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Effect of acetaldehyde on vase life and some quantity and quality traits of cut Lisianthus (*Eustoma grandiflora*)

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ABSTRACT

Today, the positive effect of alcoholic treatments on the quality and vase life of cut flowers has been demonstrated. The aim of this study was to evaluate the effects of four concentrations of acetaldehyde treatment (0, 1, 2, and 4%) on the delaying senescence of cut lisianthus. The results showed that all concentrations that used in the current experiment significantly increased vase life, reduced ethylene production, increased carotenoid content of petals and improve the process of flowers opening. Acetaldehyde 2 % showed the best performance compared to other treatments and was recognized as a superior treatment. It seems that the success of this experiment is associated with positive performance of acetaldehyde in decreasing ethylene synthesis.

Key words: Acetaldehyde, Vase life, Ethylene, Lisianthus.

INTRODUCTION

Postharvest longevity of cut flowers is one of the most important factors to estimate the value of the product. Adaptation appropriate harvest and postharvest techniques can reduce about 20 to 40 percent of postharvest losses of cut flowers [5]. Therefore, recognizing factors are affected on value of economic flowers and the factors that can delay this process is necessary. Various experiments have shown that inhibitors of ethylene biosynthesis or action can influenced the aging process of flowers and delay senescence [6]. In this research, we investigated the effect of different concentrations of acetaldehyde on vase life, ethylene synthesis and quality of cut lisianthus flowers (*Eustoma grandiflora*).

MATERIALS AND METHODS

This study evaluated the effects of acetaldehyde treatments at 4 levels (0, 1, 2 and 4%) on the vase life and quality of lisianthus cut flowers. The experiment carried out in randomized completely design, in 3 replications, 12 plots and in each plot were 5 cut flowers. Flowers underwent pulse-treated with acetaldehyde for 24-hour. After the end of pulse period and removal of flowers from solutes, the pots were replaced and flowers were maintained until the end of vase life in the container 500 ml contains 300 mg l^{-1} 8 - hydroxyquinoline sulfate and 3% sucrose. Postharvest laboratory conditions was including 12h photoperiod from florescent lamps, 12 µ mol s^{-1} m^{-2} light intensity, 20±2 ^{0}C temperature and 60-70% relative humidity.

End of vase life was when flower was wilted or leaf was discoloured [2]. Flower opening index was measured with a digital caliper as the following expressions by this formula:

$$\text{Flower opening index} = \frac{D_{n+2}}{D_n} + \frac{D_{n+4}}{D_{n+2}} + \frac{D_{n+6}}{D_{n+4}} + \frac{D_{n+8}}{D_{n+6}} = \frac{X}{4} = Y$$

Day Zero=n

Ethylene production was measured 24 h after pulse treatment by Chamani [1] method. Carotenoid petals content was measured in 5th day of experiment by Mazumdar and Majumder [7] method. Data analysis was performed using SPSS software and data mean comparison was performed according to LSD test.

RESULTS AND DISCUSSION

Vase Life

Statistical analysis showed that the effect of acetaldehyde on vase life of cut flowers was significant ($p \leq 0.01$). Highest vase life was found in 2% acetaldehyde (Table- 1, Fig.1).It seems positive effect of acetaldehyde on vase life of cut lisianthus led to its anti-ethylene activity, so it can be the senescence inhibitor agent [8]. Similar results were observed in cut carnation flowers treated with acetaldehyde [12-15].

Flower Opening Index

Data analysis showed that the effect of different concentrations of acetaldehyde was significant on the flower opening index ($p \leq 0.05$) and has improved flower opening process. Also, 2% acetaldehyde had the best effect (Table-1, Fig.2). Petridou et al. [9] and Srilaong and Buanong [14] reported that alchohol treatment in low concentrations caused to maintain the proper form of flower buds and to improve its opening process.

Ethylene Production

Data analysis showed that the effect of acetaldehyde was significant on ethylene production ($p \leq 0.01$). Mean comparison of the data showed that 2% acetaldehyde had the minimum ethylene production (0.63 nl l^{-1} $h^{-1}g^{-1}$FW) as compared to the control and other concentrations (Table- 1, Fig.3). Pod and Van staden [10-11] demonstrated that acetaldehyde pulse treatment on cut carnation flowers cause to reduce ethylene production.

Determination of Carotenoid Petals

The results showed that the amount of carotenoids increased compared with control (Table -1, Fig.4). It seems that acetaldehyde by prevent the ethylene production and influence on the development of chloroplasts caused to prevent of degradation petal's carotenoids [9]. The results of researches such as Jones and Hill [3], Sharif Hossain et al. [13] and Kelatejari et al. [4] showed that use of anti-ethylene compounds caused to stability of petal's carotenoid. These findings confirm the present study.

Table 1: Effect of acetaldehyde treatment on measured traits

Treatment	Vase life (Day)	Flower opening index	Ethylene production (nl l^{-1} $h^{-1}g^{-1}$FW)	Petal carotenoid (µg g^{-1} FW)
Control	3.67c*	0.16c	1.13a*	1.16b
A_1 (1%)	7.00bc	0.17bc	0.88b	2.06a
A_2 (2%)	8.67a	0.32a	0.63c	2.30a
A_3 (4%)	7.67ab	0.30ab	0.64c	2.20a

According to LSD test, in each column, means with the same letters are not significantly different

Fig: 1 Effect of acetaldehyde on vafe life of cut lisianthus flowers

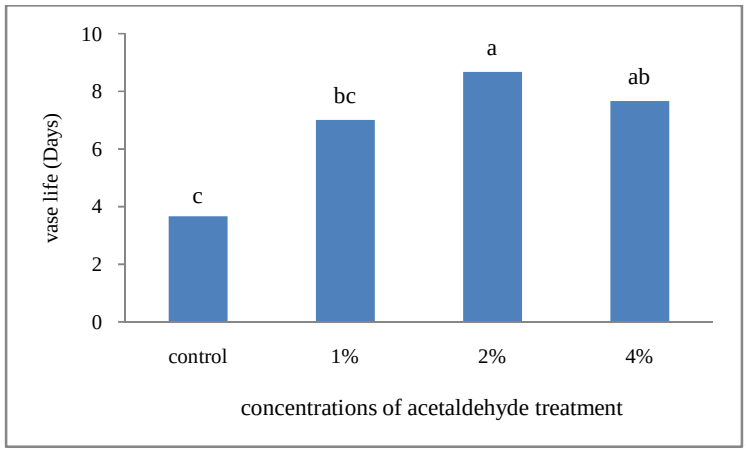


Fig: 2 Effect of acetaldehyde on flower opening index of cut lisianthus flowers

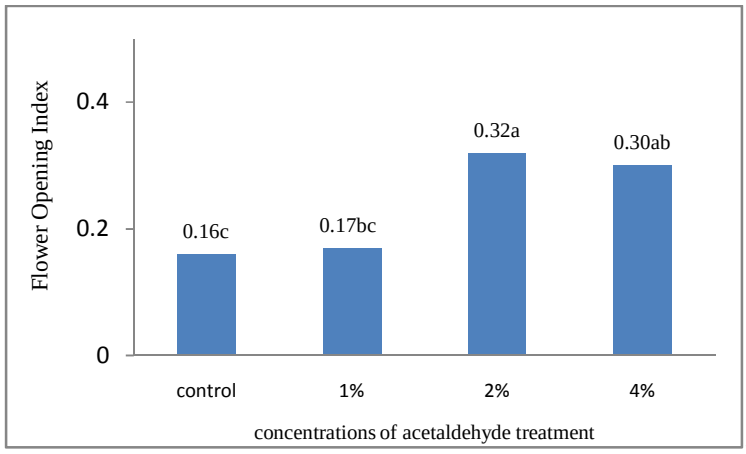


Fig: 3 Effect of acetaldehyde on ethylene production of cut lisianthus flowers

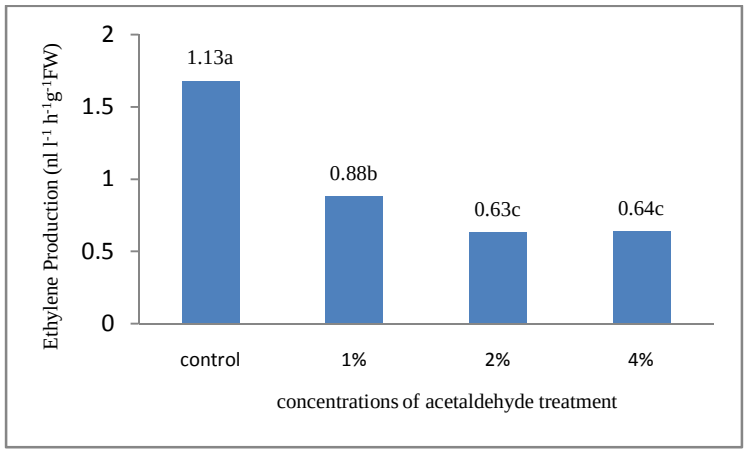
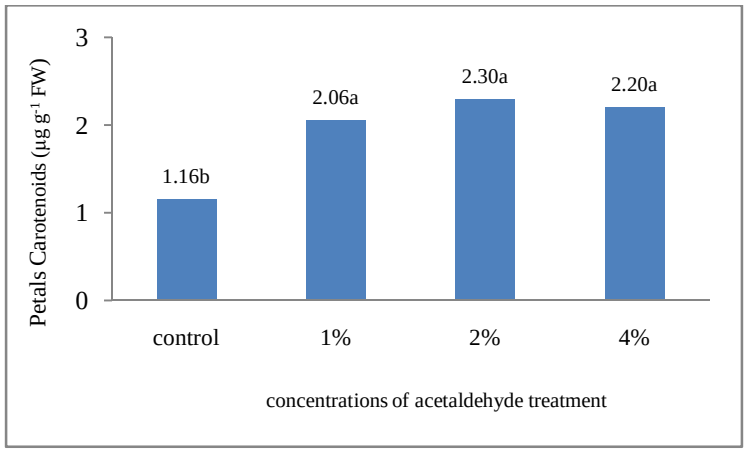


Fig: 4 Effect of acetaldehyde on Petal carotenoid of cut lisianthus flowers



CONCLUSION

It is concluded that acetaldehyde could be improved vase Life and quality of cut (*Eustoma grandiflora*) flower and decreased ethylene production in this cut flower. We suggested that this compound can be applied on the other cut flowers.

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