Journal of Applied Science and Agriculture, 9(17) November 2014, Pages: 9-12

AENSI Journals

Journal of Applied Science and Agriculture

ISSN 1816-9112

Journal home page: www.aensiweb.com/JASA

# The Influences of Proline on Fruit Qualitative Properties of *Actindiadeliciosa cv. hayward*

[1]Mehran Mahmoudi, [2]Saeed Samavat, [3]Mostafa Mostafavi, [4]Ahmad Khalighi and [5]Ali Cherati

[1]*Department of Horticulture, Faculty of Agriculture, Science and Research Branch, Islamic Azad University, Tehran, Iran.*
[2]*Sientific Member for The Research Centre of Soil and Water,Karaj,Iran.*
*3&4. Department of Horticulture,Faculty of Agriculture,Science and Research Branch, Islamic Azad University, Tehran, Iran.*
[5]*Sientific Member for The Research Centre of Natural Resources and Agriculture, Sari, Iran.*

ARTICLE INFO

*Article history:*
*Received 1 September 2014*
*Received in revised form 25 October 2014*
*Accepted 31 October 2014*
*Available online 5 November 2014*

*Keywords:*
*Actindiadeliciosa, Fruit, Hayward, Proline,Quality*

ABSTRACT

The influences of foliar application of proline on fruit qualitative properties of kiwifruit grown at a vineyard in chalouswere examined.dissolved proline wassprayed on the leaves of vines three times, before anthesis, after fruit set and fruit developing stage. The application doses of prolinewere 0, 0.1% and 0.2%.Each application consists of four replications and theexperiment was conducted in complete randomized factorial design in order to measure fiber, total sugar, pH, soluble solid content, dry matter, protein, vitamine c and flesh firmness of fruit. the statistical datas and the mentioned diagrams of comparative means showed that prolineincreased total sugar, soluble solid content, protein, vitamine c, fruit firmness and pH of fruit,butdecreased thefibre and dry matter of fruit. Also, the dose of proline0.1% decreased the pH of fruit.



**To Cite This Article:** Mehran Mahmoudi, Saeed Samavat, Mostafa Mostafavi, Ahmad Khalighi and Ali Cherati., The Influences of Proline on Fruit Qualitative Properties of *Actindiadeliciosa cv. hayward*. ***J. Appl. Sci. & Agric.,*** *9(17): 9-12, 2014*

## INTRODUCTION

Many laboratory and glasshouse studies have shown that organic fertilizers increase the growth and development of fruits due to uptake of mineral nutrients (Alam, 1994). Some studies show that foliar and root application of commercial amino acids led to a betterdevelopmentof plants (Shamsul, 2012, Cerdán *et al*., 2006).Generally,fruitquanlityis characterised by high amounts of total sugar, soluble solid content, protein, vitamine c and else which have positive effects on the palatablity of fruit by consumers(Thakurand Chandel, 2004, Nishiyama *et al*., 2008).Fruitqualitative properties are increasedby adding amino acid fertilizers to plants, because of the excess uptake of potentially nutrients and decreasing negative effects of inhibited uptake of essential mineral nutrients(Oliviera *et al*., 1998, Ahmad*et al*.,2010). Briefly, adding proline increases the physiological activities of plants andpositively affects the development of fruit and improving thefruit quality (Shehata *et al*.,2011, Han *et al*.,2004).Since amino acids may enhance uptake of some mineral nutrients and reduce the uptake of certain toxic elements, one might reason that application of Proline could improve and increase the fruit quality (El- Kosary *et al*., 2011; Kishor *et al*., 2005). However, there is a lack of research regarding Proline application and its effects on fruitquality of Kiwifruit.Therefore,The aim of this research was to study the influence of Proline on the fruit qualitative properties of Kiwifruit.

## MATERIAL AND METHODS

The soil used in this study was collected from 0–30 cm depth of the field located in Chalous and the vineswere 10 years.The field experiment was conducted in a vineyardin complete randomized factorial design with three foliar application doses of proline (0, 0.1, and 0.2%) and Each application consists of four replications.eachvine was irrigated with tap water during the experiment.Theapplied prolinewas prepared from Biochemicscompany (Netherlands).Prolinewas sprayed three times on the leaves of vines (before anthesis, after fruit set and during fruit developing stage).Finally,protein by kjeldahl method (Bremner,1965), total sugar byphehling method, pH by pHmeter, soluble solid content by refractometer, dry matter by oven, vitamine c by 2&6 dichlorophenol-endophenol method, ash by electric kiln and flesh firmness by pressuremeterwere obtained (A.O.A.C,1990). The statistical analysis was performed using SAS, MSTATC statistical softwares,and mean values were grouped with duncanmultiple range test ($P < 0.05$).

**Corresponding Author:** Mehran Mahmoudi, Department of Horticulture, Faculty of Agriculture, Science and Research Branch, Islamic Azad University, Tehran, Iran.
E-mail: mehran.mahmoudi@yahoo.com

**Journal of Applied Science and Agriculture, 9(17) November 2014, Pages: 9-12**

## RESULTS AND DISCUSSION

*3-1- Fruit protein:*

According to the tables of comparative means, proline application increased the measurement of protein which the most amounts of protein by the treatment of proline 0.2% and the least amount of protein by control treatment obtained (table2). The application of prolineincreases the fruit protein by increasing nitrate absorbtion and result in high protein of fruits. These results corroborate findings of Yuan *et al*. (2009), Jin-xing *et al*. (2011)and Akingi *et al*. (2009).

*3-2- Dry matter:*

According to the tables of comparative mean, prolineapplication decreased the dry matter which the most amounts of dry matter by the treatment of control treatment and the least amount of dry matter by proline0.2% obtained (table2). The application of prolinedecreases the fruit dry matter by changing insoluble compositions to soluble ones and result in lower dry matter of fruits.These results approves findings of Thakur and chandel (2004),Ahmad *et al*. (2010)and Mogda and Ayman (2012).

*3-3- Fruit fiber:*

According to the tables of comparative mean, prolineapplication decreased the fruit fiber which the most amounts of fruit fiber by control treatment and the least amount of fiber by the treatment of proline0.2% obtained (table2). The application of prolineincreases the metabolic activities, energy saving and cell permitance and result in more decomposition of fruit fiber. These results approves findings of Gaddalah (1999)and Shamsul (2012).

*3-4- Total sugar:*

According to the tables of comparative mean, prolineapplication increased the total sugar which the most amounts of sugar by the treatment of proline0.1% and the least amount of total sugar by the control treatment obtained, and there is no difference between proline0.2% and proline0.1% (table2).The application of prolineincreases to decomposition of polysaccharids like starch and turn them out to the reduced sugar of fruits like glucose and fructose. These results corroborate findings of Han *et al*. (2004), Nishiyama *et al*., (2008) and cecilia *et al*. (2008).

*3-5- Vitamine c:*

According to the tables of comparative means, prolineapplication increased the measurement of vitamine c which the most amounts of vitamine c by the treatment of proline0.1% and the least amount of vitamine c by control treatment obtained (table2). The application of prolineincreases the fruit measurment of vitamine c by increasing photosynthesis and respiration and result in high vitamine c of fruits. These results approves findings of Molazem *et al*. (2010), Du *et al*. (2009)and serraj and sinclair (2007).

*3-6- Flesh firmness:*

According to the tables of comparative mean, prolineapplication decreased the fruit flesh firmness which the most amounts of flesh firmness by the treatment of proline 0.1% and the least amount of flesh firmness by the control treatment obtained (table2). The application of prolineincreases the fruit flesh firmness by increasing enzymatic activities like invertase and amylase and result in decomposition of polysaccharids of cell wall and softening fruits.These results approves findings of Gaddalah (1999)and Sumalee (2011).

*3-7- Soluble solid content (brix):*

According to the tables of comparative mean, prolineapplication increased the fruit soluble solid content (brix) which the most SSC by the treatment of proline0.2% and the least amount of brix by the control treatment obtained (table2). The application of prolineincreases the SSC by increasing chlorophyll and photosynthesis. These results approves findings of Robert*et al*. (2000)and Silke *et al*. (2010).

*3-8- pH:*

According to the tables of comparative mean, prolineapplication increased the pH which the least amount of pH by the treatment of proline0.1% and the most amount of pH by control treatment obtained that had no significant different with the treatment of proline0.2% (table2). The application of prolinechanges the fruit pH by changing the organic acids of fruits. These results approves findings of Shehata *et al*. (2011) , Crisosto (2001) and Ashraf and Foolad (2007).

**Journal of Applied Science and Agriculture, 9(17) November 2014, Pages: 9-12**

*Conclusion:*

Our results show that the application of proline improves some qualitative properties of fruits like vitamine c, total sugar, soluble solid content, protein and decreases some qualitative properties like fruit fiber, dry matter and flesh firmness. Also, proline0.1% decreases the pH of *Actindiadeliciosa cv. Hayward.*

**Table A:** Analysis of variance of proline on qualitative properties of fruit

| | protein | vitamine c | pH | ssc | firmness | fiber | dry matter | sugar |
|---|---|---|---|---|---|---|---|---|
| Replicant | 0.065* | $133.3^{ns}$ | $0.112^{ns}$ | $3.33^{ns}$ | $11.11^{ns}$ | $0.084^{ns}$ | $0.334^{ns}$ | $1.76^{ns}$ |
| Treat | 0.364** | 899.20** | 0.561** | 13.48** | 44.82** | 0.833** | 0.834** | 12.86** |
| Error | 0.0266 | 266.66 | 0.166 | 2.23 | 16.7 | 0.067 | 0.576 | 2.66 |
| Cv | 15.34 | 13.21 | 12.81 | 2.25 | 4.53 | 3.51 | 1.77 | 11.73 |

Ns,*,**Nonsignificant , significant at P = 0.05 and 0.01, respectively

**Table B:** Comparision of means of proline on qualitative properties of fruit

| treatment | sugar(%) | vitaminec (mg/100gr) | pH | ssc(%) | firmness(kg) | fiber(%) | dry matter (%) | protein(%) |
|---|---|---|---|---|---|---|---|---|
| p1 | 14.90a | 129b | 3.13a | 15.50a | 16.46b | 1.56c | 3.66c | 1.02a |
| p2 | 14.60a | 144a | 3.00b | 14.80b | 19.49a | 1.74b | 3.94b | 0.90b |
| Control | 12.80b | 106c | 3.15a | 13.00c | 16.05c | 1.85a | 4.20a | 0.77c |

P1&P2= Proline 2&1g/l, respectively

## REFRENCES

Ahmad, C.B., B.B. Rouina, S. Sensoy, F.B. Boukhrissm, Abdullah, 2010. Exogenous proline effects on photosynthetic performance and antioxidant defense system of young olive trees. J Agric Food Chem., 58: 4216-4222.

Alam, S.M., 1994, Nutrient by plant under stress condition.Handbook of Plant and Crop Stress. Marcel Dekker, NewYork, 227-246.

A.0.A.C. 1990. Official methods of analysis.Association of official analytical chemists, Incorporated. Virginia.

Ashraf, M and M.R. Foolad, 2007. Roles of proline in improving plant abiotic stress resistance. Environ Exp Bot, 59: 206-216.

Bremner, J.M., 1965. Total nitrogen.In: Black, C.A.(Ed.), Methods of Soil Analysis. Am. Soc. Agron., Madison, pp: 1149-1178.

Cecilia, P., C. Fatima, S. Vieira, F. Santos, N. neves, F. curado, J. fran co, Rodrigues, D. Antunes, 2008. Influence of nitrogen and potassium on yield, fruit quality and mineral composition of kiwi.international journal of energy and Environment.Issue1,volume 2.

Cerdán, M., S.A. Sánchez, M. Oliver, M. Juárez, A.J.J. Sánchez, 2006. Effect of foliar and root application of amino acid on iron uptake by tomato plants.Acta Hort., 830: 481-488.

Crisosto, C.H. and G.M. Crisosto, 2001. Understanding consumer acceptance of early harvested Hayward kiwifruit. Postharvest Biology and Technology, 22: 205-213.

polyphenol and vitamin c in *Actindia*fruits.Food Chem.113: 557-562.

EL-Kosary, S., I. El-Shenawy and S. Redwan, 2011. Effects of microelements, amino and humic acids on growth, flowering and fruiting of some mango cultivars. Journal of Horticultural Science &Ornamentaln plants, 3(2): 152-161.

Gadallah, M.A.A., 1999. Effects of Proline and Glycinebetaine on Bean Responsesto Salt Stress.BiologiaPlantarum, 42(2): 249-257.

Giancarlo, B., B. Antonella, Emilio Di Stasio, 2011. The effects of proline application on protein synthesis and quality of *Erucasativa*.ScientiaHorticulturae, 128: 393-400.

Han, C.Y., S.W. Zhao, M.G. Traber, 2004. Edible coatings to improvestorability and enhance nutritional value of fresh and frozenstrawberries and raspberries. Postharvest Biol. Tech, 33: 67-78.

Jin-xing, C., C. Jun-qing, B. Zhai And Z. Zhao, 2011. Effects of compound amino acid-iron fertilizer on fruit quality of kiwifruit. Natural Science, 39(12): 119-123.

Kishor, K., S. Sangam, N. Amrutha and K. Nahid, 2005. Regulation of proline biosynthesis, degradation, uptake and transport in higher plants, current science, 88(3): 424-438.

Mogda. M., and E.S. Ayman, 2012. Effect of humic acid and amino acids on pomegranate trees under deficit irrigation. Journal of Horticultural Science & ornamental plants, 4(3): 253-259.

Molazem, D., E.M. Qurbanov and S.A. Dunyamaliyev, 2010. Role of Proline, Na and chlorophyll content in salt tolerance of corn. American- Eurasian J. Agric & Environ. Sci., 9(3): 319-324.

Morton, Julia, 1996. kiwi fruit. California Rare Fruit Growers, Inc.

Nishiyama, I., T. Fukuda, A. Shimohashi, T. Oota, 2008. Sugar and organic acid composition in the fruit juice of different *Actinidia*varieties.Food Sci.Tech. Res., 14: 67-73.

Olviera-Neto, B., A.T.J. Damasceno and J. Tarquinio prisco, 1998. Effect of Nacl salinity on the expression of cotyledonary amylase from vignaunguiculata.RevistaBrasileira de fisiologia vegetal., 10: 97-100.

Razavi, S.M., M.B. Parvar, 2007. Some physical and mechanical propertiesof kiwifruit. Int. J. Food Engr. 3(6,3): 1-14.

Robert, B.J., F.W. Eric and J.S. Richard, 2000. Postharvest fruit density as an indicator of dry matter and ripened soluble solids of Kiwifruit. Postharvest Biol. and Technol, 20: 163-173.

Serraj, R., T.R. Sinclair, 2002. Osmolyteaccumulation:canitrealy help increase crop yield under drought conditions?Plant Cell Environ, 25: 333-341.

Shamsul Hayat, Qaiser Hayat, Mohammed Nasser Alyemeni, Arif Shafi Wani, John Pichtel and Aqil Ahmad, 2012. Role of proline under changing environments. signaling & behavior, 7(11): 1456-1466.

Shehata, S.A., A.A. Gharib, M. Mohamed, El. Mogy, K.F. AbdelGawa and Emad. A. Shalaby, 2011. Influence of compost, Amino acids and Humic acids on the Growth,Yield and Chemical Parameters of Strawberries.Journal of Medicinal Plants Research, 5(11): 2304-2308.

Silke, S., Heinzmann, K. Jeremi and C. Queen, 2010. Metabolic profiling strategy for discovery of nutritional biomarkers: prolinebetaine as a marker of citrus consumption. American Society for Nutrition., 92 (2): 436-443.

Sumalee Chook, H., 2011. The Effect of Salt Stress on Growth, Chlorophyll content,Proline Content and Antioxidative Enzyme of Pepper Seedling. European Journal of Scientific Research, 49(1): 103-109.

Thakur, A and J.S. Chandel, 2004. Effects of thinning on fruit yield, size, and quality of kiwifruit cv. Allison. Acta Hort., 175: 115-119.

Yuan, H., B. Zhilong, L. Zhixiong and W. Weijuan, 2009. Protective role of proline against salt stress in cucumber,Japanese journal of soil & plant nutrition, 55: 698-704.