Effect of postharvest treatments on keeping quality of *Phoenix roebelenii*

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Abstract

Wilting and yellowing of leaves are major postharvest problems that reduce export quality and vase life of cut foliage species. Phoenix roebelenii has export potential as cut leaves and it shows wilting appears 3 d after harvesting. A series of experiments were conducted at Tropiflora company to investigate the effect of hydration solution (Florissant 400C, water) with wax treatment, harvesting time (6.00, 8.00, 10.00 a.m., 12.00, 2.00, 4.00 & 6.00 p.m.) and irrigation (irrigated & non irrigated), preservative solutions (Citric acid, Vinegar, Sugar & Phyzan) and commercial floral preservatives (Chrysal instant pac, Chrysal food pac, Chrysal professional 01 & Florissant 400C) on keeping quality of leaves. Water was used as the Control. All experiments were arranged as CRD with 4 replicates. The vase life is (14.75 d) significantly affected by hydration in water and wax treatment. No significant differences of leaf freshness or vase life of leaves harvested at 6.00 a.m. and 6.00 p.m. from irrigated fields. Results indicate that preservative solutions of 5 % Sugar, 200 ppm Phyzan and 500 ppm Citric acid increased vase life (13 d) than control. Immersing in 25 ppm GA_3 + 25 ppm BAP had beneficial effect on vase life (19 d) of Phonenix. Among the floral preservatives, Chrysal professional 01 showed longer freshness. Hydrated (horizontal 6 h and vertical 12 h) with Chrysal professional 01 and wax treated leaves gave the highest vase life (27 d) and leaf freshness.

Key words: *Phoenix roebelenii*; hydration; floral preservatives; vase life.

Introduction

Phoenix roebelenii cut leaves are used for decorative purposes. It has higher demand in the export market. Sri Lanka export Phoenix leaves to European Union, Japan and Middle East counties. It is cultivated under normal field conditions. Exportation is restricted due to vase life problems such as wilting and yellowing of leaves during transportation. So far, no one has done research to find appropriate postharvest treatments for P. roebelenii. However, the efficiency of pre-packing treatments depends on the species used, its concentration and method of application. Thus, the objectives of this research were to find out appropriate postharvest treatments; especially application of floral preservatives, its concentration and methods of application to maintain keeping quality of Phoenix roebelenii.

Materials and Methods

Experiment 1: Leaves harvested at 8.00 a.m. were hydrated using Florissant solution (1 tablet/1 l of water) and water for 24 h and then leaves were immersed in wax solution. Control leaves were only hydrated in Florissant and water solutions. All leaves were packed in corrugated cardboard boxes and kept under room conditions for 2 days.

Experiment 2: 4 h irrigation intervals (at 5.30 a.m., 9.30 a.m., 1.30 p.m. and 5.30 p.m.) and harvesting time (6.00 a.m., 8.00 a.m., 10.00 a.m., 12.00 p.m., 2 p.m., 4.00 p.m. and 6.00 p.m.) were practiced. Harvested leaves were hydrated and waxed as in the experiment 1.

Experiment 3: Preservative solutions (Phyzan (0.2 ml), Sugar (50 g), Citric acid (0.1, 0.2, 0.3 & 0.4 g) and Vinegar (2, 3, 4 & 5 ml)) were used in this experiment to determine the effect of the preservatives on vase life.

Experiment 4: Pretreatment solutions (Chrysal instant pac, Chrysal food pac, Chrysal professional 01 & 02 and Florissant 400C) were used to determine the effectiveness of pretreatment solutions on vase life. Tap water was used as the control. Procedure was same as the experiment 1.

Experiment 5: Growth regulators (GA_3 and BAP) were used in different concentrations (25, 50 ppm) to determine the effectiveness of on vase life. Leaves bundled and packed in separate corrugated boxes were kept under room temperature.

Experiment 6: Effect of floral preservatives (Chrysal food pac, Chrysal professional 01, Chrysal instant pack, Citric acid and Vinegar), hydration method (Vertical and Horizontal) and wax treatment were studied on the vase life. Leaves harvested at 6.00 a.m. were subjected to above treatments before packing.
The general appearance and color of the leaves were recorded daily. Vase life of leaves was considered when 50 % of leaves show wilting and browning. Dates of freshness including glossiness and color were observed. Leaf freshness dates were considered for data analysis using SAS GLM procedure.

Results and Discussion

Experiment 1: The highest vase life (15 d) was shown by water hydrated and wax treated leaves (Fig. 1). Wax coating acted as a primary barrier for evapo-transpiration.

Experiment 2: Leaves harvested at 6.00 a.m. from irrigated fields maintained the longest freshness (7 d) compared to other treatments (fig. 2). Leaves harvested at 6.00 p.m. from non-irrigated field showed same freshness (6.25 d) values. Midday (12.00 a.m. - 2.00 p.m.) harvested leaves maintained leaf freshness only for 4 days.

Experiment 3: The highest vase life (13 d) has been observed in Citric acid (100 ppm) + sugar (50 g) + Phyzan (200 ppm) solution(Fig. 3). Leaves placed in citric acid (300 ppm) with sugar and phyzan also performed better than leaves dipped in vinegar. Addition of citric acid to the holding solution may increase vase life by reducing microbial activity and by increasing the flow of water through petiole.

Experiment 4: Leaves placed in Chrysal professional 01(Fig. 4) gave the highest leaf freshness (14 d). Leaves placed in water (control) gave the shortest vase life (7 d). The benefits of low pH solution to maintain vase life of ornamentals have been recognized (Halevy & Mayak, 1981) and most commercial preservative formulations contain an acid to reduce pH of the solution. Brecheisen et al. (1995) found that Chrysal professional prolonged vase life of many ornamentals.

Experiment 5: Addition of 50 ppm BAP had beneficial effect on vase life. It delayed wilting compared to the control. Results revealed that combination of 25 ppm BAP and GA3 had positive effects (Fig. 5) on vase life compared to the leaves placed in water. GA3 in the vase solution had no significant effect on *Phoenix* vase life.

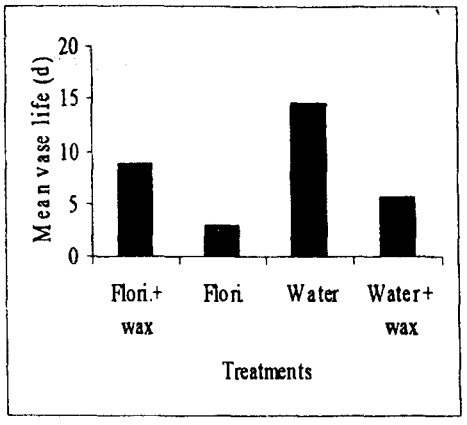
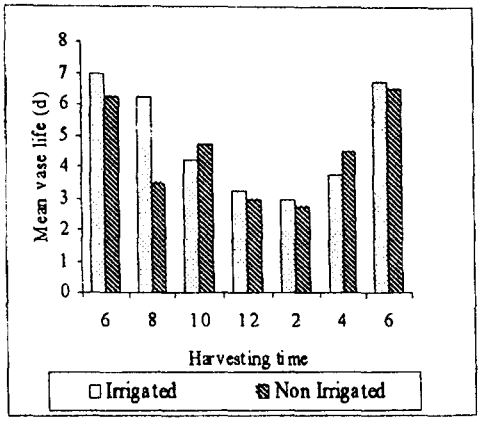


Fig 1: Effect of hydration and wax application on vase life



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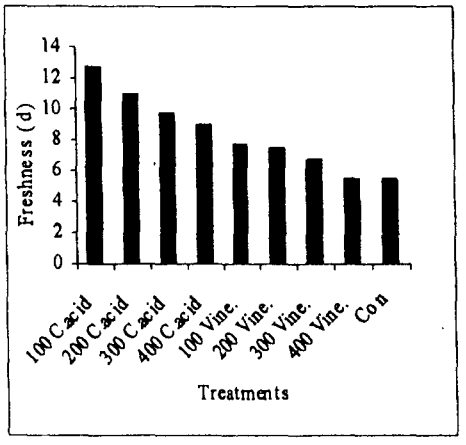

Fig 3: Effect of preservative solutions on leaf freshness

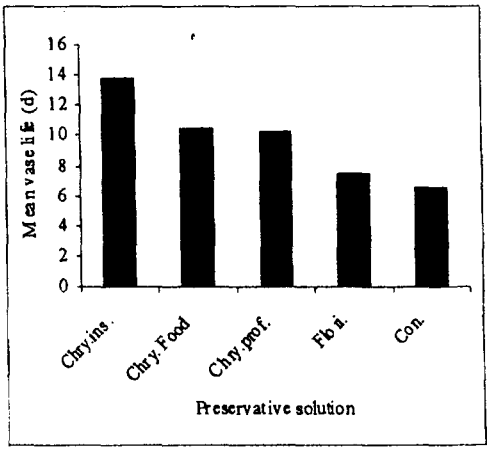

Fig 4: Effect of commercial floral preservatives on leaf freshness

Experiment 6: Hydration in Chrysal professional 01 (6 h horizontal & 18 h vertical) and wax treated leaves showed the highest freshness (27 d) compared to the control (Fig. 6). Immersing of leaves (horizontal hydration) and dipping of cut ends (vertical hydration) in preservative solutions showed significantly (ád"0.05) longer vase life than only dipping cut ends. The lowest vase life (10 d) has been recorded in leaves hydrated vertically in water.

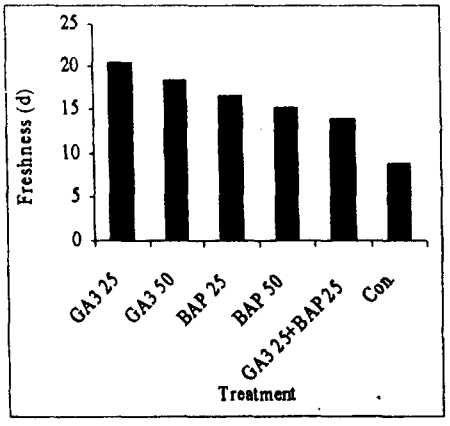

Fig 5: Effect of hormones on leaf freshness

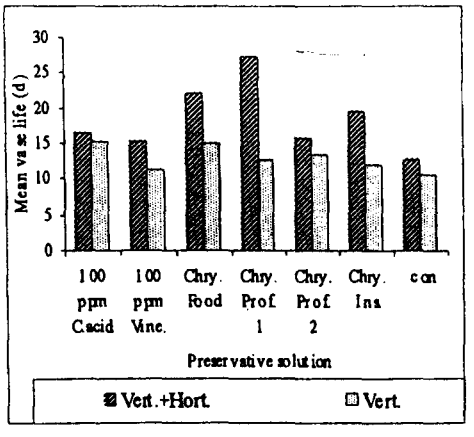

Fig 6: Effect of hydration methods, preservative solutions and wax treatment on leaf

Conclusions

Leaves harvested at 6.00 a.m. from irrigated fields showed positive effect on the vase life. Harvesting in the morning reduces evapotranspiration and heat stress to the plant. Proper handling and keeping cut leaves in buckets of water helped to maintain leaf freshness. The most noticeable variation (15 d vase life) was shown on hydrated (with water) and wax applied leaves.

Citric acid 100 ppm with 5 % sugar and 200 ppm Phyzan showed positive effect on maintaining leaf freshness for 13 d. Leaves immersed in 50 ppm BAP (6 h-horizontal and 18 h-vertical) is best for maintaining vase life of *Phoenix roebelenii*. In addition, combination of 25 ppm GA_3 and same amount of BAP were able to maintain vase life up to 20 d. Results revealed that leaf petiole absorbed more water than basal parts. However, a special hydration method; Hydration in Chrysal professional 01 (6 h horizontal & 18 h vertical) and wax treated leaves indicated 27 d of vase life.

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