Effects of Some Preservative Solutions on Vase Life in *Gerbera jamesonii*

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Abstract

Gerbera (*Gerbera jamesonii* H. Bolus ex. Hooker) is an important ornamental flower in global flower market. Consumers are attracted by its bright colour and beautiful shape; but as with other cut flowers, quality loss after harvest is a major concern. Moreover, in certain cultivars, its vase life is dramatically shortened by a stem bending problem. ‘Navy’, an attractive new variety, caused customer complaints resulting from its short vase life, as a result of a high incidence of stem bending.

In this thesis, 2 – 6% sucrose was shown to be an effective preservative for preventing ‘Navy’ from stem bending. Furthermore, deeper research showed sucrose improved stem rigidity and did so by improving lignification of sclerenchyma fibres in the phloem caps and interfascicular region.

Once stem bending has been prevented by sucrose, it is also possible to delay underlying flower senescence. Certain antibacterial materials were tested and a preservative solution containing 4% sucrose and colloidal silver (3 or 5 ppm) was shown to be the best. This may be mainly due to effective control of bacteria and resulting reduction in water stress; but also it may delay flower senescence by inhibiting ethylene action (although most gerbera varieties that have been tested are ethylene insensitive). Just sucrose and colloidal silver is sufficient to keep ‘Navy’ flowers alive for three or four weeks; which should be enough for consumer demand.

There is quite limited knowledge on the mechanism of gerbera flower senescence. The sequence of ‘Navy’ senescence was shown to involve first a change in head angle which always occurred on day 11 after harvest. Water uptake mostly started to be affected from day 13 to 15. Most of the senescence-associated colour changes, including the values of ‘L’, ‘a’, ‘b’, began to change during day 15 to 20. Flower weight generally did not change too much, and accompanying with water uptake reduced (apart from the first experiment). Therefore, the results suggest visible initiation of ‘Navy’ senescence might start
at around 11 – 13 days after harvest, so investigations into underlying genetic regulation would need to start before this time.
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# Table of Content

Abstract ............................................................................................................................................... i
Acknowledgements ........................................................................................................................ iii
Table of Content .......................................................................................................................... iv
List of Figures .................................................................................................................................. vi
List of Tables ..................................................................................................................................... ix
Abbreviations ................................................................................................................................... x

## Chapter 1 Introduction .................................................................................................................. 1

1.1 Literature Review ....................................................................................................................... 1

1.1.1 Background of Gerbera ........................................................................................................ 1

1.1.1.1 Brief for Gerbera and Its Industry .................................................................................. 1

1.1.1.2 The Gerbera Industry ........................................................................................................ 4

1.1.1.2.1 Growing ....................................................................................................................... 4

1.1.1.2.2 Harvesting ..................................................................................................................... 6

1.1.1.2.3 Postharvest Handling .................................................................................................. 6

1.1.2 Vase Life for Cut Gerbera Flowers ....................................................................................... 11

1.1.2.1 Stem Bending .................................................................................................................. 12

1.1.2.2 Flower Senescence ......................................................................................................... 15

1.1.2.3 Preservative Solutions Choices for Gerbera ................................................................. 24

1.2 Aims and Hypotheses ................................................................................................................. 27

## Chapter 2 Comparing the Effectiveness of Different Vase Life Solutions in ‘Navy’ ...................... 28

2.1 Introduction and Aim .................................................................................................................. 28

2.2 Materials and Methods .............................................................................................................. 30

2.2.1 Plant Materials .................................................................................................................... 30

2.2.2 Measurements ..................................................................................................................... 34

2.2.2.1 Flower and Solution Weight .......................................................................................... 34

2.2.2.2 Flower Colour ............................................................................................................... 34

2.2.2.3 Stem Angle .................................................................................................................... 34

2.2.2.4 Vase Life ....................................................................................................................... 35

2.2.2.5 Bacteria Load ............................................................................................................... 36

2.2.3 Statistics ............................................................................................................................... 37
List of Figures

Figure 1.1: Gerbera flower and its petal category .......................... 2
Figure 1.2: Cut flowers at the Dutch Auctions, in % of turnover in 2013 ................................................................................. 3
Figure 1.3: Positions of programmed cell death in floral organs ............................................................................................... 17
Figure 1.4: A model for regulatory pathways in flower senescence ................................................................. 19
Figure 1.5: Components of the ethylene downstream signaling pathway ................................................................. 21
Figure 2.1: ‘Navy’ stored in controlled temperature room .......... 31
Figure 2.2: Measurement of flower angle ....................................... 35
Figure 2.3: The symptoms of the end of vase life ....................... 36
Figure 2.4: Fresh weight (g) of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival .... 42
Figure 2.5: Water uptake (g/h) of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival ...... 43
Figure 2.6: Temperature of experiment 1, 2 and 4 in each day from the day after arrival to the day ending the experiment ................................................................. 44
Figure 2.7: Water uptake (g/h) of ‘Navy’ every two days on the day after flower arrival after modifying data in experiment 2 .................................................................... 44
Figure 2.8: The original data of water uptake on the day after flower arrival in experiment 1 ................................................................. 45
Figure 2.9: Colour ‘L’ of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival ................. 48
Figure 2.10: Colour ‘a’ of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival .............. 49
Figure 2.11: Colour ‘b’ of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival .......... 50
Figure 2.12: The original data of colour ‘b’ on the day after flower arrival in experiment 1 ......................................................... 51
Figure 2.13: Angle of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival ............... 52
Figure 2.14: Vase life of ‘Navy’ in experiment 1(A), 2 (B), 4 (C)  
Figure 2.15: Vase life of ‘Navy’ in experiment 3  
Figure 3.1: Diameter (mm) of gerbera stem at different distances (cm) to flower head  
Figure 3.2: Stem strength (N) of gerbera stem at different distances (cm) to flower head  
Figure 3.3: Displacement to peak load (mm) of gerbera stem at different distances (cm) to flower head  
Figure 3.4: Diameter (mm) of gerbera stem at original 5 cm point below flower head  
Figure 3.5: Stem strength (N) of gerbera stem at original 5 cm point below flower head  
Figure 3.6: Displacement to peak load (mm) of gerbera stem at original 5 cm point below flower head  
Figure 3.7: Diameter (mm) of gerbera stem at original 10 cm point below flower head  
Figure 3.8: Stem strength (N) of gerbera stem at original 10 cm point below flower head  
Figure 3.9: Displacement to peak load (mm) of gerbera stem at original 10 cm point below flower head  
Figure 3.10: Different colour degree for vascular bundles in gerbera stem  
Figure 3.11: Different Interfascicular region width degree in gerbera stem  
Figure 3.12: Auto-fluorescence colour of lignified tissues at different distance to flower head  
Figure 3.13: Proportion of thickness of interfascicular region  
Figure 3.14: Percentage distribution of vascular bundle ‘colour categories’ by treatment at original 5 cm point below flower head  
Figure 3.15: Percentage distribution of vascular bundle ‘colour categories’ by treatment at original 10 cm point below flower head
Figure 3.16: Percentage distribution of interfascicular region width by treatment at original 5 cm point below flower head 79

Figure 3.17: Percentage distribution of interfascicular region width by treatment at original 10 cm point below flower head 80

Figure 1: Plant growth (g/h) of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival 104

Figure 2: Transpiration (g/h) of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival 105

Figure 3: Colour ‘C’ of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival 106

Figure 4: Colour ‘h°’ of ‘Navy’ every two days in experiment 1(A), 2 (B), 4 (C) on the day after flower arrival 107
List of Tables

Table 1.1: Five gerbera categories based on flower forms 2
Table 1.2: Categories of flowers responding to ethylene 18
Table 2.1: Chemicals and their concentration used in experiments 29
Table 2.2: The number of flowers being tested in different day after flower arrival 32
Table 2.3: Original flower weight (g) of flower on the first day after flower arrival 38
Table 2.4: The log count of bacteria number in experiment 2 on day 8 after flower arrival 56
Table 2.5: The log count of bacteria number in experiment 3 on day 11, 21 and 31 after flower arrival 56
Table 2.6: The log count of bacteria number in experiment 4 on day 8, 15 and 22 after flower arrival 57
Table 3.1: Chi-squared analysis of distribution of vascular bundle ‘colour categories’ by treatment at original 5 cm point below flower head 77
Table 3.2: Chi-squared analysis of distribution of vascular bundle ‘colour categories’ by treatment at original 10 cm point below flower head 78
Table 3.3: Chi-squared analysis of distribution of interfascicular lignification extent by treatment at original 5 cm point below flower head 79
Table 3.4: Chi-squared analysis of distribution of interfascicular lignification extent by treatment at original 10 cm point below flower head 80
Table 1: The log count of bacteria number on experiment 1 on day 13 after flower arrival 108
Abbreviations

8-HQC: 8-hydroxyquinoline citrate
8-HQS: 8-hydroxyquinoline sulfate
ABA: abscisic acid
ACC: 1-aminocyclopropane-1-carboxylic acid
ACO: ACC oxidase
ACS: ACC synthase
AgNO₃: silver nitrate
AOA: amino-oxyacetic acid
AOPP: α-aminooxi-β-phenylpropionic acid
AP: apoptotic-like mechanism
AU: autophagous-like mechanism
BA: benzyl adenine
CaCl₂: calcium chloride
CHS: chalcone synthase
CMS: cytoplasmic male sterility
DFR: dihydroflavonol-4-reductase
Dfs: disc florets
ER: endoplasmic reticulum
GA: gibberellic acids
GDP: geranyl diphosphate
JA: jasmonic acid
MAP: modified atmosphere packaging
MAPK: MAP kinase
MTs: cortical microtubules
PAL: phenylalanine ammonia-lyase
PAs: polyamines
PGRs: plant growth regulators
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>PCD</td>
<td>programmed cell death</td>
</tr>
<tr>
<td>PE</td>
<td>polyethylene</td>
</tr>
<tr>
<td>PP</td>
<td>polypropylene</td>
</tr>
<tr>
<td>PVC</td>
<td>polyvinylchloride</td>
</tr>
<tr>
<td>Rf</td>
<td>ray floret</td>
</tr>
<tr>
<td>ROS</td>
<td>reactive oxygen species</td>
</tr>
<tr>
<td>UV</td>
<td>ultraviolet</td>
</tr>
<tr>
<td>SA</td>
<td>salicylic acid</td>
</tr>
<tr>
<td>SAGs</td>
<td>senescence associated genes</td>
</tr>
<tr>
<td>SAM</td>
<td>S-adenosyl methionine</td>
</tr>
<tr>
<td>SI</td>
<td>self-incompatibility</td>
</tr>
<tr>
<td>TFS</td>
<td>signal transduction and transcription factor</td>
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