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

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XIUYING ZOU

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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_3 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

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF ABBREVIATIONS

6-BA	6-benzyladenine
ABA	abscisic acid
AVOVA	An Analysis of Variance
C_2H_4	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