

# Effects of Storage on Unrooted Cuttings of *Euphorbia pulcherrima* 'Prestige Red' and 'White Star'

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## Introduction

*Euphorbia pulcherrima* (poinsettia) is one of the most common and important floriculture species; it is a significant part of the approximate 1.5 billion vegetative unrooted cuttings imported into North America every year. During shipping, these cuttings face adverse environmental conditions. High temperatures increase respiration and nutrient use, humidity promotes disease, and dark conditions reduce photosynthetic rates. Propagating stressed cuttings can delay crop schedules and increase plant losses. Carbohydrates are main energy sources for root development and are important factors that influence a cultivar's ability to survive and perform after shipping and storage.

## Objectives

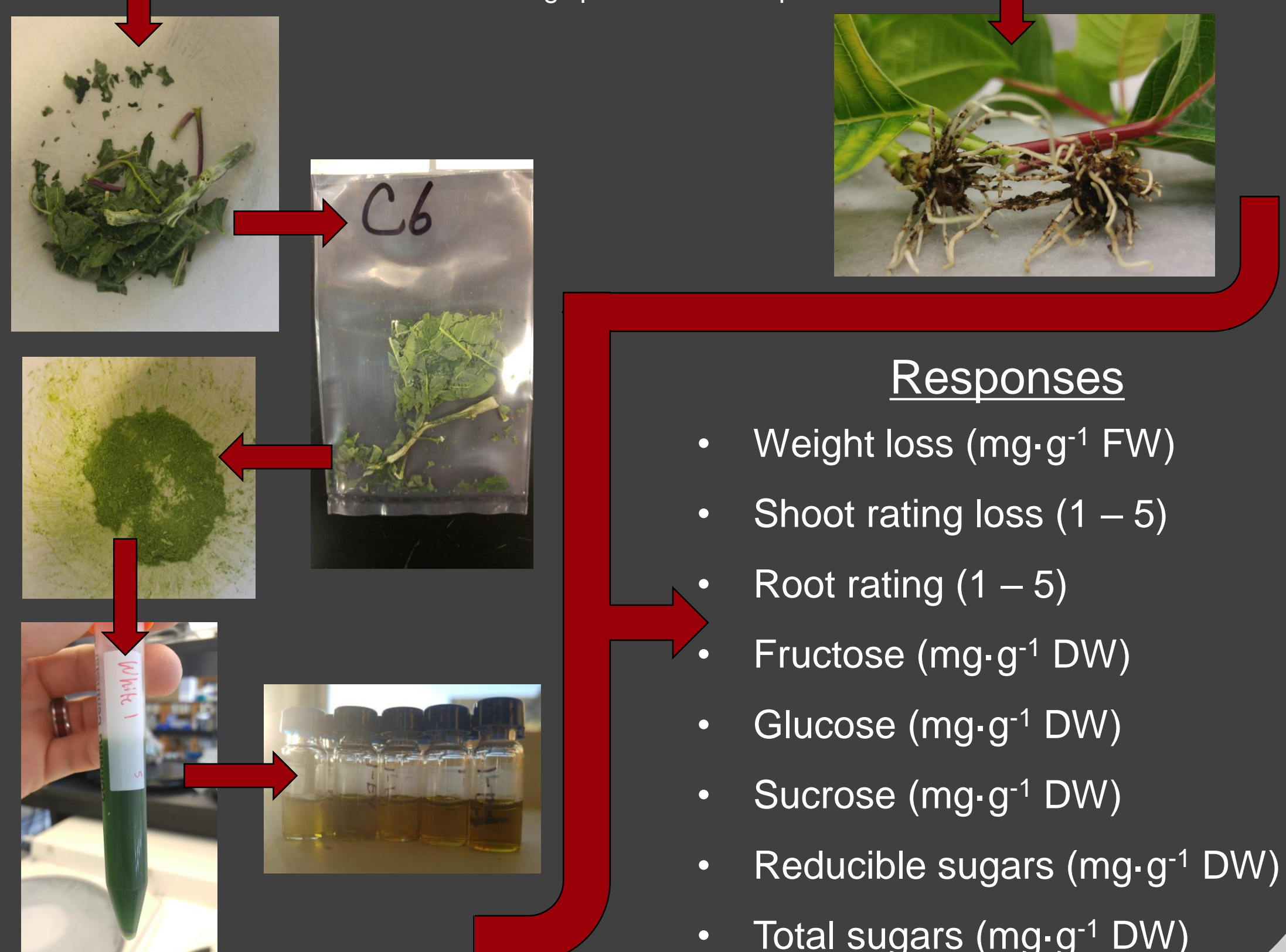
- Determine carbohydrate content throughout storage of two poinsettia cultivars
- Evaluate the role of carbohydrate content in rooting performance after storage

## Materials & Methods

- Cultivars: 'Prestige Red' & 'White Star'
- Storage (10 °C): 0, 2, 4, 6, 8 days
- Experimental design: Complete randomized design
- Replicated: 9 Sept. 2016; 27 Sept. 2016; 18 Oct. 2016
- Statistics: Generalized linear model (GLM), SAS 9.4



12 cuttings per cultivar sampled



### Responses

- Weight loss (mg·g<sup>-1</sup> FW)
- Shoot rating loss (1 – 5)
- Root rating (1 – 5)
- Fructose (mg·g<sup>-1</sup> DW)
- Glucose (mg·g<sup>-1</sup> DW)
- Sucrose (mg·g<sup>-1</sup> DW)
- Reducible sugars (mg·g<sup>-1</sup> DW)
- Total sugars (mg·g<sup>-1</sup> DW)

## Results

- Cuttings averaged 8% weight loss after 8 days in storage (Table 1)
- Turgidity was fully restored after 24 h under mist during propagation
- Increasing storage duration reduced root ratings
- Sucrose concentrations were initially higher in 'Prestige Red', but were significantly reduced over time compared to 'White Star' (Figure 1)
- 'White Star' maintained higher carbohydrate concentrations throughout storage (Table 2)
- Glucose and reducible sugars (fructose + glucose) were correlated with root ratings ( $r = 0.4824$  and  $0.4222$ , respectively) through Pearson-product moment correlation

Table 1. Storage duration effect across cultivars

Response	Storage duration (d)					Significance
	0	2	4	6	8	
Weight loss (mg·g <sup>-1</sup> FW)	0.0 d <sup>z</sup>	72.0 b	91.8 c	123.4 b	151.7 b	<0.0001
Shoot rating loss	0.0 d	0.8 c	1.3 b	1.5 ab	1.7 a	<0.0001
Root rating	2.1 ab	2.3 a	1.7 ab	1.6 b	1.6 b	<0.0043

<sup>z</sup>Mean separation in rows followed by the same letter are not significantly different according to Tukey's Studentized range test procedure at  $\alpha = 0.05$ .



Shoot rating 5 – fully turgid

Shoot rating 3 – slight wilt

Shoot rating 2 – extreme wilt

Average cutting carbohydrate content

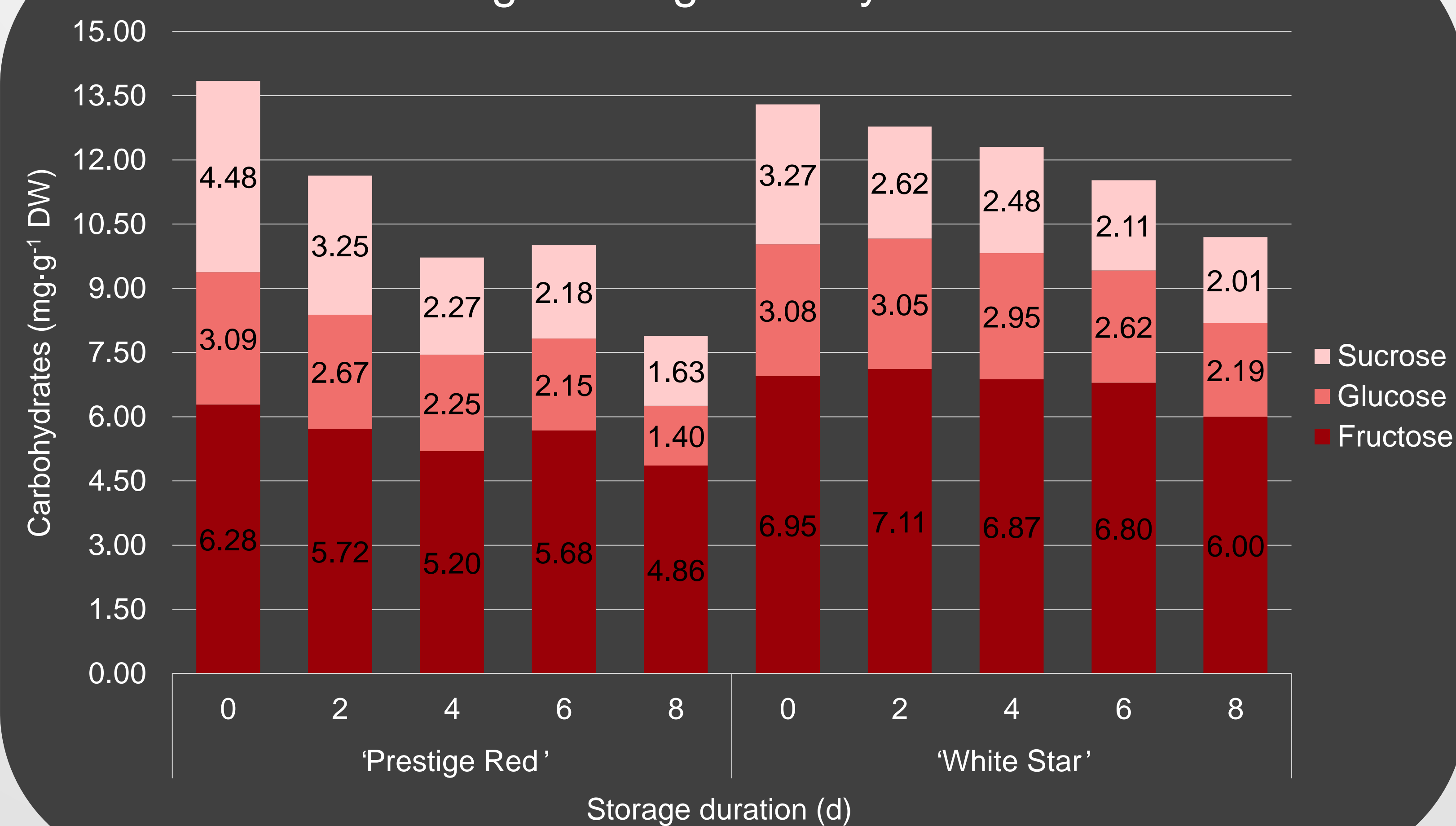


Table 2. Cultivar differences

Responses	'Prestige Red'	'White Star'	Significance
Weight loss (mg·g <sup>-1</sup> FW)	91.03	84.33	NS <sup>y</sup>
Shoot rating loss	1.0	1.1	NS
Root rating	1.6 b <sup>z</sup>	2.1 a	0.0032
Fructose (mg·g <sup>-1</sup> DW)	5.55 b	6.75 a	<0.0001
Glucose (mg·g <sup>-1</sup> DW)	2.31 b	2.78 a	0.0071
Reducible sugars (G+F, mg·g <sup>-1</sup> DW)	9.52 b	7.86 a	<0.0001
Total sugars (mg·g <sup>-1</sup> DW)	12.02 b	10.62 a	0.0052

<sup>z</sup>Mean separation in rows followed by the same letter are not significantly different according to Tukey's Studentized range test procedure at  $\alpha = 0.05$   
<sup>y</sup>NS: not significant at  $\alpha = 0.05$

## Discussion

Regardless of weight loss and wilting (shoot ratings), all cuttings returned to full turgidity after 24 h under mist during propagation, meaning cuttings can easily recover from dehydration. However, wilted, flimsy cuttings may inhibit worker and automation efficiency.

Root ratings were low, which may have been caused by low light levels and lack of root zone heating. The differences between cultivar rooting may not be differentiable to growers, but could become more apparent as plants are finished.

Years of breeding may have made white poinsettias more durable in postharvest environments than previously thought. The ability to maintain high levels of reducible sugars (glucose and fructose) may differ between cultivars and result in better post-storage performance. In order to increase postharvest quality and propagation success more work is needed to discover and preserve rooting constituents.

## Conclusion

Unrooted cuttings of 'Prestige Red' and 'White Star' poinsettia have been found to:

- Recover from extreme wilting and weight loss
- Produce adequate roots even after 8 d of storage at 10 °C
- Differ in carbohydrate concentration of glucose, fructose, and sucrose
- Have better rooting with higher concentrations of glucose and fructose

There are a variety of factors that promote and make adventitious rooting successful. In this study, glucose and fructose best correlated with rooting. However, other factors are likely involved and need to be explored to provide suppliers and growers with methods of maintaining important rooting constituents, alleviating stressed plant material, and ensuring propagation success.