Vegetative propagation of *Sansevieria trifasciata*(L.) under *in vitro* and *ex vitro* conditions

By

Hematharshini Alaguthurai

Faculty of Agriculture

Eastern University

Sri Lanka

2014

ABSTRACT

The present studies were conducted to investigate the vegetative propagation of *Sansevieria trifasciata* (L.) under *in vitro* and *ex vitro* conditions. First experiment was conducted at the Tissue Culture Laboratory, Department of Crop Science, Eastern University, Sri Lanka to study the effect of orientations of explants and sucrose concentrations (3% and 5%) on shoot organogenesis. Explants were kept horizontal and vertical positions in MS medium contained 3% and 5% of sucrose. Sucrose at 3% was the most suitable concentration for the highest number of shoots and sucrose at 5% was the most responsive concentration for the shoot elongation in cultured leaf explants of *Sansevieria*. The result exhibited that the most suitable orientation for the shoot proliferation was horizontal placement of explants.

Second experiment was conducted at the net house of crop farm, Eastern University, Sri Lanka to select the best section among apical, middle and bottom portions of leaves and also to evaluate their performance in different potting media. Leaf sections were taken from apical (L_1) middle (L_2) and bottom (L_3) portions and planted in soil: compost at 1:0 (P_1), soil: compost at 1:1 (P_2) and soil: compost at 1:2 (P_3) ratios. After 90 days, number of shoots per cutting (>1cm), number of shoot buds (<1cm), length of longest shoots, leaf area, fresh weight of shoots, dry weight of shoots, number of roots, length of longest root, fresh weight of roots and dry weight of roots were recorded. The result indicated that leaf sections showed the significant influence on number of days taken to emerge shoots, leaf area, number of roots per section, longest shoot length, longest root length, fresh weight of shoot, fresh weight of roots, dry weight of shoot, dry weight of roots.

TABLE OF CONTENTS

ABSTRACT iv

ACKNOWLEDGEMENTS vi

TABLE OF CONTENTS vii

LIST OF TABLES x

LIST OF FIGURES xi

ABBREVIATIONS xii

CHAPTER 01 1

1.0 INTRODUCTION 1

1.1 *Sansevieria trifasciata* and its importance 1

1.2 Need for micropropagation 2

1.3 In vitro studies in *Sansevieria trifasciata* 4

1.4 Conventional propagation of *Sansevieria trifasciata* 5

1.5 Use of compost 5

1.6 Objectives of this study 6

CHAPTER 02 7

2.0 REVIEW OF LITERATURE 7

2.1 The Nomenclature of *Sansevieria trifasciata.* 7

2.2 Origin and distribution 7

2.3 Importance of *Sansevieria trifasciata* 8

2.4 Ecology 8

2.5 Morphology 9

2.6 *In vitro* propgation 11

2.6.1 Plant tissue culture of *Sansevieria trifasciata* 11

2.6.2 Tissue culture medium 13

2.6.3 Plant Growth Regulators 15

2.6.4 Tissue Culture Application 16

2.7 Vegetative propagation of *Sansevieria trifasciata* via leaf section 21

2.8 compost (potting media) 21

2.8.1 Ingredients of compost 24

CHAPTER 03.....28

3.0 MATERIALS AND METHOD.....28

3.1 *In vitro* study on shoot regeneration of *Sansevieria trifasciata*(L.).....228

3.1.1 Sterilization of culture vessels.....228

3.1.2 Preparation of stock solution.....28

3.1.3 Preparation of culture medium.....29

3.1.4 Collection of explants.....30

3.1.5 Sterilization of explants.....30

3.1.6 Sterile technique in laminar hood.....30

3.1.7 Inoculation of explants.....31

3.1.8 Culture environment.....31

3.1.9 Shoot multiplication.....31

3.1.10 *In vitro* plantlets.....32

3.1.11 Data collection.....32

3.1.12 Statistical analysis.....32

3.2 *Ex vitro* study on plant regeneration of *Sansevieria trifasciata*.....33

3.2.1 Treatments and experimental design.....33

3.2.2 Preparation of potting media.....33

3.2.3 Collection of leaf sections.....33

3.2.4 Placement of cuttings into potting media.....34

3.2.6 Data collection.....34

3.2.7 Statistical analysis.....35

CHAPTER 04.....36

4.0 RESULTS AND DISCUSSION.....36

4.1 Experiment 1.....36

4.1.1 Contamination and phenolic browning.....36

4.1.2 Morphogenesis of cultured explants.....38

4.1.3 Number of newly developed shoots.....38

4.1.4 Longest shoot length.....39

4.1.5 *In vitro* responses.....40

4.2 Experiment 2.....43

4.2.1 Number of days taken to emerge shoots.....43

4.2.2 Number of shoot /s per section.....45