RESEARCH PAPER International Journal of Agricultural Sciences, Vol. 7 Issue 2 (June, 2011) : 378-381

Effect of ethylene absorbent on post-harvest physiology of peach at ambient storage

ARVIND PREET KAUR* AND KULDIP SINGH[1]
Department of Horticulture, Punjab Agricultural University, LUDHIANA (PUNJAB) INDIA
(Email : kuldiparvind@gmail.com)

ABSTRACT

Fruits of Peach cv. SHAN-I-PUNJAB, were pre-treated with 2.0 per cent calcium nitrate spray and harvested at hard mature stage. These fruits packed in corrugated fiber board boxes having paper lining, pre-treated with different concentrations *i.e.* 500, 1000, 1500, 2000, 2500 and 3000ppm of $KMnO_4$ (ethylene absorbent) and stored at room temperature. The combined effect of calcium nitrate spray and $KMnO_4$ treatments was observed up to 7days on physiological loss in weight, spoilage, palatability rating, TSS, acidity and firmness. All the concentrations of $KMnO_4$ on pre-treated calcium nitrate fruits were significantly decreased ($p<0.01$) the physiological loss in weight, spoilage loss and firmness of the peach fruits while a significant increase was observed in palatability rating and TSS with respect to their respective controls (untreated) at ambient storage but no statistical significant change was noticed on acidity in pre-harvest calcium nitrate spray and post harvest $KMnO_4$ treated peach fruits as compared to their respective control fruits. All these observations suggested that preharvest spray of calcium nitrate (2.0%) and post harvest potassium permanganate treatments (500, 1000, 1500, 2000, 2500 and 3000ppm) could be better as they reduced the physiological loss in weight, spoilage and firmness and also increased the palatability of peach fruits.

Kaur, Arvind Preet and Singh, Kuldip (2011). Effect of ethylene absorbent on post-harvest physiology of peach at ambient storage. *Internat. J. agric. Sci.*, **7**(2): 378-381.

Key words : Calcium nitrate, Ethylene absorbent ($KMnO_4$), Peach, Post harvest physiology, Ambient storage

INTRODUCTION

Peach cv. SHAN-I-PUNJAB is widely planted by farmers of Punjab because of its better fruit quality, firmness and bigger fruit size in comparison to other cultivars. The fruit is perishable in nature and a glut is often seen in the market during its peak harvesting season. Due to a heavy glut, the quality of fruits deteriorates rapidly, causing great loss to both producers as well as consumers.

Hence, there is a need to improve quality and shelf life of fruits by means of chemical treatments. Calcium and potassium permanganate ($KMnO_4$) treatments to fruits reduce post-harvest losses have proved effective by delaying fruit ripening (Ishad *et al.,* 2009). Thus, there is reduction in rate of ethylene generation, which increases shelf-life of peach. The efforts of elucidating the ripening mechanism of peach fruits and the maintenance of fruit quality has been based on the modifications taking place in cell wall (Brummell *et al.,* 2004) with calcium having a profound effect on the above changes (Alcaraz *et al.,* 2004, Serrano *et al.,* 2004). Foliar application of calcium nitrate spray reduce post-harvest loss have proved effective in enhancing shelf-life of peach fruit by delaying fruit ripening and degradation (Singh and Arora, 1997). Potassium permanganate was found to extend the storage life of climacteric fruit (Nwufo *et al.*, 1994). Use of $KMnO_4$ in packing material is known to absorb ethylene produced during storage and has been reported to enhance the shelf-life of banana and peach fruit, respectively (Scott *et al.*, 1970 and Sandooja *et al.*, 1987). Therefore, the present study was undertaken to find out the combined effect of pre-harvest calcium nitrate spray and post harvest potassium permanganate treatments on storage of peach fruits. But so far no study has been made to study the pre-harvest as well as post-harvest treatment on storage of peach fruits.

MATERIALS AND METHODS

Preparatory operations and collection of sample:

Six year old trees of peach cultivar Shan-i-Punjab of uniform size and vigour were selected and maintained under uniform cultural schedule. Selected tree were sprayed with 2% calcium nitrate as pre harvest spray when fruits showed appearance of pink color at their blossom end. Hard mature peach fruits were directly harvested from calcium nitrate treated trees with the help of secateurs keeping small intact pedicel with the fruit.

* Author for correspondence.
[1]Department of Biochemistry, Govt. Medical College, AMRITSAR (PUNJAB) INDIA

After collection, the fruit was immediately transferred to PG Laboratory, Department of Horticulture, Punjab Agricultural University- Ludhiana. The fruits were washed in a running tap water, cleaned and dried with muslin cloth. After drying sorted fruits were divided into equal lots and lot was then subjected to post-harvest treatments with $KMnO_4$ @ 500, 1000, 1500, 2000, 2500 and 3000 ppm. The fruits were packed in $KMnO_4$ treated blotting paper and also fruits pre-treated with calcium nitrate spray were packed as such in untreated papers for control and kept in corrugated fiber board boxes under ambient storage conditions. Each corrugated fiber board box was packed with 2kg of fruits. All treatments were replicated four times taking one box as one replicate.

Physical and chemical analysis:

The quality characteristics such as physiological loss in weight was calculated on the basis of initial weight and expressed in terms of percentage while spoilage was calculated on weight basis according to the formulae suggested by Srivastava and Tandon (1968). Fruit firmness was measured with penetrometer and expressed as kg/cm^2. Total soluble solids were determined by Abbe's refractometer and were expressed on per cent basis. Acidity was determined by titration against 0.1 N NaOH and expressed as maleic acid. Palatability rating of fruits was rated by panel of five judges on the basis of external appearance of fruit, texture, taste and flavor. The data obtained were statistically analyzed using randomized block design with seven treatments and four replications.

RESULTS AND DISCUSSION

A significant decrease in PLW was observed in pre-harvest calcium nitrate sprayed and post harvest $KMnO_4$ treated peach fruits during all the periods of storage as compared to their respective control fruit group (Fig. 1).

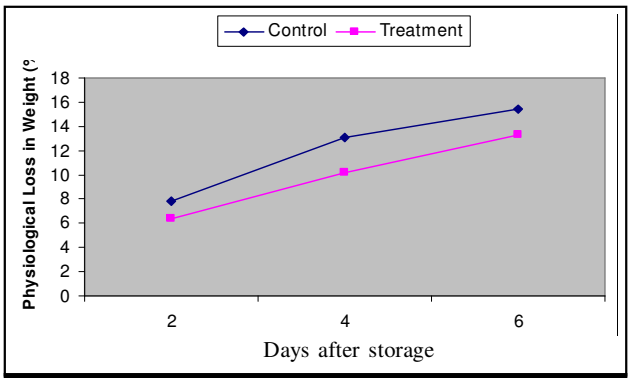

Fig. 1 : Effect of $KMnO_4$ on physiological loss in weight of peach cv. SHAN-I-PUNJAB at ambient storage

A similar trend was also observed in spoilage upon $KMnO_4$ treatments of peach fruits in comparison to their respective control fruit group (Fig. 2). Literature reports (Sandooja *et al.*, 1987, Srivastava and Tandon, 1968, Ibrahim, 2005) also revealed that fruits packed in polythene bags with $KMnO_4$ treatments showed a significant decrease in PLW in apricot fruit. The reduction in PLW and spoilage in pre-harvest calcium nitrate sprayed and post harvest $KMnO_4$ treated fruits might be due to fact that it retards

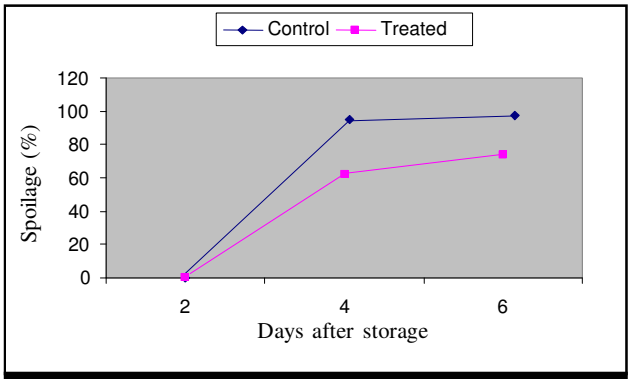

Fig. 2 : Effect of $KMnO_4$ on spoilage of peach cv. SHAN-I-PUNJAB at ambient storage

the ripening, ethylene production and respiration. Therefore, less weight loss occured in $KMnO_4$ treated fruits during storage, as there was absorption of evolved ethylene. Also, the various physiological processes might have slowed down and resulted in reduced PLW. Firmness of fruit was found to be significantly decreased in pre harvest calcium nitrate sprayed and post harvest $KMnO_4$ treated peach fruits with respect to their respective control fruits (Fig. 3). A significant decrease in firmness with subsequent period of storage indicated the natural process

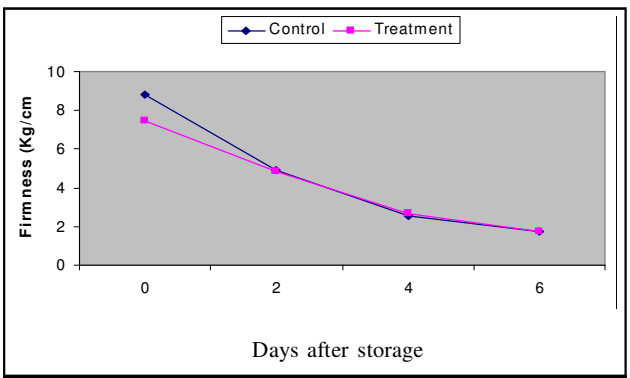

Fig. 3 : Effect of $KMnO_4$ on firmness of peach cv. SHAN-I-PUNJAB at ambient storage

of ripening. This might be due to decrease in rate of respiration with $KMnO_4$, which ultimately leads to higher retention of firmness.TSS content of fruits increased with increasing period of ambient storage in fruits packed in $KMnO_4$ soaked papers (Fig. 4). These results corroborate with the results of Jawanda *et al.*, 1980. The higher retention of TSS contents in pre-harvest calcium nitrate spray and post harvest $KMnO_4$ treated peach fruits might be due to delay in ripening process, lower ethylene level and decrease in respiration and other metabolic processes during storage. Arthey and Philip (2005) reported that higher retention of TSS is due to the slower alteration in cell wall structure and breakdown into simple sugars. Present results of significant increase in TSS upon $KMnO_4$ treatment in peach fruit are agreement with literature reports that $KMnO_4$ increased the TSS Agar and Polate, 1995, Antunes *et al.*, 2003 and Su-Jinle *et al.*, 2004).

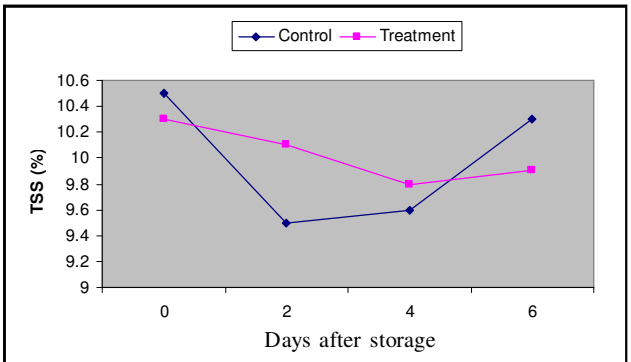

Fig. 4 : Effect of $KMnO_4$ on TSS of peach cv. SHAN-I-PUNJAB at ambient storage

A nominal increase in acidity was observed in $KMnO_4$ treated peach fruits in comparison to control fruits (Fig. 5). However, the acidity of peach fruits decreased

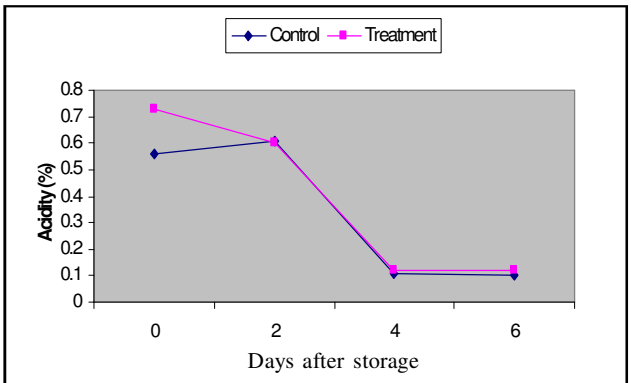

Fig. 5 : Effect of $KMnO_4$ on acidity of peach cv. SHAN-I-PUNJAB at ambient storage

with increase in storage period. This might be due to increase in metabolic changes of organic acids into carbon dioxide and water (higher rate of respiration). In the present study, we observed a better palatability in $KMnO_4$ treated peach fruits than the untreated control fruits during ambient storage (Fig. 6). Similar results were also reported by other studies (Zora *et al.*, 2000, Akbudak and Eris, 2004 and Hayat *et al.*, 2005) on different fruit at different

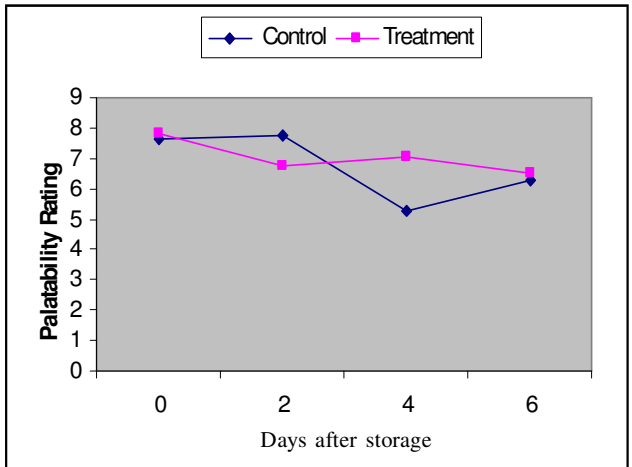

Fig. 6 : Effect of $KMnO_4$ on palatability of peach cv. SHAN-I-PUNJAB at ambient storage

treatments of $KMnO_4$. Better palatability of peach fruits in pre-harvest calcium nitrate sprayed and post harvest $KMnO_4$ treated could be due to slow down of physiological and morphological changes by KMnO4 during ambient storage, as it acts as oxidizing agent and ethylene absorbent. In conclusion, the aforementioned observations suggested that pre-harvest calcium nitrate spray and post harvest potassium permanganate treatments could be better as it reduced the PLW, spoilage and increased the palatability of peach fruits with increase in ambient storage.

REFERENCES

Agar, T. and Polate, A. (1995). Effect of different packing materials on the storage quality of some apricot varieties. *Acta Hort.,* **384** : 625-631.

Akbudak, B. and Eris, A. (2004). Physical and chemical changes in peaches and nectarines during the modified atmosphere storage. *Food Count.,* **15** : 307-313.

Alcaraz, L., Botia, M., Alcaraz, C.F. and Riquelme, F. (2004). Effect of foliar sprays containing calcium, magnesium and titanium on peach (*Prunus persica* L.) fruit quality. *J. Sci. Food Agric.,* **84** : 949-954.

Antunes, M. D.C., Correia, M.P., Miguel, M.G., Martin, M.A. and Neves, M.A. (2003). The effect of calcium chloride post-harvest application on fruit storage ability and quality of 'Beliana'and 'Lindo' apricot (*Prunus armeniaca* L.) cultivar. *Acta Hort.,* **604** : 721-726.

Arthey, D. and Philip, R.A. (2005). *Fruit processing nutrition, product and quality management*, Brijbasi Art Press Ltd. India 45 pp.

Hayat, I.T., Masud, A., Rathore, H.A. (2005). Effect of coating and wrapping material on the shelf life of apple (*Malus domestica* cv. BORKH). *Internat. J. Food Safety*, **5** : 24-34.

Ibrahim, F. E. (2005). Effect of post harvest treatments on storage ability and keeping quality of Amaar apricot fruits. *Ann. Agric. Sci.,* **43** : 849-867.

Ishad, S., Rathore, H.A., Masud, T. and Ali, S. (2009). Influence of postharvest calcium chloride application ,ethylene absorbent and modified atmosphere on quality characteristics and shelf life of apricot(*Prunus armeniaca* L.) fruit during storage. *Pak. J. Nutrition*, **8** : 861-865.

Nwufo, M.L., Okonkwo, M.L. and Obiefune, J.C. (1994). Effect of postharvest treatments on storage life of avocado pear. *Trop. Sci.,* **34** : 364-370.

Sandooja, J.K., Sharma, R.K., Singhrot, R.S. and Singh, J.P. (1987). Studies on shelf-life of different maturity stages of peach cv. FLORDASUN as affected by $KMnO_4$ and $AgNO_3$. *Haryana J. Hort. Sci.,* **15** : 210-217.

Scott, K.J., Glarson, M.C. and Robats, E.A. (1970). Potassium permanganate as an ethylene absorbent in polythene bags to delay ripening of banana during storage. *J. Exp. Agri. Hort.,* **10** : 237-39.

Serrano, M., Martinez-Romero, D., Castillo, S., Guillen, F. and Valero, D. (2004). Effect of pre-harvest sprays containing calcium, magnesium and titanium on the quality of peaches and nectarines at harvest and during postharvest storage. *J. Sci. Food Agric*., **84** : 1270-1276.

Singh, J.K. and Arora, H.J. (1997). Effect of pre-harvest sprays of zinc, boron and different sources of calcium on yield, quality and shelf-life of peach cv. FLORDASUN. *Prog. Hort.,* **29** : 22-27.

Srivastava, M.P. and Tandon, R.N. (1968). Influence of temperature in Botryoplodia roots of citrus and sapodilla. *Indian Phytopath.,* **21** : 195-177.

Su-Jinle, L., Wang,N., Li-jing, E. and Wang, L. (2004). Effect of calcium chloride treatment and different packing method on fruit quality of Yutian peach. *J. Henan Agri. Univ.,* **38** : 417-422.

Zora, S., Janes, J. and Tan, S.C. (2000). Effect of different surfactants on calcium uptake and its effects on fruit ripening, quality and post harvest storage of mango under modified atmosphere packaging. *Acta Hort.,* **509** : 413-417.

Received : February, 2011; Accepted : May, 2011