Producing ice cream using a substantial amount of juice from kiwifruit with green, gold or red flesh

Ice cream prepared using a substantial amount of juice from kiwifruit with green, gold or red flesh may have consumer appeal, through the combination of kiwifruit's unique color, natural flavor and health-promoting constituents. The aqueous fractions from purees of kiwifruit with green, gold and red flesh (AFKWs) were added at 49% v/v to a basic low-fat ice cream mix that contained no commercial flavoring and coloring agents. The resultant ice creams were subjected to comparative product evaluation (e.g. overrun, melting behavior and rheological properties) and chemical analyses of bioactives (e.g. total extractable polyphenol content (TEPC), vitamin C, antioxidant capacity, polyphenol (PP) and carotenoid composition). Results revealed that both the pH pre-adjustment and pre-heating of the AFKW played critical roles in ice cream making. The ice creams retained the PP and vitamin C contents as well as natural color flavor of the kiwifruit used. The rheological properties of all ice creams showed non-Newtonian flow behavior, and the storage modulus G' decreased in the same pattern following the order of green > gold > red. The melting rate, overrun and vitamin C content of the ice cream with green AFKW were the fastest, lowest and least, respectively. The TEPC and antioxidant capacity in the ice cream with red AFKW were the highest. The amounts of PPs and vitamin C were encouragingly high. Health beneficial compounds, dimethyl-caffeic acid hexoside, caffeic acid derivatives, protocatechuic acid, syringic acid, salicylic acid/ο-coumaric acid, lutein and beta-carotene, were detected in the final products. Thus, there are commercial possibilities for using AFKW which should be further evaluated [D. Sun-Waterhouse*, L. Edmonds, S.S. Wadhwa and R. Wibisono (The New Zealand Institute for Plant & Food Research Limited, Private Bag 92169, Auckland 1020, New Zealand), Food Research International, 2013, 50 (2), 647–656].

Effect of high pressure processing on color, biochemical and microbiological characteristics of mango pulp (Mangifera indica cv. Amrapali)

The effects of high pressure processing, (HPP) applied within 100 to 600 MPa for 1 s to 20 min at ambient temperature (30 ± 2°C), on the color, biochemical characteristics and inactivation kinetics of natural microflora in fresh mango pulp (Mangifera indica cv. Amrapali) were investigated. Changes in color of mango pulp were found to be significant after HPP. Processed pulp retained a maximum of 85, 92 and 90% of its original ascorbic acid, total phenolics and in-vitro antioxidant capacity, respectively. Isobaric destruction of microorganisms followed the first-order death kinetics. Among the groups of microorganisms studied, pressure sensitivity of coliforms was found to be maximum whereas yeast & mold were least sensitive ($z_P$ values of 306.8 and 630.5 MPa; $\Delta V$ values of $-18.9 \times 10^{-6}$ and $-9.2 \times 10^{-6}$ m$^3$mol$^{-1}$, respectively). High pressure treatment of 600MPa for 5 min was adjudged best for mango pulp which achieved maximum reduction in microflora and moderate changes in quality attributes Mango is the king of fruits which is globally valued for its unique aroma, flavor and high nutritive value. Most of the current preservation techniques available for mango involve the use of thermal treatments which result in loss of quality. India ranks no.1 in global mango production and has huge potential for utilizing new preservation technologies, such as HPP, which promise fresh-like and shelf stable products. This study will help one to understand the changes induced by HPP in mango pulp which may further be applied to develop the process technology for preservation of mango based products [Neelima Kaushik*, Barjinder Pal...}

NPARR 5(3), 2014-0255 Ripening period influences fruit softening and antioxidative system of ‘Samar Bahisht Chaunsa’ mango

Increased respiration rate and textural softening in mango during fruit ripening limit its postharvest shelf life with poor quality. Changes in ethylene production, respiration rate, activities of fruit softening [exo-polygalacturonase (exo-PG), endo-polygalacturonase (endo-PG), pectin esterase (PE) and endo-1,4-β-d-glucanase (EGase)], and antioxidative [peroxidase (POX), catalase (CAT) and superoxide dismutase (SOD)] enzymes were studied in mango cv. ‘Samar Bahisht Chaunsa’ during ripening at ambient conditions (25±1°C; 60–65% RH). Ethylene production (0.01–0.34 \( \mu \)mol kg\(^{-1}\) h\(^{-1}\)) and respiration rate (1.14–2.70 mmol CO\(_2\) kg\(^{-1}\) h\(^{-1}\)) showed quadratic and cubic increase respectively up to day-5 of fruit ripening and later on reduced as the fruit reached to fully ripe stage (day-9).

Fruit showed a linear decreasing trend for fruit firmness (160.6–4.1 N) during the entire ripening period. Fruit exhibited significant linear increase in the activities of endo-PG (4.11–8.15 viscosity changes mg\(^{-1}\) protein h\(^{-1}\)), cubic increase for exo-PG (18.95–60.3 \( \mu \)g gal acid mg\(^{-1}\) protein h\(^{-1}\)) and EGase (3.96–9.52 viscosity changes mg\(^{-1}\) protein h\(^{-1}\)) and cubic decrease in PE (0.93–0.19 mM NaOH mg\(^{-1}\) protein h\(^{-1}\)) enzymes during the entire ripening period. Linear decreasing trend for SOD (50.71–26.75 U mg\(^{-1}\) protein) and cubic increasing trend for CAT (37.63–78.45 U mg\(^{-1}\) protein) and POX (17.11–82.35 U mg\(^{-1}\) protein) enzymes were observed during fruit ripening in ‘Samar Bahisht Chaunsa’ mango. Fruit showed linear increase in total antioxidant scavenging activities (766.87–478.41 IC\(_{50}\) value) up to day-7 and later on it decreased. Conclusively, along with the ethylene production and respiration rate, fruit ripening period was well associated with the activities of fruit softening and antioxidative enzymes of ‘Samar Bahisht Chaunsa’ mango fruit. As the ripening stage advanced, except PE and SOD, activities of fruit softening and antioxidative enzymes significantly increased in ‘Samar Bahisht Chaunsa’ mango fruit [Kashif Razzaq, Ahmad Sattar Khan*, Aman Ullah Malik and Muhammad Shahid (Postharvest Research and Training Centre, Institute of Horticultural Sciences, University of Agriculture, Faisalabad 38040, Pakistan), *Scientia Horticulturae*, 2013, **160**, 108–114].

NPARR 5(3), 2014-0256 Effect of gamma irradiation on the physico-chemical and visual properties of mango (*Mangifera indica* L.), cv. ‘Dushehri’ and ‘Fazli’ stored at 20°C

The effect of \( \gamma \)-irradiation doses (0.3, 0.5, 0.7, 1.0, 6.0, 10.0 kGy) on different physico-chemical and visual properties of two Indian cultivars of mango, cv. ‘Dushehri’ and ‘Fazli’ was observed during storage at 20°C for the evaluation of delayed ripening and extension of shelf-life. Visually all the irradiated fruit showed greener peel and lighter pulp throughout the storage, however, radiation injuries were present in ‘Dushehri’ treated with 6–10 kGy and in ‘Fazli’ with 1–10 kGy. Loss of fruit due to rotting was less in the irradiated samples, treated up to 1 kGy of both the cultivars. Irradiated fruit of both the cultivars at high doses (6–10 kGy) showed increased sugar content from 0 d, however, all the treated fruit registered a slower rate of increase of sugars with storage compared to the respective controls and those treated with the lower doses of 0.5 and 0.7 kGy attained peak sugar concentration later. Significant (\( p \leq 0.05 \)) textural deterioration could be detected immediately after irradiation, in ‘Dushehri’ at doses ≥1 kGy and in ‘Fazli’ at doses ≥0.7 kGy. However, low dose treated fruit (0.3–1 kGy) of both the cultivars softened at a considerably slower rate during storage and registered significantly greater fruit firmness (compression strength) throughout the
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storage period. Similarly, ‘Dushehri’ treated with 0.3–0.7 kGy and Fazli treated with 0.7 kGy registered significantly greater flesh firmness (shear strength). ‘Dushehri’ treated with 0.3–1 kGy and ‘Fazli’ with 0.5–1 kGy also registered significantly harder and tougher peel, as determined by puncture test, throughout the storage. Scanning electron microscopy (SEM) performed on 3rd and 2nd d of storage of ‘Dushehri’ and ‘Fazli’ respectively, revealed microstructural breakdown at and above 1 kGy in both cultivars. Cell separation could be observed in ‘Fazli’ even at 0.7 kGy. SEM also revealed that the control fruit were in a more advanced stage of ripening than the low dose treated fruit. The study showed the feasibility of low dose γ-irradiation on ‘Dushehri’ (0.3–0.7 kGy) and ‘Fazli’ (0.5 and 0.7 kGy) that induced useful delay in ripening and extension of shelf-life by a minimum of 3 and 4 d, respectively [R. Mahto and M. Das (Department of Food Technology and Biochemical Engineering, Jadavpur University, Kolkata 700 032, India), Postharvest Biology and Technology, 2013, 86, 447–455].

NPARR 5(3), 2014-0257 A review of the management alternatives for controlling fungi on papaya fruit during the postharvest supply chain

Due to their flavor and nutritional characteristics, papaya fruit are consumed worldwide. As a tropical commodity, storage has serious limitations that result in their rapid deterioration and high incidence of rots during handling and storage. Postharvest handling of papaya differs according to destination. For export markets, there are well-defined postharvest steps established that include technologies that generally avoid disease incidence. For national markets, the postharvest chain is short but characterized by poor handling practices that result in serious losses due to microorganisms. Anthracnose is considered the main postharvest disease, but development of other rots may also limit good fruit quality, as is the case with, among others, stem-end rots. Control of papaya rots for export markets are applied in accordance with import–export regulations, while for the national market it has typically relied on synthetic fungicides; however, due to their already known ‘side-effects’ on humans and the environment, other alternatives alone or combined should be tested in integrated technologies. We reviewed the available literature on different control methods to reduce postharvest diseases during papaya storage, including those that reported on their effects on fruit quality. Wax combined with fungicides and heat is currently in use. Other methods, such as the application of irradiation, antagonistic microorganisms and natural compounds [e.g. chitosan and plant derivatives (extracts, essential oils and isothiocynates)], are still under evaluation, but have yielded promising initial results. The application of various organic salts and minerals and modified and controlled atmosphere technologies using ozone and volatiles such as 1-methycyclopropane are also under experimentation. We believe that research areas that include preharvest experimentation aimed at reducing postharvest diseases on papaya fruit should be taken into account. Finally, the integration of more than one control method will reduce the incidence of rots, and therefore improve and extend the storage life of this important commodity [Silvia Bautista-Baños, Dharini Sivakumar, Arturo Bello-Pérez, Ramón Villanueva-Arce and Mónica Hernández-López (Centro de Desarrollo de Productos Bióticos, Instituto Politécnico Nacional Carr, Yautepex-Jojutla km. 8.5, San Isidro Yautepex Morelos 62731, Mexico), Crop Protection, 2013, 49, 8-20].

NPARR 5(3), 2014-0258 Postharvest quality of peeled prickly pear fruit treated with acetic acid and chitosan

White (Opuntia albicarpa) and red (Opuntia ficus-indica) prickly pears were peeled and submerged in chitosan solutions containing different concentrations of acetic acid (1.0 or 2.5%) to obtain ready-to-eat prickly pear
products. Some physicochemical (pH, total soluble solids, color, weight loss, and firmness), antioxidant (phenolic compounds and antioxidant activity), microbiological (aerobic mesophile bacteria and yeasts plus molds), and sensory (color, firmness, aroma, flavor, and overall acceptance) characteristics were assessed during 16 d of storage at 4±1°C and 85±5% of relative humidity. Chitosan coating containing 1.0% of acetic acid delayed weight loss, maintained firmness and color of white prickly pear during the storage time. Most of the sensory values for white prickly pear coated with chitosan containing 1.0 and 2.5% of acetic acid were higher than those obtained for uncoated fruit. Red prickly pear coated with chitosan with 2.5% acetic acid did not maintain its sensory quality throughout 16 d of storage. Chitosan coating with 1 and 2.5% acetic acid did not affect phenolics content and antioxidant activity in white prickly pears; however, an increase of these compounds was observed in red prickly pears. Microbe populations were unchanged in white prickly pears (<10 CFU g\(^{-1}\)) and slightly increased in red prickly pears (10–500 CFU g\(^{-1}\)) coated with chitosan during the entire storage time [Carlos Enrique Ochoa-Velasco, José Ángel Guerrero-Beltrán* (Departamento de Ingeniería Química, Alimentos y Ambiental, Universidad de las Américas Puebla, Sta. Catarina Mártir, Cholula 72820, Puebla, Mexico), Postharvest Biology and Technology, 2014, 92, 139–145].

**NPARR 5(3), 2014-0259 Lemongrass essential oil incorporated into alginate-based edible coating for shelf-life extension and quality retention of fresh-cut pineapple**

The effects of different concentrations (0.1%, 0.3% and 0.5%, w/v) of lemongrass essential oil incorporated into an alginate-based [sodium alginate 1.29% (w/v), glycerol 1.16% (w/v) and sunflower oil 0.025% (w/v)] edible coating on the respiration rate, physico-chemical properties, and microbiological and sensory quality of fresh-cut pineapple during 16 days of storage (10±1°C, 65 ± 10% RH) were evaluated. Coated fresh-cut pineapple without lemongrass and uncoated fresh-cut pineapple were stored under the same conditions and served as the controls. The results show that yeast and mould counts and total plate counts of coated samples containing 0.3 and 0.5% (w/v) lemongrass were significantly (p<0.05) lower than other samples. However, the incorporation of 0.5% (w/v) lemongrass in coating formulation significantly (p<0.05) decreased the firmness and sensory scores (taste, texture and overall acceptability) of fresh-cut pineapples. Therefore, the results indicate that an alginate-based edible coating formulation incorporated with 0.3% (w/v) lemongrass has potential to extend the shelf-life and maintain quality of fresh-cut pineapple [Nima Azaraksh, Azizah Osman, Hasanah Mohd Ghazali, Chin Ping Tan and Noranizan Mohd Adzahan (Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia), Postharvest Biology and Technology, 2014, 88, 1-7].

**NPARR 5(3), 2014-0260 Aloe vera based edible coatings improve the quality of minimally processed ‘Hayward’ kiwifruit**

This article studies the efficacy of an edible coating based on Aloe vera gel at four different concentrations (0, 1, 5, 15% (v/v)) in maintaining the quality of fresh-cut kiwifruit. The kiwifruit slices were packaged under passive atmosphere and stored at 4 ±1°C. Quality attributes such as colour and texture (firmness and texture profile analysis), titratable acidity, total soluble solids, pectin content, microbial load and sensory parameters were evaluated during storage. In general, Aloe vera coating reduced respiration rates and microbial spoilage in sliced kiwifruit. After seven days of storage, the mesophilic load dropped by approximately one logarithmic unit for slices coated with 15% and 5% Aloe vera. Total pectin depolymerization was also lower in the treated samples and the textu
of the uncoated samples deteriorated more rapidly than the treated slices during storage. Furthermore, due to the atmospheric composition and the microbial load, the quality of the control samples declined after six days of storage. Our results show that an Aloe vera coating improved the quality of stored kiwifruit slices. The best results obtained in the instrumental texture profile and in the preference panel test were with the 5% coating, indicating that this may be a healthy alternative coating for fresh-cut kiwifruit [S. Benítez, I. Achaerandio, F. Sepulcre and M. Pujolà; M. Pujolà (Departament d’Enginyeria Agroalimentària i Biotecnologia, Escola Superior d’Agricultura de Barcelona, Universitat Politècnica de Catalunya BarcelonaTech, Barcelona, Spain), Postharvest Biology and Technology, 2013, 81, 29-36].