

Seed Ageing Effect on Post-germinative Seedling Growth of *Salvia splendens*

Xiaolei Toddy Hu*, Miller McDonald and David Tay

Department of Horticulture and Crop Science, The Ohio State University, Columbus, OH 43210



Introduction

- During storage, seed ageing is constantly occurring, causing tremendous economical losses;
- Most seed quality tests are based on the performance of germination or seedling growth;
- Following storage (ageing), seed germination was usually found delayed and smaller seedlings observed.

Objectives

This study was conducted to determine whether seed ageing inhibits post-germinative seedling elongation, and which quality test is most efficient in terms of seed quality monitoring.

Methods

- *Salvia* seeds were subject to the ageing condition of 41°C and 85% RH for 1 up to 3 days;
- Seeds from each treatment were allowed to germinate following the ISTA rules. Germination was observed twice per day and the number of seeds with visible radicles counted;
- Pressure-volume analysis. Hypocotyls after 7d growth were harvested, weighed and rehydrated overnight, then paired measurement of fresh weight and water potential was recorded as tissues dried out;
- Storage experiments. *Salvia* seeds were subject to two storage conditions (30°C, 58% and 75% respectively). Quality tests were conducted on a regular basis.

Germination

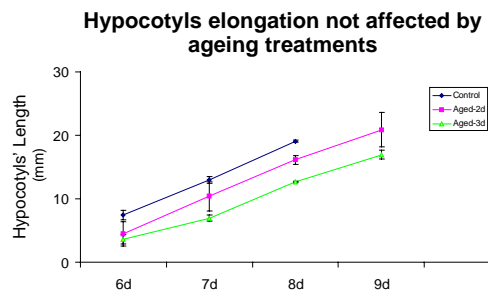
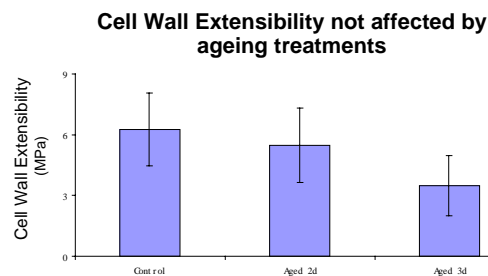
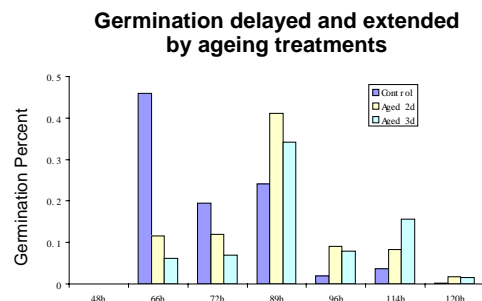
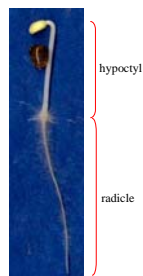
Pattern



Endosperm Rupture
48h after imbibition



Radicle Protrusion
60h after imbibition



I. Comparison of quality tests (30°C, 58% RH)

	SG	GR	SSAA	GRFA	SVIS		
					GI	UI	VI
Control	86a	31.31a	86a	27.29a	866a	700a	783a
1 month	76a	28.12b	64b	26.67a	533b	325b	429b
2 months	80a	25.21b	61b	19.18b	558b	417b	488b
3 months	78.7a	21.05c	30c	10.35c	497b	349b	423b

GI: Growth Index; GR: Germination Rate; GRFA: Germination Rate Following Ageing; SG: Standard Germination; SSAA: Saturated Salt Accelerated Ageing; SVIS: Seed Vigor Imaging System; UI: Uniformity Index; VI: Vigor Index

II. Comparison of quality tests (30°C, 75% RH)

	SG	GR	SSAA	GRFA	SVIS		
					GI	UI	VI
Control	86a	67.15a	86a	54.59a	866a	700a	783a
1 week	76a	58.90b	73a	47.65a	655b	397b	526b
2 weeks	79.5a	60.90b	62a	40.46a	439c	343b	391c
3 weeks	73a	49.86c	22.5b	26.02b	273d	138c	205d

GI: Growth Index; GR: Germination Rate; GRFA: Germination Rate Following Ageing; SG: Standard Germination; SSAA: Saturated Salt Accelerated Ageing; SVIS: Seed Vigor Imaging System; UI: Uniformity Index; VI: Vigor Index

Results

- Seed germination, the onset of radicle protrusion was delayed by ageing treatments;
- After ageing, cell wall property was not significantly different from one another, so was the driving force inside the cells, i.e. osmotic potential and turgor pressure (data not shown);
- After germination, seedlings could elongate at the same rate, regardless of the ageing treatments;
- Following storage, both growth capacity and growth uniformity of a seedlot were reduced.

Conclusions

- These findings indicate that ageing causes damages to seeds so that it takes a longer time for them to recover and germinate;
- Ageing does not affect the seedling elongation. Shorter seedlings are only due to the delayed germination;
- Growth and uniformity are integrated components of seed vigor, and they both are reduced during storage;
- The newly developed SVIS is as powerful as germination rate test in terms of monitoring seed quality, and it is fast and objective as well.

Acknowledgements

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