Extending vase life of rose (*Rosa hybrida* L) cv Avalanche Ivory White through chemical preservatives

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ABSTRACT

A laboratory experiment was carried out to explore the best preservative solution for rose cultivar Avalanche Ivory White, the experiment repeated 2 times. The experiment was performed with 5 treatments viz T_1 (Tap water), T_2 (Sugar 5% + citric acid 100 ppm), T_3 (Sugar 5% sugar + lemon juice 1 ml/l), T_4 (Sugar 5% sugar + salicylic acid 100 ppm) and T_5 (Citric acid 100 ppm + salicylic acid 100 ppm). Minimum physiological loss, maximum amount of uptake of water, highest increase in flower head diameter and vase life were recorded in T_5 (Citric acid 100 ppm + salicylic acid 100 ppm) while T_1 (Tap water) was last in the queue.

Keywords: Rose; vase life; chemical preservative; lemon juice; citric acid

INTRODUCTION

Rose (*Rosa hybrida* L) is the most popular cut flower in the world (Rupasinghe et al 2015). Length of vase life is one of the most important factors for quality of cut flowers (Vehniwal and Abbey 2019). Rose is usually harvested at bud stage. For flower opening, large amount of soluble carbohydrates is required as substrate for respiration and synthetic materials as well as osmolytes.

Cut flowers wilt and floral axis becomes bent (bent-neck) just below flower head (van Doorn and de Witte 1997). Its longevity in the flower vase can be increased by using the vase life extending solutions. Han (2003) added sugar to the vase solution to mitigate the negative effects of defoliation on petal colour and reduce bud blasting. The vase life was greatly enhanced when 125 mg/l salicylic acid was used (Feigel-Terek et al 2010, Roodbaraky et al 2012).

Darandeh et al (2010) reported that combining citric acid and sucrose had a substantial influence on the vase life of cut flowers particularly cut roses (Shirin and Mohsen 2011). However if treating a cut rose cultivar with sucrose alone enhances vase life; a lack of carbohydrates is thought to be a factor in short vase life. Citric acid is a frequently available and inexpensive acidifier that can destroy germs in a solution. It can be found in citrus fruits (like lemons, limes, oranges etc). Citric acid can be found in abundance in lemon and lime juice.

Citric acid concentration in lemon and lime juice concentrates is 1.10 and 1.06 g/oz respectively. The amount of citric acid in commercially available lemonade and other juice products ranges from 0.03 to 0.22 g/oz (Penniston et al 2008). Citric acid's effects on harvested roses and other species have received minimal attention.

MATERIAL and METHODS

The experiment was conducted in the Department of Floriculture and Landscaping, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, West Bengal. Cut flowers of rose were collected from the flower market of Kalyani, West Bengal. All flowers were trimmed to avoid air embolism (van Leperen et al 2001). From the lower section of the stem, all leaves were removed. Treatments used were T_1 (Tap water), T_2 (Sugar 5% + citric acid 100 ppm), T_3 (Sugar 5%

sugar + lemon juice 1 ml/l), T_4 (Sugar 5% sugar + salicylic acid 100 ppm) and T_5 (Citric acid 100 ppm + salicylic acid 100 ppm).

RESULTS and DISCUSSION

As presented in Figs 1, 2, 3 and 4 (Plate 1) the post-harvest parameters of cut rose cultivar Avalanche Ivory White were significantly influenced by different chemical preservatives. Lowest physiological loss (4.62 and 6.25 g), maximum water uptake (120.87 and 111.00 ml), maximum increase in flower diameter (2.7 and 2.07 cm) and longest vase life (8.00 and 5.75 days) were recorded in T_5 (Citric acid 100 ppm + salicylic acid 100 ppm) and T_4 (Sugar 5% sugar + salicylic acid 100 ppm) respectively. Maximum physiological loss (8.12 g) was recorded in T_2 (5% sugar + citric acid 100 ppm) whereas lowest increase in flower head diameter and vase life was observed in T_1 (Tap water).

Lowest physiological loss recorded in T_5 and T_4 could be due to the presence of salicylic acid as salicylic acid delays the senescence of flowers (Gerailoo and Ghasemnezhad 2011). During rose and lily flowers senescence (Gerailoo and Ghasemnezhad 2011), salicylic acid and sucrose prolonged vase life by boosting the antioxidant system and minimising oxidative stress damages (Kazemi and Ameri 2012). The plant regulating and anti-stress qualities of salicylic acid and citric acid are thought to be responsible for the 300 per cent improvement in vase life (Mashhadian et al 2012). In terms of water absorption, the administration of salicylic acid (Hajreza et al 2013) and sucrose (Shirin and Mohsen 2011) resulted in greater water absorption than the control. Microorganisms collecting at the bottom of the cut stem induce vascular blockage which contributes to a short vase life (van Doorn et al 1990). Salicylic acid has a pH of 2.4 which is too acidic for bacteria to flourish in. As a result vascular obstruction is avoided allowing for maximum solution uptake (Raskin 1992).

From the study it was concluded that citric acid 100 ppm + salicylic acid 100 ppm or sugar 5 per cent + salicylic acid 100 ppm are the best preservative solutions to prolong vase life of rose.

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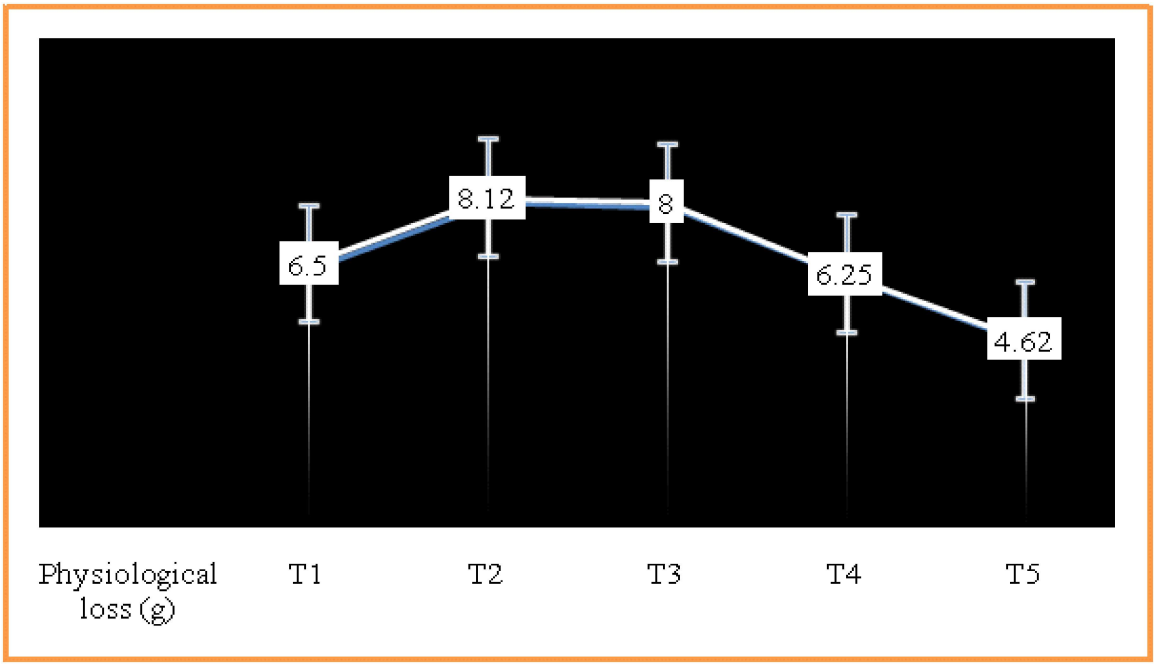

Fig 1. Effect of chemical preservatives on physiological loss of rose cut flowers

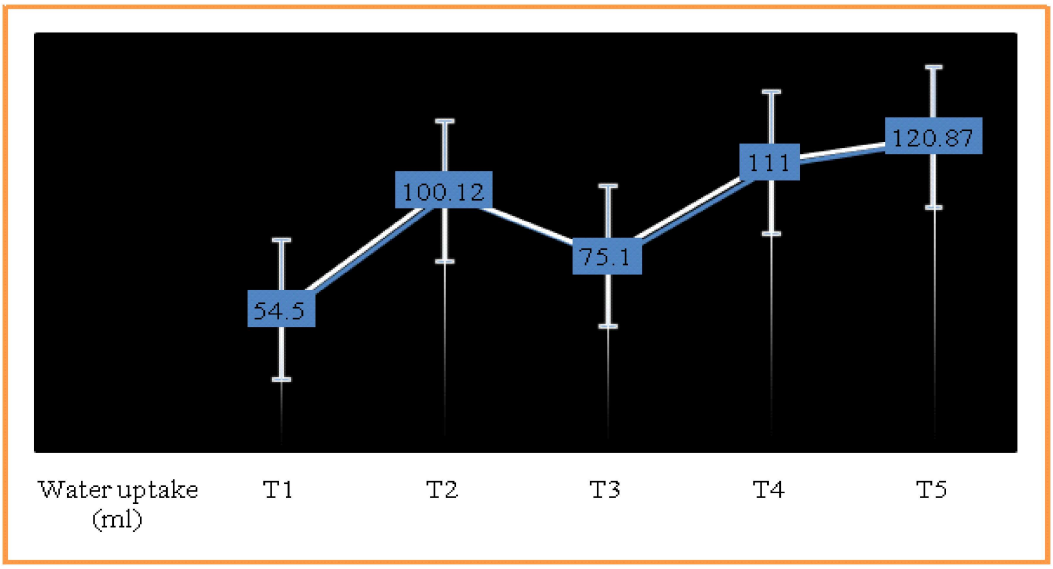

Fig 2. Influence of chemical preservatives on water uptake of rose cut flowers

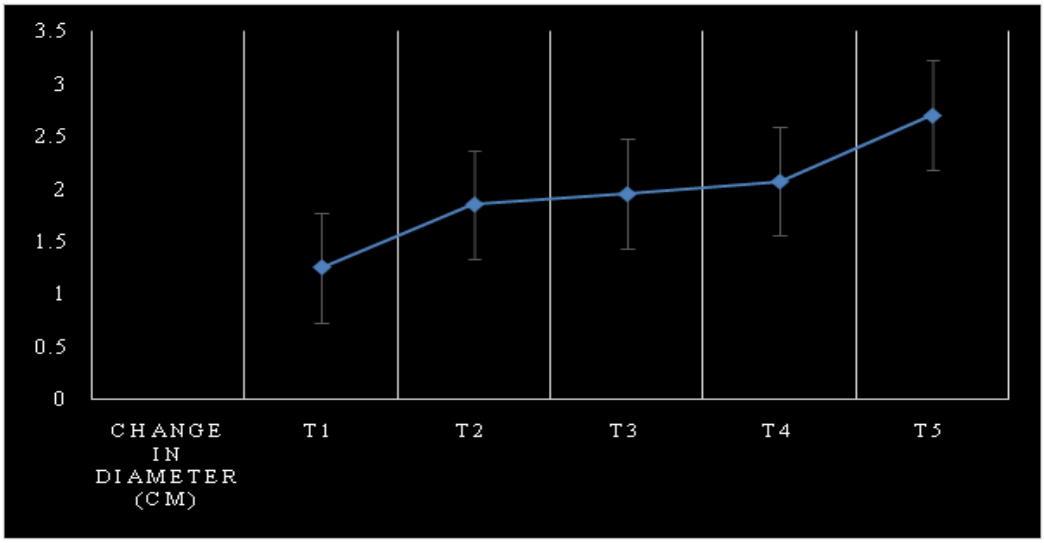

Fig 3. Effect of chemical preservatives on head diameter of rose cut flowers

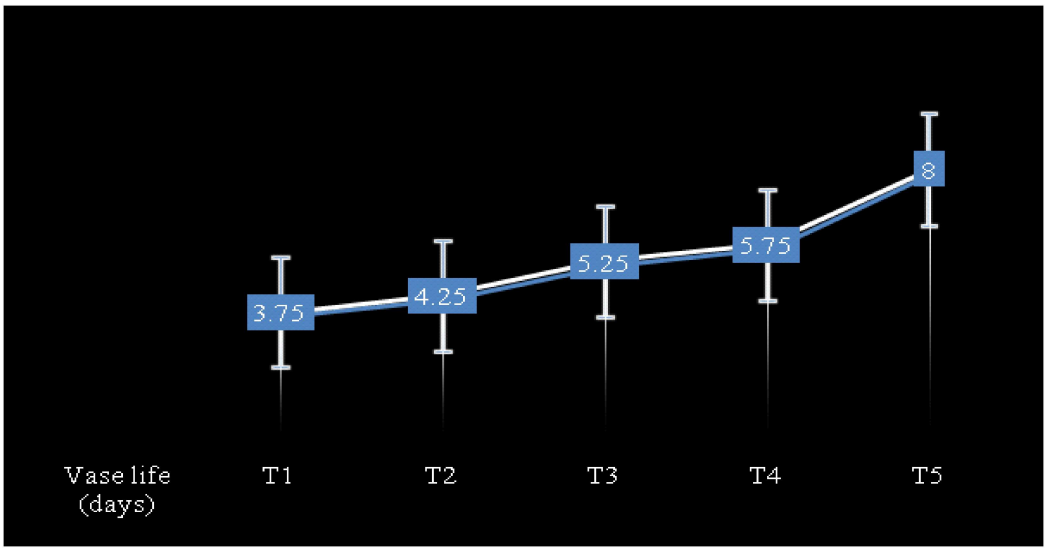

Fig 4. Effect of chemical preservatives on vase life of rose cut flowers

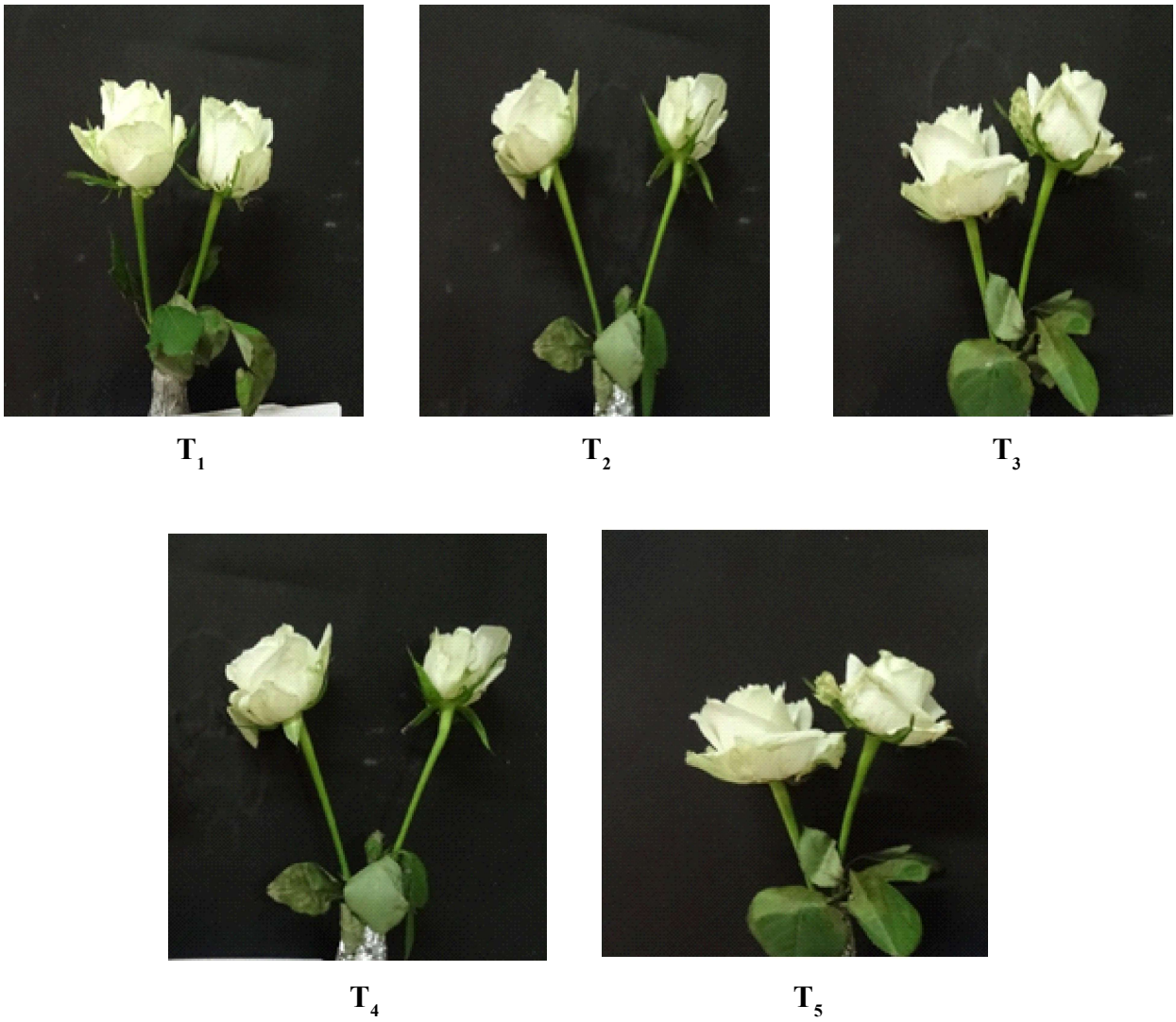

Plate 1. Influence of chemical preservatives on rose cut flowers, T_1 (Tap water), T_2 (Sugar 5% + citric acid 100 ppm), T_3 (Sugar 5% sugar + lemon juice 1 ml/l), T_4 (Sugar 5% sugar + salicylic acid 100 ppm), T_5 (Citric acid 100 ppm + salicylic acid 100 ppm)

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