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Small Island Developing States”**

**“Realidad y Potencial de la Seguridad Alimentaria y la Diversificación
Agrícola en Pequeños Estados Insulares en Desarrollo”**

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POST-HARVEST TREATMENT WITH AMINOETHOXYVINYLGLYCINE (AVG) AND STORAGE TEMPERATURES AFFECT PEACH SHELF LIFE

J. Pablo Morales-Payán, María del Carmen Librán, Department of Crops and Agro-environmental Sciences, College of Agricultural Sciences. University of Puerto Rico, Mayagüez Campus. P.O. Box 9030, Mayagüez P.R. 00681-9030, morales.payan@upr.edu, josepablomorales@yahoo.com, and Evelio Hernández, Agric. Exp. Station, University of Puerto Rico, Mayagüez Campus.

ABSTRACT: Experiments were conducted in Mayagüez, Puerto Rico, to assess the effect of the physiological regulator aminoethoxyvinylglycine (AVG) as a post-harvest treatment on a low-chill peach variety grown in Puerto Rico. Fruits of 'FlordaPrince' were harvested at the 40% green peel color stage and dipped in AVG aqueous solutions (0 and 300 mg/L) for 120 or 300 seconds, allowed to air-dry, and stored at 10 or 20 °C. Five days after exposure to AVG, fruit weight loss, external coloration, acidity, and soluble solids were determined. When fruits were stored at 10° C, there was no detectable difference between AVG-treated and control fruits. However, when stored at 20° C, by five days after treatment fruits exposed to AVG for either two or five minutes were firmer than control fruits. These results indicate that, under the conditions of this research, the benefit of post-harvest AVG treatment in melting flesh peach depended more on post-treatment temperature than on time of exposure to AVG.

Keywords: Caribbean agriculture, Fruit crops, Low-chill requirement, Organic, Post-harvest

INTRODUCTION

Peach (*Prunus persica*) varieties with low chill requirements have been introduced into Puerto Rico as a potential alternative crop for the highlands. Several of those varieties, including 'FlordaPrince', thrive in Puerto Rico and produce fruits of good quality (Librán et al., 2005; Padilla-Paez & Morales-Payán, 2008; Ramos et al., 2008). By definition, peach fruits of melting flesh varieties such as 'FlordaPrince' undergo ripening rapidly after harvest and must be kept in cold storage to prolong their marketable life. Because of the delicate peel and rapid deterioration of tropic-grown peach fruits after harvest, it is important to develop practices that extend the fruit post-harvest life challenge. Hence, retarding peach ripening for several more days may be economically important for post-harvest handlers.

The physiological regulator aminoethoxyvinylglycine (AVG) has been shown to retard ripening in various fruits, including peach. However, most of the documented effects of AVG in fruits relate to pre-harvest treatment (Begroli et al., 2002; Torrigiani et al., 2004; Vizzotto et al., 2002), which may be less target-specific and may necessitate more product than post-harvest treatment.

In a related study, the authors found that in 'FlordaPrince' peaches (harvested at the 50% green peel color) treated with aqueous solutions of AVG (0, 100, 500 parts per million) for 300 seconds and stored at cool temperature (20° C), AVG treatment helped retain fruit firmness and retarded fruit weight loss (Morales-Payan et al., 2009). Nevertheless, the effects of storage temperatures after exposure to AVG are largely unknown. The objective of this research was to assess the effects of post-harvest exposure to AVG and subsequent storage temperatures on the quality of 'FlordaPrince' peach fruits grown in Puerto Rico

MATERIALS AND METHODS

In the spring of 2009, fruits of 'FlordaPrince' were harvested from the University of Puerto Rico peach orchards at the Agricultural Experiment Station in Adjuntas, Puerto Rico (594

meters above sea level). Fruits harvested at the 40% green peel color stage were used for this experiment.

The fruits were taken to the laboratory and dipped in aqueous solutions of AVG (0 and 300 parts per million) for 120 or 300 seconds. After exposure to AVG, the fruits were allowed to air-dry and then were stored for five days at either 10 or 20 °C. After the 5-d cold storage, standard procedures (Crisosto, 2006) were used to determine fruit firmness, weight loss, acidity, and soluble solids on five fruits for each treatment. Analysis of variance and separation of means (Least Significant Difference, 5% significance level) were conducted on the resulting data.

RESULTS AND DISCUSSION

Time of exposure (120 and 300 seconds) to AVG did not result in significant differences in response to AVG rates (0 and 300 parts per million). However, fruit quality attributes were affected by AVG rates and storage temperature.

Fruits stored at 10° C ripened faster than fruits stored at 20° C. When stored at 10° C for five days, there were no significant differences between fruits not exposed to AVG and fruits exposed to AVG at 300 mg/L (regardless of duration of exposure, 120 or 300 seconds). In contrast, when fruits were stored at 20° C for five days, there were no significant differences in quality variables caused by duration of exposure to AVG (120 or 300 seconds)(Table 1). The effect of storage temperatures may be partially attributable to higher respiration rates and enzymatic activity at 20° C than at 10° C, all of which has been documented in peach (Crisosto, 2006) and other fruits such as banana (Bhande et al., 2007), strawberry (Shin et al., 2008), avocado (Quezada, 2005), and tomato (Ilić et al., 2009).

Exposure to AVG followed by storage at 20° C did not significantly affect fruit weight loss, acidity, or soluble solid content. However, exposure to AVG significantly reduced loss of firmness (by approximately 50%) as compared to that of 'Flordaprince' fruits not treated with AVG stored at 20° C (Figure 1). These results are similar to those reported by the authors for 'Flordaprince' peach fruits harvested at the 50% green peel stage and exposed to AVG. In that study, by seven days after treatment application, AVG-treated fruits were firmer and had lost less weight than fruits not treated with AVG (Morales-Payán et al., 2009).

In summary, in this research, response to AVG was not significantly affected by duration of exposure (120 or 300 seconds), but storage temperature was a determining factor in the response of 'Flordaprince' fruits to AVG treatment. There was little benefit to AVG treatment when fruits were stored at 10° C, but fruits stored at 20° C were firmer at five days after treatment than untreated fruits. Because AVG-treated 'Flordaprince' fruits retained firmness better than control fruits, without other quality factors being affected, AVG treatment in post-harvest may be useful in extending the post-harvest life of the fruit. Future research will focus on exploring other temperature regimens after exposure to AVG, and on other post-harvest ripening regulators.

Table 1. Selected fruit quality attributes of 'Flordaprince' peach after post-harvest exposure to AVG (dipping for 120 seconds in aqueous solution at 300 parts per million) followed by storage for five days at 20° C. Percentage expresses the highest value for each attribute. Values followed by the same letter are not significantly different.

Fruit quality attribute	Check	Treated with AVG
Firmness	53.3b	100.0a
Acidity	94.4a	100.0a
Soluble solid content	100.0a	95.1a
Weight	95.2a	100.0a

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REFERENCES

- Bhande, S. D., M. R. Ravindra, & T.K. Goswami. 2007. Respiration rate of banana fruit under aerobic conditions at different storage temperatures. *Journal of Food Engineering* 87:116-123.
- Bregoli, A. M., S. Scaramagli, G. Costa, E. Sabatini, V. Ziosi, S. Biondi, & P. Torrigiani. 2002. Peach (*Prunus persica*) fruit ripening: aminoethoxyvinylglycine (AVG) and exogenous polyamines affect ethylene emission and flesh firmness. *Physiologia Plantarum* 114: 472-481.
- Crisosto, C. H. 2006. Peach quality and postharvest technology. *Acta Horticulturae* 713:479-488.
- Ilić, Z., Z. Aharon, Y. Perzelan, S. Alkalai-Tuvia, & E. Fallik. 2009. Lipophilic and hydrophilic antioxidant activity of tomato during postharvest storage on different temperatures on different temperatures. *Acta Horticulturae* 830:627-634.
- Librán, M. del C., R. Rouse, E. Hernández, & L. Cardona. 2005. Melocotones Tropicalizados (*Prunus persica* L.): Cultivo Alterno Para la Zona Montañosa de Puerto Rico. Abstr. Inter-American Society for Tropical Horticulture 49:oral presentation number 41
- Morales-Payán, J. P., M. del C. Librán, and E. Hernández. 2009. Effects of aminoethoxyvinylglycine (AVG) in two low-chill peach cultivars. *Proc. Plant Growth Regulation Society of America* 36: In press.
- Padilla Paez, M. C. & J. P. Morales-Payán. 2008. Analysis of external coloration of the low-chill peach 'Tropic Beauty' grown in Puerto Rico. *Proceedings of the Caribbean Food Crops Society* 44:280-283.
- Quezada, D. 2005. Efecto de la atmósfera controlada y manejo de temperatura en la calidad de palta 'Hass'. Tesis de Ingeniero Agrónomo. Facultad de Ciencias Agronómicas, Universidad de Chile. Santiago, Chile. 54 pp.
- Ramos, S., M. del C. Librán, A. González, R. Rouse, P. Stansly, A. Wszelaki, J. P. Morales-Payán & E. Hernández. 2008. Control of the Caribbean fruit fly on three peach cultivars in Adjuntas, Puerto Rico. *Proc. Florida State Horticulture Society* 121:26-27.
- Shin, Y., J. Ryu, R. H. Liu, J. F. Nock, & C. B. Watkins. 2008. Harvest maturity, storage temperature and relative humidity affect fruit quality, antioxidant contents and activity, and inhibition of cell proliferation of strawberry fruit. *Postharvest biology and Technology* 49:201-209.
- Torrigiani, P., A. M. Bregoli, V. Ziosi, S. Scaramagli, T. Ciriaci, A. Rasori, S. Biondi, & G. Costa. 2004. Pre-harvest polyamine and AVG applications modulate fruit ripening in Stark Red Gold nectarines (*Prunus persica* L. Batshe). *Postharvest Biology and Technology* 33: 293-308
- Vizzotto, G., E. Casatta, C. Bomben, A. M. Bregoli, E. Sabatini, & G. Costa. 2002. Peach ripening as affected by AVG. *Acta Horticulturae* 592:561-566.