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Dianthus caryophyllus L. cv. tempo: improvement vase life and postharvest characteristics by silver thiosulphate

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ABSTRACT

In this study effect of STS was the investigated on the vase life and postharvest characteristics of cut carnation cv. Tempo were investigated. The experiment was conducted based on completely randomized design with 4 levels of STS (0, 0.1, 0.2 and 0.3 mM) and 3 replications. Analysis of variance showed that effect of STS on vase life ($p \le 0.05$) and loss of °brix ($p \le 0.01$) was significant. Results showed that 0.2 mM STS with 15. 23 days vase life and 0.3 mM STS by 1.38 FOI, 1.08 °brix loss and 55.67 CFU ml⁻¹ bacterial colonies were the best treatments compared to other levels of STS.

Key word: carnation , vase life , STS , brix , flower opening index

INTRODUCTION

Carnation (*Dianthus caryophyllus* L.) belong to caryophyllaceae family and one of the most important cut flowers in the world [5, 7]. Carnation is very sensitive to ethylene. Also bacterial contamination in stem end reduces water absorption and finally cut carnation will wilt and decreased vase life [4]. So application of antiethyle and antimicrobial compounds has been suggested[8, 11, 13, 15]. Silver ion of STS has antiethylene and antimicrobial activity in plants [14]. Ichimura and Hiraya [10] indicated that pulse treatment of sucrose and/or STS was effective in maintaining the vase life of cut sweet pea (*Lathyrus odoratus*) flowers. Han [6] reported that the postharvest quality of cut *Heuchera sanguine* was significantly improved and its vase life significantly increased by pulsing the inflorescence with STS for 4 hr.

MATERIALS AND METHODS

In March 2011 cut carnation cv. Tempo flowers at commerical stage, was purchased from a greenhouse located in Mahallat and immediately transferred to the postharvest laboratory of Islamic Azad University, Rasht Branch, Iran under standard conditions. 5 cut flowers were placed in 2 liter vases and they were treated with determined concentrantion of STS. Experiment was conducted based on completely randomized design with 4 levels of STS (0, 0.1, 0.2 and 0.3 mM) in 3 replications, 12 plots and 5 cut flowers per plot. The measured traits were vase life, flower opening indox, loss of °brix and number of bacteria in stem end. The end of vase life determined by petals inrolling [5]. Flower opening index (FOI) was calculated by this formula [7]:

FOI=[(Dn+2/Dn]+ (Dn+4/Dn+2)+ (Dn+6/Dn+4)]/3

That Dn is days that measured flower diameter .

[°]Brix was determined by refractometer N-a mode by Atago Ltd. Japan. Loss of brix was calculated by this formula [7]:

Loss of °brix = °Brix in first day – °Brix in final day.

24 h after pulse treatment, 2 ml of vase solution was sampled from each vase and diluted with 2 ml of 0.9% sterile normal saline. Liquid extract (0.1ml) was spread on nutrient agar. Bacteria colonies were enumerated after incubation for 24 at 37 °C. Data analysis carried out by using SPSS and MSTATC softwares and mean comparisons was done according LSD test.

RESULTS AND DISCUSSION

Analysis of variance showed that effect of STS on vase life ($p \le 0.05$) and °brix loss ($p \le 0.01$) was significant. Results indicated that 0.2 mM STS with 15.23 days vase life and 0.3 mM STS by 1.38 FOI, 55.67 CFU ml⁻¹ bacterial population and 1.08 °brix loss were the best treatment (Table I) (Fig. 1). Positive effect of this treatments is due to antiethylenic and antimicrobial properties that improves water relation, maintain carbohydrates , water absorption and reduced respiration rate that finally improved vase life and postharvest quality of cut carnation cv. Tempo [3, 7, 9, 16]. Abdul Wasea [1] demonstrated that using of 0.2mM STS with sucrose improved vase life amount 7 days compared to control in snapdragon. Zencirkiran [19] showed the 1-methylcyclopropene (1-MCP) and STS delayed senescence in cut *Freesia* sp. Solgi et al. [17] revealed that silver ion in nanosize and essential oils improved vase life, fresh weight and water absorption in cut gerbera cv. Dune. Basiri et al. [3] showed that silver nano particles, an antiethylene compound, improved vase life, flower opening index, °brix and decreased bacterial population in cut carnation cv. White Liberty. Our results is agreement by Hoseinzadeh Liavali & Zarchini [8], Ansari et al. [2], Liao et al. [12] and Son et al. [18]



Fig 1-Effect of STS on vase life of cut carnation cv. Tempo. S1: Control, S2: 0.1 mM STS, S3: 0.2 mM STS, S4: 0.3 mM STS. *Means with the same letters are not significantly different.

Table 1. Effect of STS on vaselife and postharvest characteristics of cut carnation cv. Tempo.

Treatments	Flower opening index (FOI)	°Brix loss (% sucrose)	Bacterial clonies in stem end (log ₁₀ CFU ml ⁻¹)	Vase life (days)
S1 (Control)	1.51a	1.90a	56.5a	12.33b
S ₂ (0.1 mM STS)	1.43a	1.71a	56.08a	14.52ab
S ₃ (0.2 mM STS)	1.40a	1.13b	61.83a	15.23a
S ₄ (0.3 mM STS)	1.38a	1.15b	55.67a	14.81ab

*Means with the same letters are not significantly different.

CONCLUSION

In conclusion, 0.2 mM STS improved vase life of cut carnation cv. Tempo (3 days) compared to control plants. Also, 0.3 mM STS had the least brix loss, bacterial colonies and FOI.

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