A review on the use of essential oils for postharvest decay control and maintenance of fruit quality during storage

Postharvest diseases are one of the major causes for the postharvest loss of horticultural fresh produce during the supply chain. The incidence of postharvest diseases can affect the quality and restrict the shelf life of the horticultural fresh produce. At present strict regulations are enforced by the fresh produce importing countries regarding the minimum pesticide residue levels in the edible portion of the fresh produce. Some fungal pathogens were reported to develop resistance to synthetic fungicides. Waste disposal of fungicides has an impact on environmental footprint. All these above-mentioned reasons have necessitated the search for a natural novel fungicide to replace the synthetic fungicide application in the packing line as postharvest treatment. Consumer preference to organic fresh produce is increasingly becoming popular in the developed countries. Therefore, this review summarises the use of essential oils in the control of postharvest diseases of horticultural commodities, their mode of actions, effects on the defence mechanism and quality of fresh fruit. Future research must be focused on conducting large scale trials to prove the feasibility of combination treatments. The cost benefit analysis of the treatments needs to be carried out in order to implement their application and the commercial applications of essential oils and host pathogen infection must be investigated in detail in order to control latent infections during postharvest storage. [Dharini Sivakumara and Silvia Bautista- Baños (Postharvest Technology Group, Department of Crop Sciences, Tshwane University of Technology, Pretoria 0001, South Africa) Crop Protection, 2014, 64, 27-37].

Browning inhibition and quality preservation of button mushroom (Agaricus bisporus) by essential oils fumigation treatment

The effect of essential oil fumigation treatment on browning and postharvest quality of button mushrooms (Agaricus bisporus) was evaluated upon 16 days cold storage. Button mushrooms were fumigated with essential oils, including clove, cinnamaldehyde, and thyme. Changes in the browning index (BI), weight loss, firmness, percentage of open caps, total phenolics, ascorbic acid, microbial activity and activities of polyphenol oxidase (PPO), phenylalanine ammonia lyase (PAL), and peroxidase (POD) were measured. The results indicated that all essential oils could inhibit the senescence of mushrooms, and the most effective compound was cinnamaldehyde. Fumigation treatment with 5 µl l⁻¹ cinnamaldehyde decreased BI, delayed cap opening, reduced microorganism counts, promoted the accumulation of phenolics and ascorbic acid. In addition, 5 µl l⁻¹ cinnamaldehyde fumigation treatments inhibited the activities of PPO and POD, and increased PAL activity during the storage period. Thus, postharvest essential oil fumigation treatment has positive effects on improving the quality of button mushrooms [Mengsha Gao, Lifang Feng and Tianjia Jiang (College of Food Science and Biotechnology, Zhejiang Gongshang University, Food Safety Key Lab of Zhejiang Province, Hangzhou 310035, PR China), Food Chemistry, 2014, 149, 107-113].

Postharvest treatment with nitric oxide influences the physiological and quality attributes of ‘Santa Rosa’ plums during cold storage

Studies were conducted to observe the effect of nitric oxide (NO) on ‘Santa Rosa’ plum, a Japanese plum grown extensively in India. ‘Santa Rosa’ plums were dipped in solution of sodium nitroprusside (SNP @ 0.25, 0.5, 1.0 and 1.5 mM) and distilled water (control) for 5 min. After treatment, fruits were air-dried under fan and stored at 2°C temperature and 90 ± 5% RH
for 36 days. Results revealed that SNP treatments significantly delayed the weight loss, fruit softening, and fruit decay in plums. However, minimum weight loss (8.3%), maximum firmness (3.463 N) and lowest fruit decay (0.0%) were recorded in SNP (0.5 mM) treated plums, whereas untreated fruits showed maximum weight loss (13.8%), lowest fruit firmness (1.595 N) and highest decay loss (18%). All SNP treatments significantly suppressed and delayed the rates of respiration and ethylene production by the fruits. Maximum phenolics content (106 mg/100 g pulp) and titratable acidity (1.1%) was observed in SNP @ 0.5 mM treated fruits, while it was lowest (65.3 mg/100 g pulp, 0.8% respectively) in untreated plums. Untreated fruits reached the highest SSC content on 16th day of storage (16.7°Brix) followed by a decline, while SNP (0.5 mM) treated fruits showed slower increase in SSC content. Hence, SNP 0.5 mM treatment can be effectively used for maintenance of desired postharvest quality and extending the market life of ‘Santa Rosa’ plums up to 36 days when stored at 2°C [Sharma Swati, Sharma R.R.*, and Verma M.K. (Division of Fruits & Horticultural Technology, IARI, New Delhi, 110 012), Indian Journal of Horticulture, 2015, 72 (4), 535-540].