HORTICULTURAL RESEARCH, 1991 - OVERTON

RESEARCH CENTER TECHNICAL REPORT 91-1

Texas A&M University Agricultural Research & Extension Center
at Overton

Texas Agricultural Experiment Station
Texas Agricultural Extension Service

Overton, Texas

June 20, 1991

CRITICAL TISSUE MOISTURE LEVELS NEEDED FOR MAINTENANCE OF ROSE PLANT VIABILITY

H. B. Pemberton and W. E. Roberson

INTRODUCTION

After a two-year production cycle, dormant rose plants are harvested and placed into cold storage until they are needed for processing and marketing. During this post-production period there are many opportunities for the plants to be exposed to conditions which result in severe moisture loss. Though there are many factors which are known to contribute to post-production nursery plant losses, moisture loss control has been demonstrated to be critical in the prevention of such losses for many crops. The objective of this study was to determine how much moisture can be lost by a dormant rose plant before irreversible declines in the quality of the resulting new growth can be detected.

MATERIALS AND METHODS

On 2 February 1988, field grown *Rosa* cv. Mister Lincoln plants were selected and harvested. The plants were wrapped in plastic to reduce moisture loss during transportation from the field to the lab. In the lab, plants were pruned to 14 in, weighed, and returned to the plastic cover. As soon as the initial weights were recorded, the plants were uncovered and allowed to dry for 0, 1, 4, 7, or 24 hours (storage treatments) at 60°F. At the end of each storage period, all plants were re-weighed. One group of plants was then oven dried to determine moisture content. Following removal of weak growth, the canes of another group were pruned to 8 in and the plants were potted in 2 gallon containers using a pine bark mulch:sand (4:1 by volume) media. A third group of plants was submerged in water up to the graft unions for 20 hours and then weighed, pruned, and potted as described above. The potted plants were forced in a glasshouse until the first petal on the first flower began to unfold. Glasshouse temperatures were 68 to 80°F during the day and 60°F at night. A completely randomized block design with eight replications was used and standard analysis of variance procedures were used to analyze the data.

RESULTS AND DISCUSSION

As expected, plants exhibited decreasing moisture content with increasing length of storage (Table 1). Storage of up to 7 hours resulted in a loss of 7% water. But, percent live plants, days to force out, and days to flower were unaffected. When storage time was increased to 24 hours, moisture content after storage dropped to 33%. Concurrently, percent live plants dropped to 56 and days to force out and days to flower increased to 31.6 and 58.9, respectively. However, the total number of flowering shoots per plant, total number of flowering shoots per cane, dry weight of flowering shoots per cane, and final plant height after forcing was unaffected by storage treatments.

Days to flower was decreased from 52 to 49 by soaking plants prior to potting. Percent moisture gain due to soaking was similar across storage treatments up to 7 hours. After 24 hours storage, however, the moisture gain rose to 17.7% (Table 1). Also, plant survival increased from 38 to 75% when plants were soaked prior to potting after 24 hours storage.

In summary, these results indicate that the main result of rose plant moisture loss is plant loss. Plants that survive excessive drying will produce flowering growth comparable to plants with a moisture content of greater than 40%. Growth and flowering will be greatly delayed, however. Soaking roots of plants that have experienced excessive drying will increase plant survival, but will not hasten the regrowth process. A critical moisture level for rose plant survival was found to be between 33 and 41% after 24 and 7 hours of drying, respectively. Further experimentation will be necessary to determine a more exact figure.

Table 1. Plant responses to storage treatments.

Length of Storage (hours)	Live (%)	Moisture After Storage (%)	Moisture Gain From Soaking (%)	Days to Force out	Days to Flower
0	100	47.9	--	16.1	48.3[y]
1	100	44.4	13.9[z]	15.3	46.5
4	100	43.0	10.5	16.2	48.6
7	100	40.9	12.0	16.8	49.1
24	56	33.3	17.7	31.6	58.9
ANOVA					
Length of storage (LOS)	--	*	*	*	*
L[x]	--	*	*	*	*
Q	--	NS	*10%	*	NS
C	--	*	--	NS	*
Potting treatment (PTRT)	--	--	--	NS	*
LOS X PTRT	--	--	--	NS	NS

[z]Data were transformed arcsin $\sqrt{x}$ for analysis. Means on original scale.
[y]Data were transformed log (x) for analysis. Means on original scale.
[x]L = linear, Q = quadratic, C = cubic.
NS, * Nonsignificant (NS) or significant at the 5% level, respectively. *10% = significant at the 10% level.