

# Control of post-harvest fungal diseases of tropical fruits by heat treatment: A review

V. P. Pawar

Arts and Science College, Bhalod, Tq. Yawal, Dist. Jalgaon (M.S.), India.

---

## Abstract

Present research communication deals with review of impact of heat treatment on post-harvest diseases of tropical fruits.

**Keywords:** Tropical fruits, fungal diseases, hot treatments

---

Heat treatments such as hot water dipping vapour heat, hot dry air or combinations of these have been increasingly used as a quarantine treatment in several studies to retard postharvest fungal damage to fruits and vegetables [1]. Particular attraction of heat treatment is that there no use of chemicals [2, 3, 4, 5 and 6]. Jacobi et al. (2000) [7] observed the Kensington mangoes were more resistant to postharvest disease and of higher quality after treatment with hot air, hot water or both.

Jacobi and Wong (1992) [8] and Jacobi and Giles (1997) [9] found that at 53°C hot water dipping for 5 min was successful treatment. Also, vapor heat treatment (VHT) at 47°C for 15-20 min was found to be right for disease manage of Kensington mango [9]. Results of Nguyen et al. (1998) [10] reported that HW treatment of Buoi mango at 52°C for 10 min induced higher shrivel incidence while at 52°C for 5 min had potential for re-duc-ing postharvest diseases with minimal fruit mass loss and shriveling compared with untreated fruits. Efficacy of heat treatment was higher when HA exposure at 40°C for 4 h was combined with dipping in HW at 50°C for 5 min or vice versa, than HW or HA treatment alone. Also, disease infection was significantly lowered by these treatments compared to control fruits, especial-ly in combination treatments (HA + HW or HW +HA). Jacobi and Giles (1997) [9] found that, treating Kensington mango with HW at 53°C for 5 min lowered dis-ease incidence, while severity of fruit injury was lower in HW + VHT fruits than in VHT fruit alone. Jacobi et al. (2000) [7] also observed that hot air conditioning at 40°C pri-or to HW treatment of Kensington mango fruits gave increased resistance to postharvest diseases. Similarly heat protocols have been successfully developed for treating a wide range of mango varieties, including Carabao from the Philippines [11], Nang Klangwan from Thailand [12], Harumanis from Malaysia [13] and Buoi from New Zealand [10]. Heat treatment as applied in this work increases the shelf life of fruits artificially inoculated or uninoculated and stored at 12°C for 2 or 4 weeks. Treatment with HA + HW or HW + HA was more effective in increasing shelf life than HW or HA treatment alone. Jacobi and Giles (1997) [9] preferred 22°C as the storage temperature during the entire transit period after VHT to maximize the quality of fruits. Another response to heat

treatment found by Jacobi and Wong (1994) [14] was that untreated fruit tend to be firmer than heated fruit even at the ripe eating stage. Changes in cell wall composition of ripening mango have been related to the action of cell wall hydrolases. Jacobi and Giles (1997) [9] suggested that 146 Effect of heat treatment of mango fruit the decrease in Kensington mango fruit firmness follow-ing heat treatment might be attributed to an increase in activity of these hydrolases caused by increased temper-ature. Jacobi et al. (2000) [7] showed that conditioning at 40°C prior to HW treatment of 45°C for 30 min or 47°C for 15 min accelerated fruit ripening, increased weight loss, reduced fruit firmness, increased Brix and lowered titratable acidity compared to untreated fruits and fruits receiving other heat treatments.

Mandhar et al. (2000) [15] found that anthracnose was controlled at 52°C for 15 min. Prakash and Pandey (2000) [16] reported that hot water treatment at 52 °C for 30 min was very effective in controlling the anthracnose in mango fruits. Hot water treatment at 52°C for 15 min effective against the post-harvest fungal diseases of mango fruits [17]. Thi-Nghiem (2010) [18] found that the disease incidences of the *Alternaria alternata* and *Colletotrichum gloeosporioides* on mango fruits were decreased by application of hot water and vapour heat treatment followed by storage at 3°C for 3 weeks.

## CONCLUSION

Hot treatments control the post-harvest diseases of fruits.

## REFERENCES

- [1] Mansour, F.S., Abd-El-Aziz, S.A. and Helal, G.A. 2006. Effect of fruit heat treatment in three mango varieties on incidence of postharvest fungal disease. *J. Plant Pathol.* 88: 141-148.
- [2] Couey, H.M. 1989. Heat treatment for control of post harvest diseases and insect pest of fruits. *Hort Science* .24: 198-202.
- [3] Fallik, K.E., Grinberg, S., Alkalai, S. and Lurie, S. 1996. The effectiveness of postharvest hot water dipping on the control of gray and black moulds in sweet red pepper (*Capsicum annum*). *Plant Pathology*.45: 644-649.
- [4] Lopez , C.J., Marrero, D.A. and Galan, S.V. 1998. Use of hot water dips to control the incidence of banana crown rot. *Acta Horticulturae*. 490: 563-569.
- [5] Rodov, V., Agar, T., Peretz, J., Nafussi ,B., JongJin, K., BenYehoshua, S and Kim, J.J. 2000. Effect of combined application of heat treatments and plastic packaging on keeping quality of "Oroblanco" fruit (*Citrus grandis* L. x c.

---

Received: July 05, 2012; Revised: Aug 13, 2012; Accepted: Sept 25, 2012.

\*Corresponding Author

V. P. Pawar

Arts and Science College, Bhalod, Tq. Yawal, Dist. Jalgaon (M.S.), India.

Email: [vppawar@gmail.com](mailto:vppawar@gmail.com)

- paradise Macf.). Postharvest Biology and Technology. 20: 287-294.
- [6] Tohamy, M.R.A., Helal, G.A., Ibrahim, K.I. and Abd El-Aziz Shadia., A. 2004. Control of postharvest tomato fruit rot 11 using heat treatments. Egyptian Journal of Phytopathology. 32: 129-138.
- [7] Jacobi, K.K., MacRae, E.A. and Hetherington, S.F. 2000. Effect of hot air conditioning of "Kensington" mango fruit on the response to hot water treatment. Postharvest Biology and Technology. 21: 39-49.
- [8] Jacobi, K.K. and Wong, L.S. 1992. Quality of 'Kensington' mango (*Mangifera indica* Linn.) following hot water and vapor-heat treatments. Postharvest Biol. & Technol. 1:349-359.
- [9] Jacobi K.K. and Giles, J.E. 1997. Quality of "Kensington" mango (*Mangifera indica* Linn.) fruit following combined vapour heat disinfestations and hot water disease control treatments. Postharvest Biology and Technology. 12: 285-292.
- [10] Nguyen, H.X., Opara, L.U., To, L.V., 1998. Hot water treatment affects fruit mass loss and incidence of postharvest diseases and disorders in "Buoï" mango (*Mangifera indica* Linn.). Journal of South Pacific Agriculture. 5: 13-18.
- [11] Merino, S.R., Eugenio, M.M., Ramos, A.U., Hernandez, S.T. 1985. Fruit fly disinfestations of mangoes by vapor heat treatment, pp. 89. Ministry of Agriculture and Food. Bureau of Plant Industry, Manila, Philippines.
- [12] Unahawatti, U., Chettanachitara, C., Poomthong, M., Komson, P., Smitasiri, E., Lapasathukool, C., Worawisthumrong, W., Intrakumheng, R. 1986. Vapor heat treatment for 'Nang Klangwan' mango, *Mangifera indica* Linn. infested with eggs and larvae of the Oriental fruit fly, *Dacus dorsalis* Hendel and the Melon fly, *D. cucurbitae* Coquillet (Diptera: Tephritidae), pp. 108. Agriculture Regulatory Di-vision, Department of Agriculture, Ministry of Agriculture and Co-operations, Bangkok, Thailand.
- [13] Mohamed, M.S., Sulaiman, Z., Latifah, M.N., Siti Halijah, A., Ahmad Tarmizi, S., Mohd Shamsuddin, O., Vijayssegaran, S. 1994. Disinfestation of oriental fruit fly *Bactrocera dorsalis* Hendel and melon fly *Bactrocera cucurbitae* Coquillet (Diptera: Tephritidae) in Malaysian mangoes (*Mangifera indica* Linnaeus var. Harumanis) using vapor heat treatment, pp. 87. Report to Japanese MAFF by Malaysian Agricultural Research and Development Institute. MAR-DI, Kuala Lumpur, Malaysia.
- [14] Jacobi K.K., Wong L.S., 1994. The effect of simulated air freight conditions on the quality of high humidity hot air treated "Kensington" mango (*Mangifera indica* Linn.). In: Proceedings of Australasian Postharvest Conference, University of Queensland, Gatton College, Gatton 1993, 289-294.
- [15] Mandhar, S.C., Senthil Kumaran, G., Mohan, B. and Carolin Rathinakumari 2000. Development of a commercial hot water plant, 14 h. Indian convention of food scientists and technologist, 22-24 November, 2000 held at central food technological research institute, Mysore.
- [16] Prakash Om and Pandey, B.K. 2000. Control of mango anthracnose by hot water and fungicides treatment. Indian Phytopath. 53:92-94.
- [17] Prasanna Kumar, M.K., Nargund, V.B. and Basha Jahir 2005. Effect of novel treatments on post-harvest diseases of mango (*Mangifera indica* L.). Mysore J. Agric. Sci. 39: 474-479.
- [18] Thi-Nghiem Le, Ching-Chang Shiesh and Huey-Ling Lin 2010. Effect of vapor heat and hot water treatments on disease incidence and quality of Taiwan native strain mango fruits. International Journal of Agriculture and Biology. 12:673-678.