoms such as falling leaves and chlorosis. Plant suffered phytotoxicity in treatment with 1000 mg/kg Zn. Results also showed that elevating the concentration of zinc in the treatment affected the phytoextraction potential of *C. annuum*. Though higher amount of zinc was absorbed by the plants in the treated soil than the control, a trend of decrease in the amount of zinc accumulated by plants in the treated soil was observed, this is primarily because increasing concentration of Zn in plant were accompanied by a suppression of plant growth. *C. annuum* can moderately accumulate zinc and could therefore be used for phytoextraction.

TABLE OF CONTENTS

| | |
|------------------------------------|----|
| Title Page | 1 |
| Approval Sheet | 2 |
| Abstract | 3 |
| Acknowledgement | 4 |
| Table of Contents | 5 |
| List of Tables | 7 |
| List of Figures | 8 |
| List of Plates | 9 |
| CHAPTER 1 INTRODUCTION | |
| 1.1 Background of the Study | 10 |
| 1.2 Conceptual Framework | 12 |
| 1.3 Statement of the Problem | 13 |
| 1.4 Hypotheses | 13 |
| 1.5 Scope and Limitations | 14 |
| 1.6 Significance of the Study | 14 |
| 1.7 Definition of Terms | 15 |
| CHAPTER 2 LITERATURE REVIEW | |
| 2.1 Conceptual Literature | 17 |

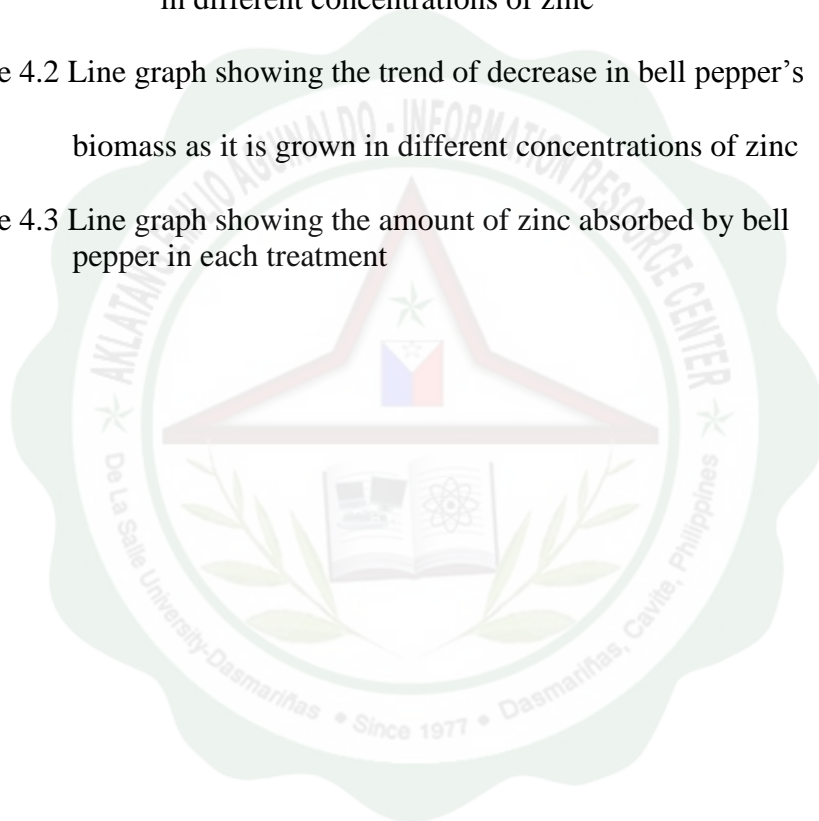
| | |
|--|----|
| 2.2 Related Studies | 22 |
| CHAPTER 3 METHODOLOGY | |
| 3.1 Research Design | 29 |
| 3.2 Research Setting | 29 |
| 3.3 Research Procedure | 29 |
| 3.4 Data Gathering and Statistical Analysis | 30 |
| CHAPTER 4 RESULTS AND DISCUSSION | |
| 4.1 Results | 33 |
| 4.2 Discussion | 38 |
| CHAPTER 5 SUMMARY, CONCLUSION AND RECOMMENDATIONS | |
| 5.1 Summary | 44 |
| 5.2 Conclusion | 45 |
| 5.3 Recommendations | 46 |
| Cited References | 47 |
| Appendices | |
| A. Tables | 55 |
| B. Photodocumentation | 59 |
| C. Curriculum Vitae | 64 |

LIST OF TABLES

| | |
|---|----|
| Table 4.1 Effect of different zinc concentrations to the height of bell pepper | 31 |
| Table 4.2 Average biomass grown in zinc treated soil | 33 |
| Table 4.3 Zinc uptake by bell pepper | 34 |
| Table 4.4 Computed Bioconcentration Factor (BCF) in all treatments | 35 |
| Table 7.1 Raw data for the absorbance of zinc accumulated by the bell pepper measured in ppm | 53 |
| Table 7.2 Statistical analysis using single factor ANOVA for the amount of zinc absorbed | 53 |
| Table 7.3 Raw data for initial height of bell pepper measured in ppm | 54 |
| Table 7.4 Raw data for initial height | 54 |
| Table 7.5 Statistical analysis using single factor ANOVA for the average height of bell pepper | 55 |
| Table 7.6 Raw data for the biomass of bell pepper | 55 |
| Table 7.7 Statistical analysis using single factor ANOVA for biomass | 56 |

LIST OF FIGURES

- Figure 4.1 Line graph showing the length increase of bell pepper
in different concentrations of zinc 34
- Figure 4.2 Line graph showing the trend of decrease in bell pepper's
biomass as it is grown in different concentrations of zinc 36
- Figure 4.3 Line graph showing the amount of zinc absorbed by bell
pepper in each treatment 37



LIST OF PLATES

| | |
|---|----|
| Plate 7.1 Collection of materials | 57 |
| Plate 7.2 Weighing of soil | 58 |
| Plate 7.3 Soil treatment using zinc sulfate | 58 |
| Plate 7.4 Planting of bell pepper | 59 |
| Plate 7.5 Transplanting of bell pepper | 59 |
| Plate 7.6 Preparation before zinc analysis | 60 |
| Plate 7.7 Zinc analysis at De La Salle University- Manila using Atomic Absorption Spectrometer | 61 |

