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**DEVELOPMENT AND GERMINATION OF *Sandersonia  
aurantiaca* (HOOK.) SEEDS**

A Thesis Presented in Partial Fulfilment of the  
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**XIUYING ZOU**

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1061353021

## ABSTRACT

*Sandersonia aurantiaca* (Hook.) has recently become an important horticultural crop through its economic value for export of its cut flowers and tubers. Little information however is available on seed structure, morphology, development and propagation. The main objectives of this study were to investigate the pattern of seed development, to find satisfactory methods of improving the seed germination and to assess possible mechanisms of seed dormancy of *Sandersonia aurantiaca* (Hook.).

Seed development was investigated by fixing plant material in FAA solution, embedding in paraffin, and staining with safranin-fast green. A series of sections were examined and photographed under a microscope. Both embryo and endosperm development in *Sandersonia* show close similarity to development in *Allium fistulosum* (Alliaceae). Embryo development passes through early globular, late globular, elongated spheroidal and linear embryo development stages. Endosperm development conforms to the Nuclear type. Freely-growing walls between the endosperm nuclei may be associated with the embryo sac wall as projections. The structure of the mature seeds is very similar to that of *Iris* (Iridaceae) seeds. The small, linear embryo is embedded in the endosperm which constitutes most of the seed volume. Such small, linear embryos may be one reason for embryo dormancy in *Sandersonia* seed. A special structure (a conical or cylindrical protuberance) is observed in the inner part of the seed coat, which may combine with a lignified layer (and perhaps including the endosperm) to contribute to the coat-imposed dormancy in this species.

Eighty five treatments were firstly used to improve the germination percentage of *Sandersonia* seed. Only the treatment in which seeds scarified firstly with sandpaper for 1 min and then nicked near the radicle end showed increased germination from 0 to 10.6 % by 30 days, at 20° C. Based on this result, 31 new treatment methods were designed in germination experiment 2. Water uptake patterns, allelopathic effect on lettuce seeds and embryo rescue of *Sandersonia* seed were also studied for assessing the possible mechanisms of dormancy.

The findings of the present study suggest that the *Sandersonia* seeds have double dormancy. The dormancy mechanism is located in both the seed coat and the embryo and it consists of at least two steps that must be activated in sequence before germination can occur. The first step can be activated prematurely by scarifying and nicking the seeds, thus allowing the seed coat to become permeable to water, oxygen or to reduced mechanical restriction. The second step can be activated directly by GA<sub>3</sub> which stimulates embryo growth. This germination-promoting technique has great potential for *Sandersonia* for improvement of the germination percentage of seeds from 0 to about 70 %, but development on a commercial scale needs further studies.

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## TABLE OF CONTENTS

<b>ABSTRACT</b>	<b>i</b>
<b>ACKNOWLEDGMENTS</b>	<b>iii</b>
<b>TABLE OF CONTENTS</b>	<b>iv</b>
<b>LIST OF TABLES</b>	<b>ix</b>
<b>LIST OF FIGURES</b>	<b>xi</b>
<b>LIST OF PLATES</b>	<b>xiv</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xvii</b>
 <b>Chapter 1</b> 	
<b>GENERAL INTRODUCTION</b>	<b>1</b>
 <b>Chapter 2</b> 	
<b>LITERATURE REVIEW</b>	<b>6</b>
2.1 Seed development	6
2.1.1 Ovary, ovule and embryo Sac	7
2.1.1.1 Ovary	7
2.1.1.2 Ovule	7
2.1.1.3 Embryo sac	9
2.1.2 Endosperm development	10
2.1.3 Embryo development	12
2.1.4 Seed coat	15
2.1.5 Seed structure	16
2.2 Seed dormancy and germination	18
2.2.1 Classification of types of seed dormancy	19
2.2.2 Embryo dormancy	20
2.2.2.1 Cotyledons and embryo dormancy	20
2.2.2.2 Germination inhibitors	21
2.2.2.3 Embryo immaturity	23
2.2.3 Cost-imposed dormancy	24

2.2.3.1	Water uptake by seeds	24
2.2.3.2	Seed impermeability	25
2.2.3.3	Mechanical restraint	27
2.2.3.4	Interference with diffusion of endogenous inhibitors	29
2.2.4	Laboratory techniques for breaking seed dormancy	30
2.2.4.1	After-ripening	30
2.2.4.2	Stratification	31
2.2.4.3	Other effects of temperature on dormancy	33
2.2.4.4	Light	34
2.2.4.5	Chemicals	34
2.2.4.6	Hard-coated seeds	34
2.2.4.7	Hormones	38
2.2.5	Embryo rescue by embryo or ovule culture	40

### Chapter 3

#### ANATOMICAL AND MORPHOLOGICAL STUDIES OF SEED DEVELOPMENT IN *Sandersonia aurantiaca* (HOOK.)

		42
3.1	Introduction	42
3.2	Materials and methods	43
3.2.1	Plant materials	43
3.2.2	Experiment methods	44
3.2.2.1	Measurements	44
3.2.2.2	Paraffin embedding and section preparation	44
3.2.2.3	Examination	45
3.3	Observations	45
3.3.1	Flower, ovary and ovule	45
3.3.2	Ovule growth	46
3.3.3	Embryo sac	47
3.3.4	Development of endosperm	54
3.3.5	Development of embryo	59
3.3.6	Development of seed coat	59

3.3.6 Development of seed coat	59
3.3.7 Seed structure	65
3.4 Discussion	69
3.4.1 Ovary and ovule	69
3.4.2 Ovule growth	70
3.4.3 Development of endosperm	71
3.4.4 Development of embryo	73
3.4.5 Seed coat development and seed structure	76

## Chapter 4

<b>GERMINATION OF <i>Sandersonia aurantiaca</i> (HOOK.) PROMOTED BY INTERACTION BETWEEN SCARIFICATION AND A PLANT GROWTH REGULATOR</b>	78
4.1 Introduction	78
4.2 Materials and methods	80
4.2.1 Seed source	80
4.2.2 Seed viability	80
4.2.3 Seed germination	80
4.2.3.1 Experiment 1: A survey of dormancy breaking treatments on <i>Sandersonia</i> seeds	81
4.2.3.2 Experiment 2: Optimisation of germination of <i>Sandersonia</i> seeds	81
4.2.3.3 Experiment 3: Effect of gibberellic acid on <i>Sandersonia</i> seed germination	83
4.2.3.4 Experiment 4: Germination optimisation treatments applied to other seed lots of <i>Sandersonia</i>	83
4.2.4 Imbibition measurements	85
4.2.5 Allelopathic effect on lettuce seeds	85
4.2.6 Ovule or excised embryo growth <i>in Vitro</i>	86
4.2.7 Statistical analysis	87



4.3 Results	87
4.3.1 Seed viability	87
4.3.2 Seed germination	88
4.3.2.1 Experiment 1: A survey of dormancy breaking treatments on <i>Sandersonia</i> seeds	88
4.3.2.2 Experiment 2: Optimisation of germination of <i>Sandersonia</i> seeds	91
4.3.2.3 Experiment 3: Effect of Gibberellic Acid on <i>Sandersonia</i> seed germination	98
4.3.2.4 Experiment 4: Germination optimisation treatments applied to other seed lots of <i>Sandersonia</i>	100
4.3.3 Imbibition measurements	100
4.3.4 Allelopathic effect on lettuce seeds	103
4.3.5 Ovule or Excised embryo growth <i>in Vitro</i>	107
4.4 Discussion	109
4.4.1 Seed viability and germination	110
4.4.1.1 Seed viability	110
4.4.1.2 Optimisation of germination of <i>Sandersonia</i> seed	110
4.4.1.3 The role of chemicals	112
4.4.1.4 The role of plant growth regulators	114
4.4.2 Embryo dormancy	115
4.4.3 Imbibition and seed coat-imposed dormancy	115
4.4.4 Germination inhibitors	118
4.4.5 Ovule and excised embryo growth <i>in Vitro</i>	119
<b>Chapter 5</b>	
<b>CONCLUSION AND RECOMMENDATION</b>	121
5.1 Conclusion	121
5.2 Suggestions for future research	123

**REFERENCES**

## LIST OF TABLES

Table 2.1	Some seeds containing germination inhibitors (Source: Bewley and Black 1994)	22
Table 2.2	Some treatments that remove coat-imposed dormancy (Source: Bewley and Black 1994)	27
Table 2.3	Removal of dormancy by dry after-ripening	30
Table 2.4	Some successful examples for breaking seed dormancy by stratification	32
Table 2.5	Effect of light on breaking seed dormancy of some species	35
Table 2.6	Some successful examples for breaking seed dormancy by chemicals	36
Table 2.7	Some successful examples for breaking seed dormancy by mechanical treatments	37
Table 2.8	Some successful examples for breaking seed dormancy by plant hormones	39
Table 2.9	Species successful in ovule culture	41
Table 3.1	Correlation of seed development and histological stages	68
Table 3.2	Comparison of embryo development between <i>Allium fistulosum</i> L. and <i>Sandersonia aurantiaca</i>	75
Table 4.1	Eighty five Seed treatment methods employed in Experiment 1	82
Table 4.2	Thirty one Treatment methods employed in Experiment 2	84
Table 4.3	The numbers of stained embryos and their topographical stain evaluation classes	88
Table 4.4	The results of 85 seed treatment employed in Experiment 1	89-90
Table 4.5	Four secondary treatments employed during experiment 1 and their results	91
Table 4.6	The results of secondary treatments (scarified with #240 sandpaper + nicked near radicle end) of replicate four in experiment 1	91
Table 4.7	Effect of temperature and light on seed germination percentage, rate of germination and days taken for germination in <i>Sandersonia aurantiaca</i>	92

Table 4.8	Effect of mechanical treatments on seed germination percentage, rate of germination and days taken for germination in <i>Sandersonia aurantiaca</i>	93
Table 4.9	Effect of chemicals on seed germination percentage, rate of germination and days taken for germination in <i>Sandersonia aurantiaca</i>	94
Table 4.10	Effect of hormones on seed germination percentage, rate of germination and days taken for germination in <i>Sandersonia aurantiaca</i>	95
Table 4.11	Effect of thiram and bleach on seed germination percentage, rate of germination and days taken for germination in <i>Sandersonia aurantiaca</i>	96
Table 4.12	Fresh weight, dry weight per 100 seeds, viability, embryo size, and percentage germination of different lots of <i>Sandersonia</i> seeds. All treatments performed in nominal darkness at 20°C with 4 replicates (×2 times), 40 seeds per petri dishes.	100
Table 4.13	The final results of ovule culture for embryo rescue	107

## LIST OF FIGURES

Figure 1.1	Main exports of fresh cut flowers from New Zealand. All figures are f.o.b for years ended June 30. (a) 1991/1992--1993/1994; (b) 1992/1993--1994/1995 (Source: <i>Flowers New Zealand August 1994 and October 1995</i> )	4
Figure 2.1	Schematic representation of main types of embryogeny; based on Schnarf and Johansen's system of classification (Source: Natesh and Rau 1984)	13
Figure 2.2	Development of embryo in <i>Muscari comosum</i> (Source: Maheshwari 1950)	14
Figure 2.3	Diagrams illustrating typology of seeds based on size, shape, and position of embryo as seen in longitudinal sections of mature seeds (Source: Esau 1977).	17
Figure 2.4	Dormancy and germination (Source: Bewley and Black 1994)	19
Figure 2.5	Triphasic pattern of water uptake by germinating seeds. Arrow marks the time of occurrence of the first signs of radicle protrusion (Source: Bewley and Black 1994)	25
Figure 3.1	Changes of mean ovule diameter in seed development of <i>Sandersonia</i> . The values are the mean diameter of 60 ovules $\pm$ mean standard deviation	47
Figure 4.1	Position of seed nick from the radicle end of the seed. (a) Nick near the radicle end for seeds scarified by sandpaper. (b) Nick at the radicle end for intact seeds. e, embryo; en, endosperm; s, strophiole; sc, seed coat	83
Figure 4.2	Effect of exogenous GA <sub>3</sub> concentration on germination percentages measured 7 days, 8 days, 10 days, 11 days, 12 days, 14 days, 17 days and 23 days after <i>Sandersonia</i> seeds were treated. Germination of treatments with the same letter was not significantly different (P = 0.05) within each curve according to Duncan's multiple range test	99
Figure 4.3	Effect on <i>Sandersonia</i> seed germination percentages of different contact time of 300 ppm GA <sub>3</sub> . Results were measured at 9 days, 11 days, 14 days, 21 days and 28 days. Germination of treatments with the same letter was not significantly different (P = 0.05) within each curve according to Duncan's multiple range test	99

- Figure 4.4 Water uptake patterns for intact seeds, decoated seeds, nicked seeds, seeds pricked with a needle, and decoated + nicked seeds during 192 hours of imbibition 101
- Figure 4.5 Water uptake patterns for seeds collected in different years during 192 hours of imbibition 101
- Figure 4.6 Water uptake patterns for seeds collected in 1995, but after different storage duration, during 192 hours of imbibition 102
- Figure 4.7 Differences in mean diameters of soaking seeds collected in different years 102
- Figure 4.8 Effect on (a) lettuce seed germination and (b) radicle length of the solutions, in which the different treatment of *Sandersonia* seeds were soaked for 1 week. Results were measured after 24 h, 48 h, 72 h and 96 h. The treatments were: (1) control, (2) nicked seeds, (3) intact seeds, (4) de-coated seeds + rinse, and (5) de-coated seeds. The values are the mean of four replicates (15 seeds each)  $\pm$  mean standard error 104
- Figure 4.9 Effect on (a) lettuce seed germination and (b) radicle length of the solutions, in which the different treatment of leaching (1 week) *Sandersonia* seeds were soaked for 1 week. Results were measured after 24 h, 48 h, 72 h and 96 h. The treatments were: (1) control, (2) de-coated + nicked, (3) intact seeds, (4) de-coated + nicked (nicking the seeds after leaching for 1 week), and (5) de-coated. The values are the mean of four replicates (15 seeds each)  $\pm$  mean standard error 105
- Figure 4.10 Effect on radicle length of lettuce seeds of the nine solutions, in which different treatment of *Sandersonia* seeds were soaked for 5 months, respectively. Results were measured 72 hours after incubation began. The values are the mean of four replicates (15 seeds each)  $\pm$  mean standard error 106
- Figure 4.11 Effect on germination percentage of lettuce seeds of the nine solutions, in which different treatment of *Sandersonia* seeds were soaked for 5 months, respectively. Results were measured 24 h, 48 h, and 72 h after incubation began. The values are the mean of four replicates (15 seeds each)  $\pm$  mean standard error 106
- Figure 4.12 Growth rate of *Sandersonia* ovules *in vitro*. (a) the ovules were collected at younger stage (8 and 14 DAP), (b) collected at old stage (21-42 DAP). The ovules were

placed at half strength MS medium (see section 4.2.6) and incubated in 16 h light /d at 25°C. Arrow marks the time of initiation of ovule germination in any replicate.

Vertical bars represent 95 % LSD

108

Figure 4.13 Schematic drawing of median longitudinal section of an iris seed from the *Oncocyclus* section. M, micropyle; A, aril; Em, embryo; VB, vascular bundle; Ch, chalaza; ST, suberized tissue; II, inner integument; OI, outer integument; En, endosperm. OI, II and A together form the seed coat (Source: Blumenthal *et al.* 1986)

117

Figure 4.14 Radicle tip of *Iris atropurpurea* seeds close to inner micropylar end.  $\times 300$ . C, seed coat; CS, conical protuberance; En, endosperm; R, radicle (Source: Blumenthal *et al.* 1986)

117

## LIST OF PLATES

Plate 1.1	The cut flowers of <i>Sandersonia aurantiaca</i> (Hook.) (Supplied by E R Morgan, Crop & Food Research Ltd. at the Levin Research Center).	5
Plate 3.1	Transverse section of flower bud at 1 week before flower opening ( $\times 14$ ). p, perianth; os, ovules; o, ovary; s, stamens.	46
Plate 3.2	Transverse section of ovary at 1 DAP ( $\times 40$ ). os, ovules; es, embryo sac; h, hypostase; f, funiculus.	49
Plate 3.3	Longitudinal section of anatropous ovule at 1 DAP with micropyle (in outer integument region), obturator and hypostase ( $\times 160$ ). oi, outer integument; ii, inner integument; ob, obturator; h, hypostase; nu, nucellar cap; es, embryo sac; m, micropyle.	49
Plate 3.4	Part of longitudinal section of developing seed at 28 DAP with a vascular bundle ( $\times 40$ ). s, strophiole; vb, vascular bundle; en, endosperm; ts, transfer cells.	49
Plate 3.5	Functional and degenerated megaspores (collected at 1 week before flower opening, $\times 400$ ). fm, functional megaspore; dm, degenerated megaspores.	49
Plate 3.6	Bi-nucleate embryo sac at 0 DAP ( $\times 640$ ).	51
Plate 3.7	Embryo sac at 1 DAP ( $\times 400$ ). s, synergid; e, egg cell; c, central cell; nc, nucellar cap.	51
Plate 3.8	Egg cell at 1 DAP with a nucleus at micropylar pole ( $\times 400$ ).	51
Plate 3.9	Zygote at 8 DAP with a nucleus at chalazal pole ( $\times 400$ ).	51
Plate 3.10	Two polar nuclei adjacent to each other at 4 DAP ( $\times 640$ ). pn, polar nuclei; nc, nucellar cap.	53
Plate 3.11	Two polar nuclei fusing to form the secondary nucleus at 7 DAP ( $\times 400$ ). sn, secondary nucleus; nc, nucellar cap.	53
Plate 3.12	The antipodal cells at 1 DAP ( $\times 400$ ). an, antipodals; nc, nucellar cap.	53
Plate 3.13	Enlarged antipodals at 10 DAP ( $\times 200$ ). an, antipodals; h, hypostase; ts, transfer cells; nc, nucellar cap.	53



- Plate 3.14 Longitudinal section of embryo sac showing most of the coenocytic nuclear endosperm and cytoplasm situating in the chalazal end and peripheral zone of embryo sac at 14 DAP ( $\times 200$ ). h, hypostase; cv, central vacuole; en, coenocytic nuclear endosperm; ts, transfer cells. 56
- Plate 3.15 14 DAP showing initiation of freely growing walls in between the endosperm nuclei at the chalazal end and the edges of embryo sac; note crooked and irregularly growing walls associated with embryo sac wall (arrows) ( $\times 160$ ). h, hypostase; ts, transfer cells. 56
- Plate 3.16 Part of cellular endosperm (14 DAP) showing the division of a cell through cell plate (arrow) formation following karyokinesis ( $\times 640$ ). 56
- Plate 3.17 Completely cellularized endosperm (21 DAP,  $\times 40$ ). em, embryo; en, endosperm; vb, vascular bundle; cp, cylindrical protuberance. 56
- Plates 3.18 and 3.19 17 DAP showing one to several layers of cellularized endosperm cells and a reduced central vacuole ( $\times 100$ ). cv, central vacuole; en, cellularized endosperm; em, embryo; cp, cylindrical protuberance. 58
- Plate 3.20 Linear embryo with a degenerating suspensor surrounded by a clear space and endosperm cells (49 DAP,  $\times 100$ ). em, embryo proper; ds, degenerating suspensor; en, endosperm; cs, clear space; sbs, small bodies. 58
- Plate 3.21 Median longitudinal section of a mature seed (56 DAP,  $\times 25$ ). em, embryo; en, endosperm; s, strophiole. 58
- Plate 3.22 Stages in the development of the embryo. a, apical cell; b, basal cell; em, embryo proper; s, suspensor; en, endosperm; cp, cylindrical protuberance; sa, shoot apex; cot, cotyledon; r, prominent radicle; ea, embryonic axis; cs, clear space; nc, nucellar cap; sbs, small bodies.  
 (A) Two-celled proembryo at 9 DAP ( $\times 400$ ).  
 (B) Three-celled proembryo at 9 DAP ( $\times 400$ ).  
 (C) Eight-celled embryo proper at 14 DAP ( $\times 400$ ).  
 (D) A eight to nine-celled suspensor at 14 DAP ( $\times 400$ ).  
 (E) Late globular embryo surrounded by endosperm cells at 21 DAP ( $\times 200$ ). (F) Elongated spheroidal embryo with a suspensor at 28 DAP ( $\times 400$ ). (G) Longitudinal section of linear embryo at 42 DAP ( $\times 200$ ). (H) Transverse section of the embryo which was shown in (G) ( $\times 400$ ). (I) Linear embryo in a mature seed (56 DAP,  $\times 200$ ). 60-62

- Plate 3.23 Stages in the development of the seed coat. oi, outer integument; ii, inner integument; en, endosperm; ep, epidermis; pcs, parenchyma cells; ccs, compressed cells; ll, lignified layer; cl, compressed cells + lignified layer. (A) A younger seed coat showing inner integument cells with horizontal elongation (12 DAP,  $\times 400$ ). (B) Developing seed coat shows that the cells of outer integument become enlarged and more vacuolated, while the inner ones are crushed and initiate lignification (14 DAP,  $\times 400$ ). (C) Seed coat at 28 DAP with four types of cells ( $\times 200$ ). (D) Seed coat at 42 DAP ( $\times 200$ ). 64
- Plate 3.24 Seed coat at maturity stage (56 DAP,  $\times 200$ ). ep, epidermis; pcl, parenchyma cell layer; ll, lignified layer; en, endosperm 67
- Plate 3.25 Charazal part of a longitudinal section of a developing seed at 42 DAP ( $\times 100$ ). en, endosperm; ts, transfer cells 67
- Plate 3.26 Micropylar part of longitudinal section of developing seed ( $\times 160$ ). em, embryo; en, endosperm; cp, cylindrical protuberance; s, strophiole. 67
- Plate 3.27 Longitudinal section of a dry seed ( $\times 40$ ). en, endosperm; h, hilum. 67
- Plate 4.1 The effect of fungicide-thiram and surface sterilisation on germination of *Sandersonia* seeds. (A) surface sterilisation by 25 % bleach for 20 min, (B) 2.5 g/l thiram in germination medium. 97

**LIST OF ABBREVIATIONS**

6-BA	6-benzyladenine
ABA	abscisic acid
AVOVA	An Analysis of Variance
C <sub>2</sub> H <sub>4</sub>	ethylene
ca	apical cell
cb	basal cell
DAA	days after anthesis
DAP	days after pollination
DW	dry weight
FAA	Formalin-alcohol-glacial acetic acid solution
GA	gibberellic acid
IAA	indole-3-acetic acid
ISTA	International Seed Testing Association
LS	Linsmaier and Skoog
LSD	Least Significant Difference
MPD	morphophysiological dormancy
MS	Murashige and Skoog
NZ	New Zealand
ppm	parts per million
PAS	periodic acid-schiff's reagent
RH	relative humidity
TBA	tertiary butyl alcohol
TTC	2,3,5-triphenyl tetrazolium chloride
WC	water content