DEVELOPMENT OF PROTOCOLS FOR TISSUE CULTURE AND MUTAGENESIS IN TWO VARIEGATED SANSEVIERIA SP.

IRMAWATI AKMA ABDUL HAPIZ

INSTITUTE OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCES
UNIVERSITY OF MALAYA
50603 KUALA LUMPUR

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IRMAWATI AKMA ABDUL HAPIZ

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INSTITUTE OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCES
UNIVERSITY OF MALAYA
50603 KUALA LUMPUR

2010
UNIVERSITI MALAYA

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Name: PROF. DR. NORZULAANI KHALID
Designation: PROF. DR. NORZULAANI KHALID
Institute of Biological Sciences,
Faculty of Science,
University of Malaya,
50603 Kuala Lumpur
ABSTRACT

Studies were conducted to develop the tissue culture protocol and mutagenesis through Gamma ray irradiation for two variegated Sansevieria species known as Sansevieria trifasciata var. Laurentii (goldband Sansevieria) and Sansevieria trifasciata var. Hahnii (birdnest Sansevieria). Seven combinations of BAP and NAA were chosen which are represented by letter A = 1.00 mg/l BAP, B = 1.00 mg/l BAP + 0.25 mg/l NAA, C = 2.00 mg/l BAP + 0.50 mg/l NAA, D = 2.00 mg/l BAP +1.00 mg/l NAA, E = 3.00 mg/l BAP + 1.00 mg/l NAA, F = 4.00 mg/l BAP + 1.00 mg/l NAA and G = 5.00 mg/l BAP + 2.00 mg/l NAA. The best result for shoot numbers in variety Hahnii was obtained by using explants incubated on Murashige and Skoog (1962) induction media with higher BAP compared to NAA but this was not consistent for variety Laurentii. Maximum shoot elongation in both varieties were achieved when MS media containing 5.00 mg/l BAP with 2.00 mg/l NAA and 4.00 mg/l BAP with 1.00 mg/l NAA were used. For the next stage, elongated shoots were excised and rooted best on MS modified medium containing 1.00mg/l IAA growth regulator in light condition (3.00 for Hahnii and 2.83 for Laurentii). However, as for root length, it showed the best result on media containing 2.00 mg/l IAA in light conditions for both Sansevieria. The two varieties of Sansevieria showed that there is significant difference between the longest roots produced by variety Hahnii (3.73±0.31) and variety Laurentii (7.08±0.55). Rooted plantlets were acclimatized under greenhouse conditions. The explants which were irradiated with low Gamma irradiation (0 to 25 Gy for variety Hahnii and 0 to 30 Gy for variety Laurentii) produced longer shoots than those irradiated with a high dose (more than 40 Gy). A significant reduction in the survival (12.5%) of the Sansevieria explants was observed following treatment with 25 Gy or higher
doses of Gamma ray. Variety *Laurentii* (LD$_{50}$ = 44 Gy) was found to be less sensitive to Gamma irradiation as compared to variety *Hahnii* (LD$_{50}$ = 38 Gy). All explants exposed to Gamma rays above 100 Gy dose did not survive. Variety *Hahnii* exhibited better growth and rigid leaf structure than variety *Laurentii* during acclimatization.
ABSTRAK

Kajian ini dijalankan untuk membangunkan prosedur kultur tisu dan mutagenesis melalui irradiasi menggunakan sinar Gamma bagi dua variasi spesis Sansevieria iaitu Sansevieria trifasciata var. Laurentii (goldband Sansevieria) dan Sansevieria trifasciata var. Hahnii (birdnest Sansevieria). Tujuh kombinasi BAP dan NAA dipilih dan diwakili oleh huruf-huruf A = 1.00 mg/l BAP, B = 1.00 mg/l BAP + 0.25 mg/l NAA, C = 2.00 mg/l BAP + 0.50 mg/l NAA, D = 2.00 mg/l BAP +1.00 mg/l NAA, E = 3.00mg/l BAP + 1.00 mg/l NAA, F = 4.00 mg/l BAP + 1.00 mg/l NAA and G = 5.00 mg/l BAP + 2.00 mg/l NAA. Hasil terbaik untuk penghasilan pucuk bagi variasi Hahnii diperolehi dengan menggunakan eksplan yang diinkubasi dalam media Murashige dan Skoog (1962) dengan kepekatan BAP yang tinggi berbanding NAA. Pemanjangan pucuk maksimum bagi kedua-dua variasi diperolehi apabila media MS mengandungi 5.00 mg/l BAP serta 2.00 mg/l NAA dan 4.00 mg/l BAP serta 1.00 mg/l NAA digunakan. Bagi peringkat seterusnya, pucuk yang telah panjang dipotong dan pertumbuhan akar adalah terbaik apabila menggunakan media MS terubahsuai yang mengandungi pengawalatur pertumbuhan 1.00 mg/l IAA didalam keadaan terang (3.00 untuk Hahnii dan 2.83 untuk Laurentii). Walau bagaimanapun, untuk kepanjangan akar, ia menunjukkan keputusan terbaik didalam media yang mengandungi 2.00 mg/l IAA didalam keadaan terang bagi kedua-dua variasi Sansevieria. Kedua-dua variasi Sansevieria menunjukkan ada perbezaan ketara di antara akar yang terpanjang dihasilkan oleh variasi Hahnii (3.73±0.31) dan variasi Laurentii (7.08±0.55). Plantlet yang sudah mengeluarkan akar dipindahkan dalam keadaan rumah hijau. Eksplan yang diirradiasi dengan dos sinar Gamma yang rendah (0 to 25 Gy untuk variasi Hahnii dan 0 hingga 30 Gy untuk variasi Laurentii) menunjukkan pertumbuhan pucuk yang lebih
panjang berbanding eksplan yang diirradiasi dengan dos sinar Gamma yang tinggi (melebihi 40 Gy). Penurunan signifikan (12.5%) kadar pertumbuhan eksplan *Sansevieria* telah diperhatikan bagi eksplan yang menerima perlakuan dos sinar Gamma bermula 25Gy atau dos-dos yang lebih tinggi. Variasi *Laurentii* (LD$_{50} = 44$ Gy) dilihat kurang sensitif terhadap irradiasi sinar Gamma berbanding variasi *Hahnii* (LD$_{50} = 38$ Gy). Semua eksplan yang didedahkan pada sinar Gamma melebihi 100 Gy tidak menunjukkan tanda-tanda pertumbuhan. Variasi *Hahnii* menunjukkan pertumbuhan yang lebih baik dan struktur daun yang kuat berbanding variasi *Laurentii* semasa pengadaptasian.
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TABLE OF CONTENTS

TABLE OF CONTENTS vii
ABSTRACT ii
ABSTRAK iv
ACKNOWLEDGEMENT vi
LIST OF TABLES x
LIST OF FIGURES xii
LIST OF APPENDICES xv
LIST OF ABBREVIATIONS xviii
1.0 INTRODUCTION 1
2.0 LITERATURE REVIEW 4
  2.1 Introduction to Sansevieria plant 4
    2.1.1 Characteristics of Sansevieria trifasciata var. Laurentii 6
    2.1.2 Characteristics of Sansevieria trifasciata var. Hahnii 7
  2.2 Introduction of Plant Tissue Culture 8
    2.2.1 Tissue Culture Media 9
    2.2.2 Plant Growth Regulators 10
    2.2.3 Tissue Culture Application 13
  2.3 Mutagenesis in Plants 15
    2.3.1 Mutagens 16
    2.3.2 Mutagen-induced Plants 18
    2.3.3 Mutagenesis Applications 19
2.3.4 In vitro Mutagenesis

3.0 MATERIALS AND METHODS

3.1 Source of Explants

3.2 Sterilization Procedures

3.2.1 Explants Sterilization

3.2.2 Media and Equipment Sterilization

3.2.3 Hormone and Plant Growth Regulators Sterilization

3.3 Media Preparation

3.3.1 Stock Solution

3.3.2 Media for Shoot Induction

3.3.3 Media for Root Induction

3.4 Explant Preparation

3.4.1 Explant Culture for Shoot Induction Studies

3.4.2 Explant Culture for Root Induction Studies

3.5 Irradiation Treatment

3.5.1 Explant Preparation for Irradiation

3.5.2 Source of Irradiation

3.5.3 Post Irradiation Treatment

3.6 Explant Acclimatization

3.7 Statistical Analysis

4.0 RESULTS AND DISCUSSIONS

4.1 Response on Shoot Induction Media

4.1.1 Effect on the Number of Shoots

4.1.2 Effect on the Height of Shoots
4.1.3 Effect on the Development of Plantlet 49

4.2 Response on Root Induction Media 52

  4.2.1 Effect on the Number of Roots 53

  4.2.2 Effect on the Length of Roots 56

  4.2.3 Effect on the Development of Plantlet on Rooting Media 60

4.3 Effect of Gamma Irradiation on Leaf Explants 65

4.4 Acclimatization of Plantlets 74

5.0 CONCLUSION 76

  Future Studies 78

REFERENCES 79

APPENDICES 86
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table Reference</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3.3.2</td>
<td>The combination of PGRs used in the culture media</td>
<td>27</td>
</tr>
<tr>
<td>Table 3.5.2</td>
<td>The period of exposure time for $\gamma$-rays irradiation for explants</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>treatment</td>
<td></td>
</tr>
<tr>
<td>Table 4.1.1(a)</td>
<td>Raw data of shoot numbers formed and Mean ± SEM for $Sansevieria$ $trifasciata$ var. $Hahnii$ and $Sansevieria$ $trifasciata$ var. $Laurentii$ explants after three months in culture</td>
<td>37</td>
</tr>
<tr>
<td>Table 4.1.1(b)</td>
<td>The shoot numbers for $Sansevieria$ $trifasciata$ var. $Hahnii$ and $Sansevieria$ $trifasciata$ var. $Laurentii$ explants after three months in culture</td>
<td>39</td>
</tr>
<tr>
<td>Table 4.1.2(a)</td>
<td>Raw data of shoot heights formed and Mean ± SEM for $Sansevieria$ $trifasciata$ var. $Hahnii$ and $Sansevieria$ $trifasciata$ var. $Laurentii$ explants after three months in culture</td>
<td>47</td>
</tr>
<tr>
<td>Table 4.1.2(b)</td>
<td>The shoot heights for $Sansevieria$ $trifasciata$ var. $Hahnii$ and $Sansevieria$ $trifasciata$ var. $Laurentii$ explants after three months in culture</td>
<td>49</td>
</tr>
<tr>
<td>Table 4.2.1(a)</td>
<td>Raw data of root numbers formed and Mean ± SEM in dark and light conditions for $Sansevieria$ $trifasciata$ var. $Hahnii$ explants after three months in culture</td>
<td>54</td>
</tr>
<tr>
<td>Table 4.2.1(b)</td>
<td>Raw data of root numbers formed and Mean ± SEM in dark and light conditions for $Sansevieria$ $trifasciata$ var. $Laurentii$ explants after three months in culture</td>
<td>55</td>
</tr>
</tbody>
</table>
Table 4.2.1(c) The root numbers formed in dark and light condition for Sansevieria trifasciata var. Hahnii and Sansevieria trifasciata var. Laurentii explants after three months in culture

Table 4.2.2(a) Raw data of root lengths formed and Mean ± SEM formed in dark and light conditions for Sansevieria trifasciata var. Hahnii explants after three months in culture.

Table 4.2.2(b) Raw data of root lengths formed and Mean ± SEM formed in dark and light conditions for Sansevieria trifasciata var. Laurentii explants after three months in culture.

Table 4.2.2(c) The root length formed in dark and light condition for Sansevieria trifasciata var. Hahnii and Sansevieria trifasciata var. Laurentii explants after three months in culture.

Table 4.3(a) Raw data shows effect of Gamma-ray irradiation on 8 replicates of each irradiation dose in Sansevieria trifasciata var. Hahnii explants growth for determination of LD$_{50}$

Table 4.3(b) Raw data shows effect of Gamma-ray irradiation on 8 replicates of each irradiation dose in Sansevieria trifasciata var. Laurentii explants growth for determination of LD$_{50}$

Table 4.3(c) The effect of Gamma-ray irradiation on 8 replicates of irradiation dose on S. trifasciata var. Hahnii and S. trifasciata var. Laurentii explants for determination of LD$_{50}$
# LIST OF FIGURES

| Figure 2.1 | *Sansevieria trifasciata* plant | 5 |
| Figure 2.1.1 | *Sansevieria trifasciata* var. *Laurentii* plant | 6 |
| Figure 2.1.2 | *Sansevieria trifasciata* var. *Hahnii* plant | 7 |
| Figure 4.1.1(a) | The effect of plant growth regulators BAP and NAA on shoot numbers formed from *Sansevieria trifasciata* var. *Hahnii* explants | 38 |
| Figure 4.1.1(b) | The effect of plant growth regulators BAP and NAA on shoot numbers formed from *Sansevieria trifasciata* var. *Laurentii* explants | 38 |
| Figure 4.1.1(c) | Stages of explants responses in *Sansevieria trifasciata* var. *Hahnii* and *Sansevieria trifasciata* var. *Laurentii* after about two to three months on each combination of media cultures | 42 |
| Figure 4.1.2(a) | The effect of plant growth regulators BAP and NAA on shoot heights formed from *Sansevieria trifasciata* var. *Hahnii* explants | 48 |
| Figure 4.1.2(b) | The effect of plant growth regulators BAP and NAA on shoot heights formed from *Sansevieria trifasciata* var. *Laurentii* explants | 48 |
| Figure 4.1.3(a) | Six-months-old *Sansevieria trifasciata* var. *Hahnii* explants with different combinations of plant growth regulators | 50 |
| Figure 4.1.3(b) | Six-months-old *Sansevieria trifasciata* var. *Laurentii* explants with different combinations of plant growth regulators | 50 |
Figure 4.2.1(a)  The effect of plant growth regulators IAA and dark-light treatments on root numbers formed from *Sansevieria trifasciata* var. *Hahnii* explants

Figure 4.2.1(b)  The effect of plant growth regulators IAA and dark-light treatments on root numbers formed from *Sansevieria trifasciata* var. *Laurentii* explants

Figure 4.2.2(a)  The effect of plant growth regulators IAA and dark-light treatments on root lengths formed from *Sansevieria trifasciata* var. *Hahnii* explants

Figure 4.2.2(b)  The effect of plant growth regulators IAA and dark-light treatments on root lengths formed from *Sansevieria trifasciata* var. *Laurentii* explants

Figure 4.2.3(a)  Three-months-old *Sansevieria trifasciata* var. *Hahnii* explants with different combinations of auxin in light condition

Figure 4.2.3(b)  Three-months-old *Sansevieria trifasciata* var. *Hahnii* explants with different combinations of auxin in dark condition

Figure 4.2.3(c)  Three-months-old *Sansevieria trifasciata* var. *Laurentii* explants with different combinations of auxin in light condition

Figure 4.2.3(d)  Three-months-old *Sansevieria trifasciata* var. *Laurentii* explants with different combinations of auxin in dark condition

Figure 4.3(a)  Response of percentage survival of one-month old explants of *Sansevieria trifasciata* var. *Hahnii* for irradiation after two months
Figure 4.3(b)  Response of percentage survival of one-month old explants of *Sansevieria trifasiiata var. Laurentii* for irradiation after two months

Figure 4.4(a)  One-week-old plantlet covered with transparent plastic bag

Figure 4.4(b)  One-month-old *S. trifasiiata var. Hahnii* acclimated plantlet under normal condition

Figure 4.4(c)  One-month-old *S. trifasiiata var. Laurentii* acclimated plantlet under normal condition
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>Modified Murashige and Skoog Media (1962).</td>
<td>86</td>
</tr>
<tr>
<td>Appendix B</td>
<td>SPSS data of shoot number responses on shoot induction media for <em>Sansevieria trifasciata</em> var. <em>Hahnii</em> <em>Sansevieria trifasciata</em> var. <em>Hahnii</em> plant</td>
<td>87</td>
</tr>
<tr>
<td>Appendix C</td>
<td>ANOVA of shoot numbers on different media combinations for <em>Sansevieria trifasciata</em> var. <em>Hahnii</em></td>
<td>87</td>
</tr>
<tr>
<td>Appendix D</td>
<td>SPSS data of shoot number responses on shoot induction media for <em>Sansevieria trifasciata</em> var. <em>Laurentii</em></td>
<td>88</td>
</tr>
<tr>
<td>Appendix E</td>
<td>ANOVA of shoot numbers on different media combinations for <em>Sansevieria trifasciata</em> var. <em>Laurentii</em></td>
<td>88</td>
</tr>
<tr>
<td>Appendix F</td>
<td>SPSS data of shoot height responses on shoot induction media for <em>Sansevieria trifasciata</em> var. <em>Hahnii</em></td>
<td>89</td>
</tr>
<tr>
<td>Appendix G</td>
<td>ANOVA of shoot heights on different media combinations for <em>Sansevieria trifasciata</em> var. <em>Hahnii</em></td>
<td>89</td>
</tr>
<tr>
<td>Appendix H</td>
<td>SPSS data of shoot height responses on shoot induction media for <em>Sansevieria trifasciata</em> var. <em>Laurentii</em></td>
<td>90</td>
</tr>
<tr>
<td>Appendix I</td>
<td>ANOVA of shoot heights on different media combinations for <em>Sansevieria trifasciata</em> var. <em>Laurentii</em></td>
<td>90</td>
</tr>
<tr>
<td>Appendix J</td>
<td>SPSS data of root number responses on root induction media according to hormone concentration and difference cultural conditions for <em>Sansevieria trifasciata</em> var. <em>Hahnii</em></td>
<td>91</td>
</tr>
</tbody>
</table>
Appendix K  ANOVA of root numbers on difference cultural conditions for 
Sansevieria trifasiciata var. Hahnii

Appendix L  ANOVA of root numbers on difference hormone 
concentrations for Sansevieria trifasiciata var. Hahnii

Appendix M  SPSS data of root number responses on root induction media 
according to hormone concentration and difference cultural 
conditions for Sansevieria trifasiciata var. Laurentii

Appendix N  ANOVA of root numbers on difference cultural conditions for 
Sansevieria trifasiciata var. Laurentii

Appendix O  ANOVA of root numbers on difference hormone 
concentrations for Sansevieria trifasiciata var. Laurentii

Appendix P  SPSS data of root length responses on root induction media 
according to hormone concentration and difference cultural 
conditions for Sansevieria trifasiciata var. Hahnii

Appendix Q  ANOVA of root lengths on difference cultural conditions for 
Sansevieria trifasiciata var. Hahnii

Appendix R  ANOVA of root lengths on difference hormone concentrations 
for Sansevieria trifasiciata var. Hahnii

Appendix S  SPSS data of root length responses on root induction media 
according to hormone concentration and difference cultural 
conditions for Sansevieria trifasiciata var. Laurentii

Appendix T  ANOVA of root lengths on different cultural conditions for 
Sansevieria trifasiciata var. Laurentii
Appendix U  ANOVA of root lengths on different hormone concentrations 94

for Sansevieria trifasciata var. Laurentii
**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D</td>
<td>2,4-Dichlorophenoxyacetic acid</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of variance</td>
</tr>
<tr>
<td>BAP</td>
<td>Benzylaminopurine</td>
</tr>
<tr>
<td>cm</td>
<td>Centimeters</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>EMS</td>
<td>Ethyl methane sulphonate</td>
</tr>
<tr>
<td>Gy</td>
<td>Gray</td>
</tr>
<tr>
<td>IAA</td>
<td>Indole-3-acetic acid</td>
</tr>
<tr>
<td>LD&lt;sub&gt;50&lt;/sub&gt;</td>
<td>Lethal dosage 50%</td>
</tr>
<tr>
<td>m</td>
<td>Meters</td>
</tr>
<tr>
<td>ml</td>
<td>Milliliters</td>
</tr>
<tr>
<td>MS</td>
<td>Murashige and Skoog</td>
</tr>
<tr>
<td>NAA</td>
<td>1-naphtaleneacetic acid</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
</tr>
<tr>
<td>PGR</td>
<td>Plant Growth Regulator</td>
</tr>
<tr>
<td>rad</td>
<td>Radian</td>
</tr>
<tr>
<td>SEM</td>
<td>Standard Error of Mean</td>
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<td>SPSS</td>
<td>Statistical Packages for Social Sciences</td>
</tr>
<tr>
<td>UV</td>
<td>Ultra-violet</td>
</tr>
<tr>
<td>γ-ray</td>
<td>Gamma-ray</td>
</tr>
</tbody>
</table>