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Quality characteristics and antioxidant activity of the mango (*Mangifera indica*) fruit under arginine treatment

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Abstract
Mango fruit is one of the most important fruits in terms of nutritional value. One of the important characters of mango is the presence of antioxidants such as polyphenols, carotenoids, and anthocyanins in its fruits and vegetables. These compounds are involved in preventing diseases and maintaining health in humans. Amino acids have been used to preserve and enhance fruits quality. In this study, the mango fruits of a local cultivar were sprayed with the arginine amino acid at concentrations of 0, 200, and 400 µM at the time of fruit formation and 10 days after this stage. Results showed that total phenolics, anthocyanins, carotenoids, antioxidant capacity, total soluble solids, pH, fruit weight, and seed weight of the fruits increased with the increase in arginine concentration and 400 µM arginine had a better effect on these characters. Comparison of the times of application indicated that the second stage of the foliar application was generally more effective than the first stage in increasing the studied characters.

Keywords: Antioxidant; Arginine; Mango; Quality

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Introduction

Mango is a popular tropical fruit because of its taste, aroma, and flavor. It is cultivated in more than 100 tropical and subtropical countries (Bally *et al*. 2020). Mango has a high nutritional value and is the main source of antioxidants including carotenoids, ascorbic acid, and phenolic compounds (Manthey and Perkins 2009). The phenolic compounds include flavonoids, phenolic acids, xanthones, and gallotannins (Kim *et al*. 2010), although this composition varies between different mango cultivars (Manthey and Perkins 2009). Antioxidants delay or remove the oxidation of oxidizing substrates in cells (Halliwell 1996). The antioxidant enzymes protect the cells of the organisms from oxidative damage. As an example, superoxide dismutase (SOD) converts superoxide radicals into hydrogen peroxide and oxygen (Yim *et al.* 1996). Mango contains a mixture of sugars and acids (Lebaka *et al*. 2021), which are the important constituents in the sweetness and acidity of fruit (Malundo *et al*. 2001).

Increasing yield and quality of mango fruit may be achieved through appropriate cultural methods including foliar fertilization, which contains some amino acids and plant nutrients. Amino acids synthesize many compounds that are important for production and fruit quality (do C Mouco *et al*. 2009). L-arginine is one of the most important amino acids in plants. Arginine is constituent of proteins and serves as a precursor for the biosynthesis of several molecules such as proline and polyamines (Chen *et al.* 2004). In

general, arginine is an essential metabolite for many cellular and developmental processes (Winter *et al.* 2015). It has been suggested that both endogenous and exogenous arginine play roles in the responses of plants to stresses such as drought (Nasibi *et al.* 2011). Researchers have reported the positive role of arginine in reducing the inhibition that is caused by exposure of plants to stress conditions (Hassanein *et al*. 2008; Khalil *et al*. 2009). Arginine increased growth and root weight and length, chlorophylls, and carotenoids in faba bean (Nassar *et al*. 2003). The use of chemicals to maintain the quality and marketability of fruits for post-harvest has been advocated in recent years. The purpose of this study was to evaluate the effect of arginine on maintaining quality and antioxidant compounds in mango fruits.

Materials and Methods

Plant materials

This research was conducted in a commercial orchard located in the south of the Kerman province of Iran. The 15-year-old trees at a spacing of 6 × 6 m with standard cultural practices were selected. The experiment was laid out as factorial based on the randomized complete block design with three replications.

Branches containing fruits of desired trees were treated with the amino acid arginine at concentrations of 0, 200, and 400 µM. The mango fruits of a local cultivar were sprayed at two stages:

Stage 1: at the time of fruit formation (fruit diameter less than one centimeter).

Stage 2: ten days after the first stage.

The branches with approximately similar lengths and the number of fruits were selected from the same age trees and 3-4 fruits were selected in each branch. The treated branches were separated 24 h after spraying and the treated fruits were immediately frozen in liquid nitrogen and stored at -80 °C for later analyses.

Analysis of biochemical characters

The extractions of samples were prepared by homogenizing 1 g of fruit in 4 ml of ice-cold, 50 mM potassium phosphate buffer (pH 7.0) with 2 mM Na-EDTA, and 1% (w/v) polyvinyl–polypirrolidone (PVP). The homogenate was centrifuged at 10,000 × g for 10 min (Bradford 1976). Then, the following enzymes were assayed.

Ascorbate peroxidase activity

Ascorbate peroxidase (APX) activity was determined according to Nakano and Asada (1987). The assay mixture contained 100 µg of the enzyme extract added which was added to the assay solution [50 mM potassium phosphate buffer (pH 6.6) and 2.5 mM ascorbate] and the reaction was initiated by adding 10 mM H_2O_2. The decrease in the absorbance of ascorbate was read at 290 nm for 3 min against assay solution (ε= 2.8 mM^{-1} cm^{-1}).

Catalase

Catalase (CAT) activity was measured according to Dhindsa *et al*. (1981). The extract of the crude enzyme (50 µM) was added to the catalase assay solution [50 mM potassium phosphate buffer (pH 7.0) and 15 mM H_2O_2]. Absorbance was read at

240 nm at 1 min intervals.

SOD

SOD was measured by the method of Beauchamp and Fridovich (1971). To obtain the reaction mixture, 50 µl of the crude enzyme extract was mixed with the SOD assay solution [50 mM potassium phosphate buffer (pH 7.8), 13 mM L-methionine, 2 µM riboflavin, 0.1 mM EDTA, and 75 mM nitro blue tetrazolium (NBT)]. After shaking the test tube, it was put in a lightbox for 15 min. One unit of the enzyme activity was equal to the amount required to inhibit the 50% NBT reduction by observing the absorbance at 560 nm.

Carotenoids and photosynthetic pigments

An amount of 0.1 g fruit in 15 ml of 80% acetone was homogenized and then, the absorbance was read by a spectrophotometer at the wavelengths of 663.2, 646.8, and 470 nm (Lichtenthaler 1987). The concentration of photosynthetic pigments and carotenoids were calculated using the following formulae:

Chl a = $12.25\ A_{663.2} - 2.79\ A_{646.8}$

Chl b = $21.21\ A_{646.8} - 5.1\ A_{663.2}$

Carotenoids = $(1000\ A_{470} - 1.8$ Chl a $- 85.02$ Chl b$) / 198$

Total phenolic content

Total phenolic content was measured according to Zieslin and Ben (1993). A 2 ml volume of 80% methanol was added to 1 g of the plant tissue. Then, 0.5 mL of methanolic extract was mixed with 0.5 mL Folin-Ciocalteu reagent on a shaker for 15-20 sec and after 3 min, 1 ml of saturated sodium carbonate and 1 ml of distilled water were added to this solution. This mixture was incubated in a dark room for 2 h. Then, the absorbance was recorded by a spectrophotometer at 725 nm against deionized water.

Measurement of DPPH

To measure DPPH, 0.2 g from the plant tissue was grounded in a mortar and pestle in 2 mL of absolute ethanol at 4 °C. An amount of 1.5 milliliters from the solution was mixed with 0.25 mL of 0.5 mM DPPH and 0.5 mL of 100 mM acetate buffer (pH 5.5). The absorbance was recorded at 517 nm after 30 min according to ABE *et al*. (1998).

Anthocyanin content

The ethanolic HCl solution (0.25 M) was added to an aliquot of the extract to reach a dilution of 1:10 based on Kim *et al*. (2003). After mixing the solution, the absorbance was read at 520 nm (A_{520}) using the ethanolic HCl solution as blank. Total anthocyanin content was measured as cyanin equivalents per 100 g of the fresh tissue (Kim *et al*. 2003).

Total soluble solids

The total soluble solids (TSS) content was measured using a hand-held refractometer (American Optical Co., NH, USA).

Acidity measurement

The acidity was measured by a pH meter (Model 3320 manufactured by Jenway, UK).

Fruit and seed weights

Fruit and seed weights were measured by a digital scale (ELB 1200, Shimadzu, Kyoto, Japan).

Statistical analysis

The experimental design was laid out as factorial based on randomized complete blocks with three replications. The data were first subjected to analysis of variance and then the means were compared using Duncan's multiple range test at $p \leq 0.05$. The SAS version 9.1was used for all analyses.

Results

Enzyme activity

The activity of antioxidant enzymes was presented in Table 1. The application of arginine with different concentrations at both stages enhanced the activity of APX, CAT, and SOD compared to the control fruits at $p \leq 0.05$. At each stage, fruits treated with 400 µM arginine showed the highest levels of enzyme activity (Table 1).

Antioxidant capacity

The results showed that the fruits treated with 400 µM arginine had higher antioxidant capacity than the control fruits at both stages. However, the difference of 200 µM arginine with the controls was only significant at stage 2. Also, with increasing the arginine concentration, the antioxidant capacity increased at stage 1 in the mango fruits (Figure 1).

Carotenoids content

The levels of carotenoids of stages 1 and 2 were not significantly different in the control fruits. Mango fruits that were sprayed with both concentrations of arginine at both stages resulted in an increase in the carotenoids content compared to the control fruits (Figure 2). The carotenoids content related to the arginine concentration of 400 µM at the second stage was significantly higher than other treatments.

Total phenolic content

The amount of total phenolic content in the control fruits at both stages was significantly lower than the treated fruits. The highest total phenolic compound was observed in the fruits treated with 400 µM arginine at ten days after the first stage (Figure 3).

Anthocyanin

The anthocyanin content of the treated fruits significantly increased with the increase in arginine as compared to the control fruits. The highest anthocyanin content was observed in the fruits treated with 400 µM arginine at stage 2 (Figure 4).

Total soluble solids and pH content

The TSS increased significantly only in the fruits treated with the 400 µM arginine at the second stage as compared to the control fruits. However, pH increased significantly by treating the fruits with arginine at both stages. Arginine application at the 400 µM concentration showed the highest effect on pH at the second stage (Figures 5 and 6).

Fruit and seed weight

Arginine pretreatment with both concentrations (200 and 400 µM) at stage 2 resulted in a significant increase of the fruit weight and seed weight of the mango fruit as compared to the respected controls (Figures 7 and 8). However, at stage 1, only 400 µM was effective in increasing the fruit weight when compared with the control fruits.

Table 1. Ascorbate peroxidase (APX), superoxide dismutase (SOD), and catalase (CAT) activity in mango fruits

Treatment	SOD		APX		CAT	
	Stage 1	Stage 2	Stage 1	Stage 2	Stage 1	Stage 2
Control	18.04c	17.98c	10.25c	10.38c	7.11c	7.08c
200 µ	21.65b	23.45b	14.11b	16.32b	9.23b	10.87b
400 µM	26.38a	31.94a	18.27a	21.38a	12.98a	14.26a

Note: Values in the same column with different superscript letters are significantly different at $p \leq 0.5$ by Duncan's multiple range test. Stage 1: at the time of fruit setting; Stage 2: ten days after stage 1.

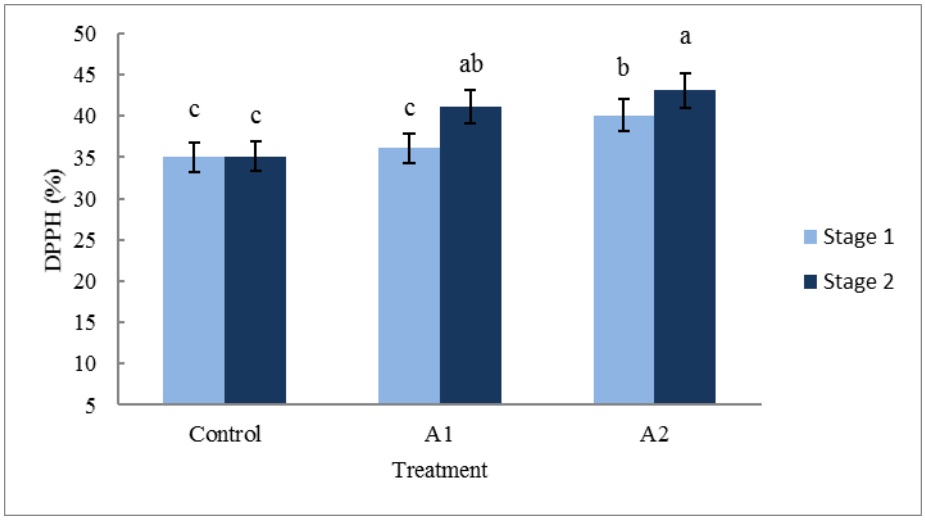

Figure 1. Effect of different concentrations of arginine on DPPH in the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

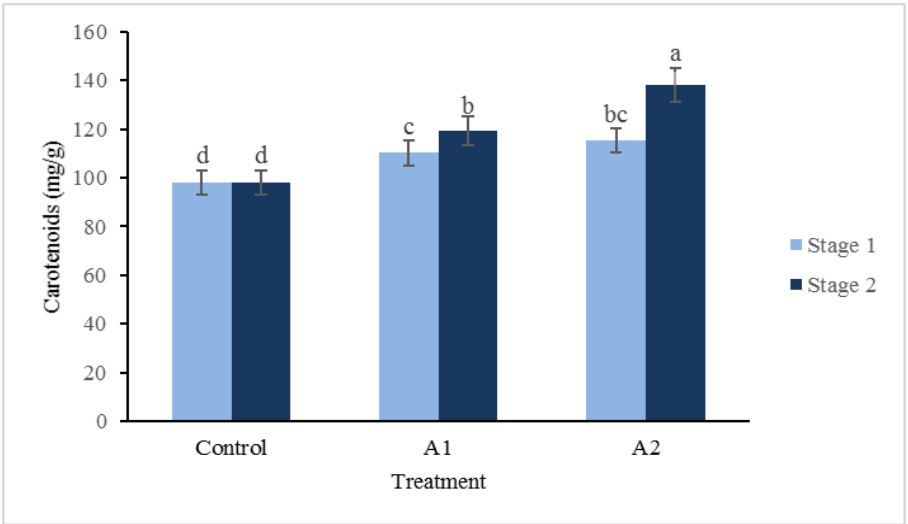

Figure 2. Effect of different concentrations of arginine on the amount of carotenoids in the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A1: 200 µM, A2: 400 µM

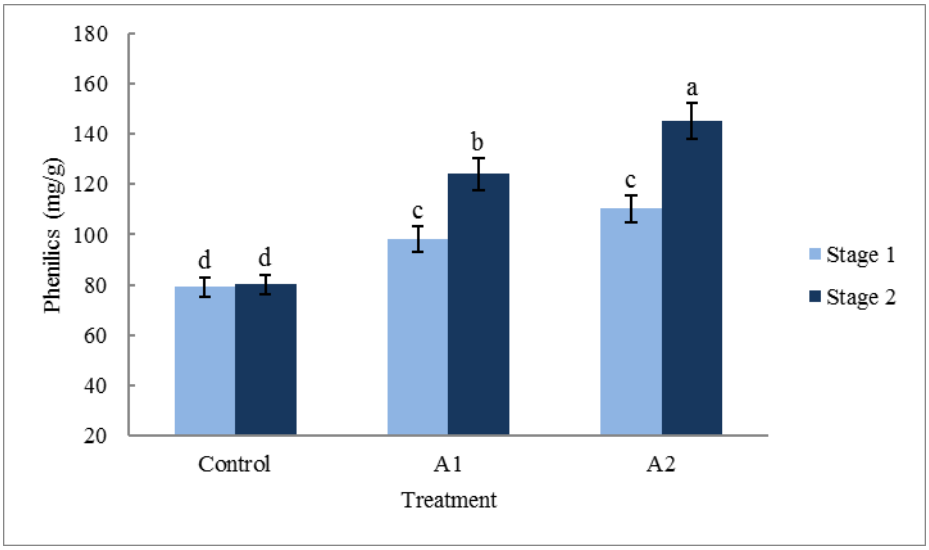

Figure 3. Effect of different concentrations of arginine on the total phenolic content in the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

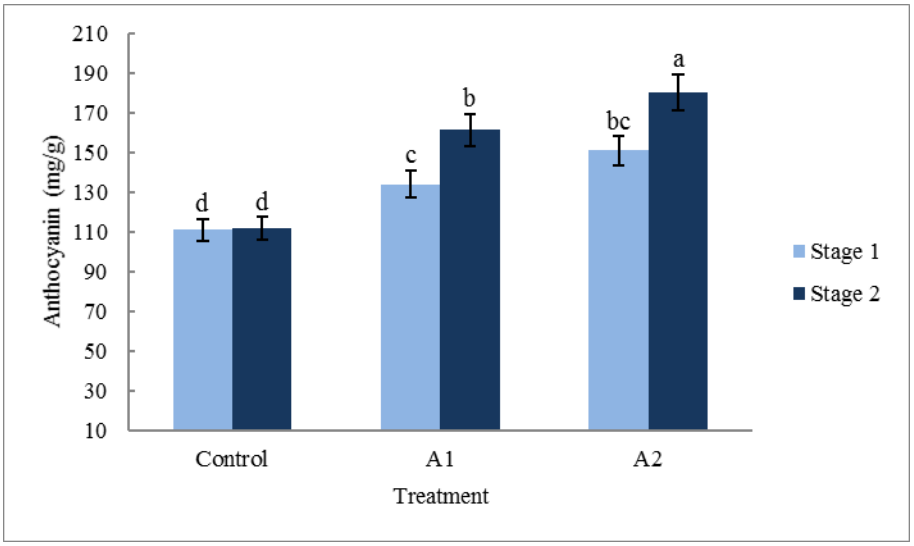

Figure 4. Effect of different concentrations of arginine on the amount of anthocyanin in the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

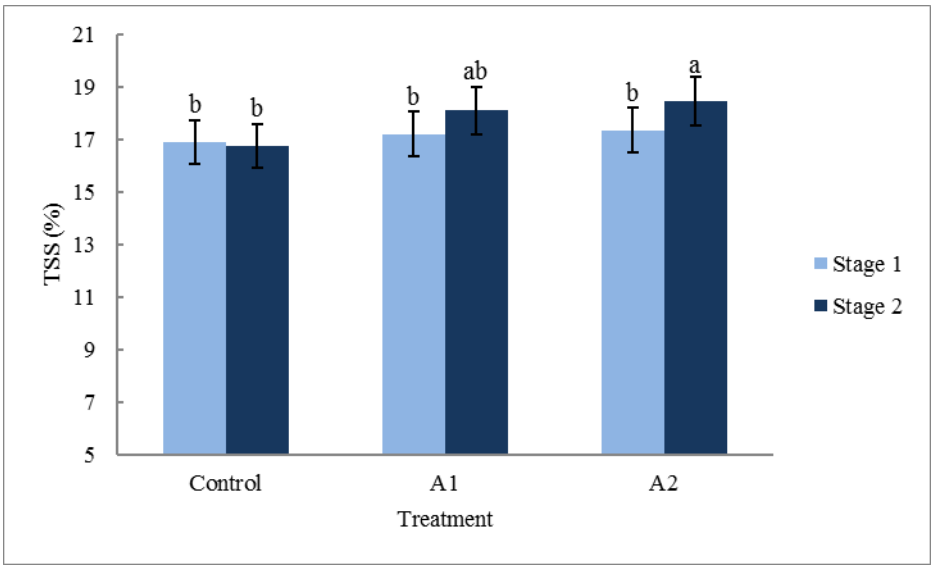

Figure 5. Effect of different concentrations of arginine on total soluble solids (TSS) in the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

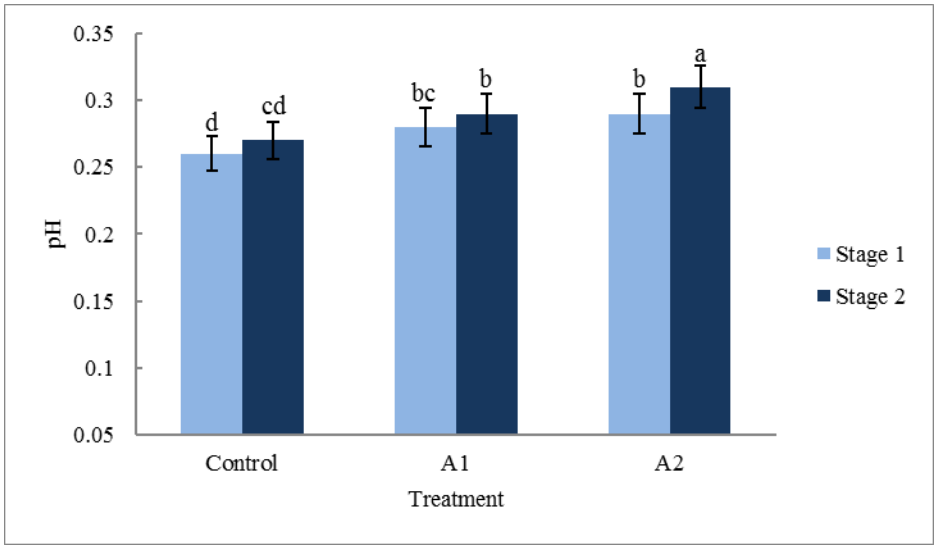

Figure 6. Effect of different concentrations of arginine on pH of the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

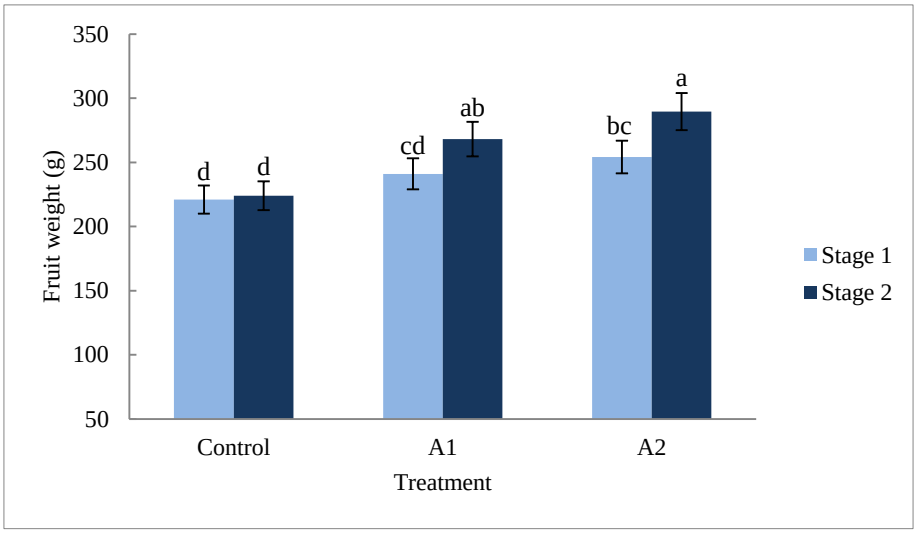

Figure 7. Effect of different concentrations of arginine on the fruit weight of the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

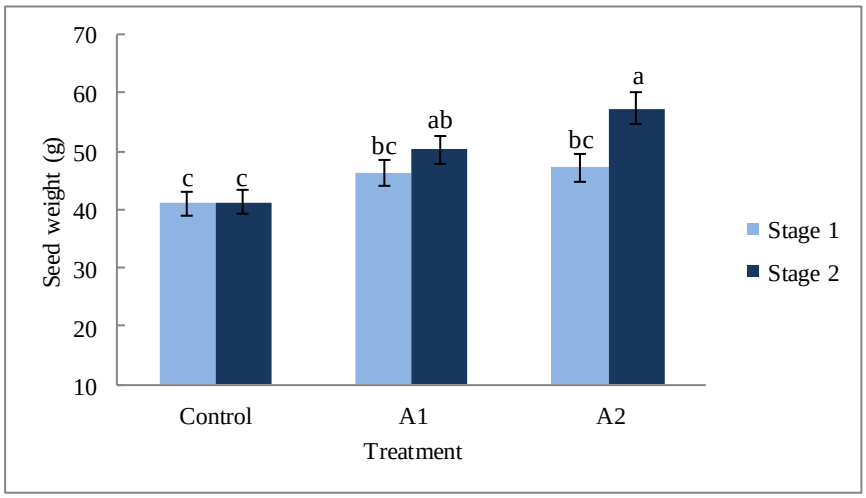

Figure 8. Effect of different concentrations of arginine on the seed weight of the mango fruits at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2). A_1: 200 µM, A_2: 400 µM

Discussion

The results of this experiment showed that the use of arginine increased the fruit weight, seed weight, and chemical properties of the mango fruit. Arginine acts as the precursor of the polyamines in plants (Winter *et al.* 2015) and polyamines play important roles in regulating plant growth and developmental processes and fine-tuning defense mechanisms against environmental stresses (Winter *et al.* 2015; Chen *et al.* 2019). Arginine helps in the better synthesis of chlorophyll and improves photosynthesis (Yagi and Al-Abdulkareem 2006). Also, arginine stimulates the synthesis of phytohormones related

to flowers and fruits (Tarenghi and Martin-Tanguy 1995). According to Mostafa *et al*. (2010), foliar application of arginine showed a significant increase in the growth and yield-related traits in wheat. Hassanein *et al*. (2008) reported that arginine was effective in improving the growth and yield in wheat at the high-temperature stress conditions. Mohseni *et al.* (2017) also reported an increase in the fruit weight of the strawberry cultivar Paros when treated with arginine. Nassar *et al.* (2003) reported that the application of arginine (as a putrescine precursor) increased plant growth, and fresh weight, dry weight, and length of roots and shoots in faba beans.

In this study, the application of arginine raised the activity of SOD, CAT, and APX antioxidants, and the application of 400 µM arginine had the highest positive effects on the activity of these enzymes. During fruit ripening, overproduction of ROS causes oxidative damage, thereby reducing the ability of the antioxidant system to remove the free radicals such as H_2O_2 and O^{2-} (Jimenez *et al*. 2002). The formation of several antioxidative enzymes, such as SOD, POX, and CAT, and non-enzymatic antioxidants like beta-carotene and ascorbic acid prevents the accumulation of ROS (Hodges *et al*. 2004). Polyamines protect the membranes from ROS injury (Verma and Mishra 2005). Polyamines act against H_2O_2 and O^{2-} by the induction of APX, CAT, SOD and other enzymes. Increase in the activity of these enzymes plays a key role in controlling ROS and provide protection for the degradation of biomolecules against oxidative damage (Verma and Mishra 2005). According to Razzaq *et al*. (2014), putrescine application on the 'Samar Bahisht Chaunsa' mango delayed fruit softening due to the suppression of the ethylene production and increasing the activities of antioxidans such as SOD, POX, and CAT.

Arginine improved total phenolics, anthocyanins, carotenoids, TSS, and pH of the mango fruits in this study that is in concordance with the results in several crops (Nassar *et al.* 2003; Nasibi *et al.* 2011; Mohseni *et al.* 2017). According to Nasibi *et al*. (2011), treating the tomato plants with arginine increased the soluble sugars. The effect of arginine on the strawberry cultivar Paros resulted in an increase in the amount of phenolic compounds, anthocyanins, and TSS (Mohseni *et al*. 2017). Arginine increased the amount of carotenoids in faba beans compared with the control plants (Nassar *et al*. 2003). The existence of an appreciable amount of total phenolic content in mango may increase the intake of the antioxidants in the diet (Scalbert and Williamson 2000).

Conclusion

Treating fruits of mango with 200 and 400 µM arginine at the time of fruit formation (stage 1) and ten days after stage 1 (stage 2) resulted in the improvement of fruit weight, seed weight, anthocyanins, carotenoids, pH, phenolics, TSS, and antioxidant compounds. Treatment of arginine at concentration of 400 µM at the stage 2 was most effective in improving the quality and quantity of mango fruits.

Conflict of Interest

The authors declare that they have no conflict of interest with any people or organization concerning the subject of the manuscript.

References

ABE A, Murata T, and Hirota A, 1998. Novel DPPH radical scavengers, bisorbicillinol and demethyltrichodimerol, from a fungus. Bioscience, Biotechnology, and Biochemistry 62(4): 661-666.

Bally ISE, Ibell P, Kare M, Wright C, Mizani A, and Wilkie J, 2020. Benefits of intensive production systems in mango. Acta Horticulturae 1281: 493-498.

Bradford MM, 1976. A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding. Analytical Biochemistry 72: 248-254.

Chen H, McCaig BC, Melotto M, He SY, and Howe GA, 2004. Regulation of plant arginase by wounding, jasmonate, and the phytotoxin coronatine. Journal of Biological Chemistry 279(44): 45998-46007.

Chen D, Shao Q, Yin L, Younis A, and Zheng B, 2019. Polyamine function in plants: metabolism, regulation on development, and roles in abiotic stress responses. Frontiers in Plant Sciences 9: 1945.

do C Mouco MA, de Lima MAC, da Silva AL, dos Santos SCA, and Rodrigues FM, 2009. Amino acids on mango yield and fruit quality at Submedio Sao Farncisco Region, Brazil. Aca Horticulturae 820: 437-442.

El-Bassiouny HMS and Bekheta MA, 2001. Role of putrescine on growth, regulation of stomatal aperture, ionic contents and yield by two wheat cultivars under salinity stress. Egyptian Journal of Physiological Sciences 26(1-3): 95-114.

Gao X, Ohlander M, Jeppsson N, Bjork L, and Trajkovski V, 2000. Changes in antioxidant effects and their relationship to phytonutrients in fruits of sea buckthorn (*Hippophaerhamnoides* L.) during maturation. Journal of Agricultural and Food Chemistry 48(5): 1485-1490.

Halliwell B, 1996. Oxidative stress, nutrition and health. Experimental strategies for optimization of nutritional antioxidant intake in humans. Free Radical Research 25(1): 57-74.

Hassanein RA, Khalil SI, El–Bassiouny HMS, Mostafa HAM, El–Khawas SA, and Abd El–Monem AA, 2008. Protective role of exogenous arginine or putrescine treatments on heat shocked wheat plant. 1st International Conference on Biological and Environmental Sciences, March 13-16, Hurghada, Egypt.

Hodges DM, Lester GE, Munro KD, and Toivonen PMA, 2004. Oxidative stress: importance for postharvest quality. HortScience 39(5): 924-929.

Jimenez A, Creissen G, Kular B, Firmin J, Robinson S, and Verhoeyen M, 2002. Changes in oxidative processes and components of the antioxidant system during tomato fruit ripening. Planta 214(5): 751-758.

Jones DL, Healey JR, Willett VB, Farrar JF, and Hodge A, 2005. Dissolved organic nitrogen uptake by plants-an important N uptake pathway? Soil Biology and Biochemistry 37(3): 413-423.

Khalil SI, El-Bassiouny HMS, Hassanein RA, Mostafa HA, El-Khawas SA and Abd El-Monem AA, 2009. Antioxidant defense system in heat shocked wheat plants previously treated with arginine or putrescine. Australian Journal of Basic and Applied Sciences 3(3) 1517-1526.

Kim H, Moon JY, Kim H, Lee DS, Cho M, Choi HK, Kim YS, Mosaddik A, and Cho SK, 2010. Antioxidant and antiproliferative activities of mango (*Mangifera indica* L.) flesh and peel. Food Chemistry 121(2): 429-436.

Lebaka VR, Wee YJ, Ye W, and Korivi M, 2021. Nutritional composition and bioactive compounds in three different parts of mango fruit. International Journal of Environmental Research and Public Health 18(2):741.

Li CZ, Jiao J, and Wang GX, 2004. The important roles of reactive oxygen species in the relationship between ethylene and polyamines in leaves of spring wheat seedlings under root osmotic stress. Plant Science 166(2): 303-315.

Lichtenthaler HK, 1987. Chlorophylls and carotenoids: pigments of photosynthetic biomembranes. Methods in Enzymology 148: 350-382.

Malundo TMM, Shewfelt RL, Ware GO, and Baldwin EA, 2001. Sugars and acids influence flavor properties of mango (*Mangifera indica*). HortScience 126(1) :115-121.

Manthey JA and Perkins-Veazie P, 2009. Influences of harvest date and location on the levels of β-carotene, ascorbic acid, total phenols, the in vitro antioxidant capacity, and phenolic profiles of five commercial varieties of mango (*Mangifera indica* L.). Journal of Agricultural and Food Chemistry 57(22): 10825-10830.

Mohseni F, Pakkish Z, and Panahi B, 2017. Arginine impact on yield and fruit qualitative characteristics of strawberry. Agriculturae Conspectus Scientificus 82(1): 19-26.

Mostafa HAM, Hassanein RA, Khalil SI, El-Khawas SA, El-Bassiouny HMS, and Abd El-Monem AA, 2010. Effect of arginine or putrescine on growth, yield and yield components of late sowing wheat. Journal of Applied Sciences Research 6(2): 177-183.

Mukerjee PK, 1959. Biochemical and physiological studies during development of mango fruit. Hortic. Adv. 3: 95-101.

Nasibi F, Yaghoobi MM, and Manouchehri Kalantari K, 2011. Effect of exogenous arginine on alleviation of oxidative damage in tomato plant under water stress. Journal of Plant Interactions 6(4): 291-296.

Nassar AH, El-Tarabily KA, and Sivasithamparam K, 2003. Growth promotion of bean (*Phaseolus vulgaris* L.) by a polyamine–producing isolate of *Streptomyces griseoluteus*. Plant Growth Regulation 40: 97-106.

Razzaq K, Sattar Khan A, Ullah Malik A, Shahid M, and Ullah S, 2014. Role of putrescine in regulating fruit softening and antioxidative enzyme systems in 'Samar Bahisht Chaunsa' mango. Postharvest Biology and Technology 96: 23-32.

Scalbert A and Williamson G, 2000. Dietary intake and bioavailability of polyphenols. The Journal of Nutrition 130: 2073S-2085S.

Tarenghi E and Martin-Tanguy J, 1995. Polyamines, floral induction and floral development of strawberry (*Fragaria ananassa* Duch.). Plant Growth Regulation 17: 157-165.

Verma S and Mishra SN, 2005. Putrescine alleviation of growth in salt stressed *Brassica juncea* by inducing antioxidative defense system. Journal of. Plant Physiology 162: 669-677.

Winter G, Todd CD, Trovato M, Forlani Gm and Funck D, 2015. Physiological implications of arginine metabolism in plants. Frontiers in Plant Science 6: 534.

Yagi MI and Al-Abdulkareem SS, 2006. Effects of exogenous arginine and uric acid on Eruca sativa Mill shoots grown under saline conditions. Journal of Science and Technology 7: 1-15.

Yim MB, Kang JH Yim HS, Kwak HS, Chock PB, and Stadtman ER, 1996. A gain-of-function of an amyotrophic lateral sclerosis-associated Cu,Zn-superoxide dismutase mutant: an enhancement of free radical formation due to a decrease in Km for hydrogen peroxide. Proceedings of the National Academy of Sciences USA 93(12): 5709-5714.

Zeid IM, 2009. Effect of arginine and urea on polyamines content and growth of bean under salinity stress. Acta Physiologiae Plantarum 31: 65-70.

Zieslin N and Ben Zaken R, 1993. Peroxidase activity and presence of phenolic substances in peduncles of rose flowers. Plant Physiology and Biochemistry 31(3): 333-339.

تأثیر کاربرد خارجی اسید آمینه آرژنین بر برخی ویژگی‌های کیفی و فعالیت آنتی‌اکسیدانی در میوه‌های انبه (*Mangifera indica*)

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چکیده:
پلی فنول‌ها، کاروتنوئیدها و آنتوسیانین‌های موجود در میوه‌ها و سبزیجات به دلیل اثرات آنتی‌اکسیدانی بیشتر مورد توجه قرار گرفته‌اند. این ترکیبات در پیشگیری از بیماری‌ها و حفظ سلامت انسان نقش دارند. اسیدهای آمینه برای حفظ و افزایش کیفیت میوه‌ها استفاده شده‌اند. در این آزمایش، میوه‌های عنبه با اسید آمینه آرژنین در غلظت‌های ۰، ۲۰۰ و ۴۰۰ میکرومولار تیمار شدند. میوه‌های رقم محلی در دو مرحله شامل زمان تشکیل میوه و ۱۰ روز پس از مرحله اول سم پاشی شدند. تاثیر آرژنین بر کل فنول‌ها، آنتوسیانین‌ها، ظرفیت اکسیدانی، کاروتنوئیدها، کل مواد جامد محلول، pH، وزن میوه و دانه در انبه مورد بررسی قرار گرفت. نتایج نشان داد که صفات اندازه‌گیری شده با افزایش غلظت آرژنین افزایش می‌یابند. آرژنین ۴۰۰ میکرومولار منجر به بهبود کل فنولیک‌ها، آنتوسیانین‌ها، ظرفیت آنتی‌اکسیدانی، کاروتنوئیدها، کل مواد جامد محلول، pH میوه و وزن دانه در میوه‌های انبه شد. مقایسه زمان کاربرد آرژنین نشان داد که ۱۰ روز پس از تشکیل میوه به طور کلی موثرتر از مرحله اول در بهبود صفات مورد مطالعه بود.

واژه‌های کلیدی: آرژنین؛ انبه؛ آنتی اکسیدان؛ کیفیت میوه