

**SELECTIVE DESSIMINATION OF INFORMATION (SDI)
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GENERAL

CONSUMER PERCEPTIONS

Kurnia, P. X. Sun and R. Collins. 2013. **Consumers perceptions** towards organic food in Yogyakarta, Indonesia. Acta Hort. 1006: 185 – 192.

Abstract

Consumer behaviour in purchasing organic food products in Muslim countries has rarely been studied. This paper explores consumers understanding, perceptions and purchasing behaviour of organic foods in three regions of Yogyakarta, Indonesia. It was found that consumers had limited knowledge of organic food. In comparison with conventionally produced food, consumers held positive attitudes towards organic food. Statistical analysis revealed that age, income and level of education influenced consumers perceptions. However, perceptions were not affected by gender. The major obstacles preventing people from purchasing organic foods was the high price, non availability, the lack of credentials and poor appearance. The implications of these findings for supply chain management are discussed.

Keywords: /Consumer perceptions/ /Chain Management/ /Organic Food/

CONSUMER PROFILE

Veerapa, K. et.al. 2013. Consumer behaviour towards organic vegetables and their certification in Vietnam. Acta Hort. 1006: 391 – 396.

Abstract

As consumers become more concerned about the environment and their health, food quality, food safety and their interest in organic food becomes more apparent. Several researchers have examined the behaviour of consumers of organic produce in western economies but little is known about the consumer of organic vegetables in the transitional economies. This paper uses a blend of interviews with key players in the supply chain for organic vegetables in Hanoi, Vietnam, as well as the results of a small scale survey of consumers to develop a better understanding of the organic vegetable buyer. The typical organic vegetable buyer emerges as being female, between 25 and 40 years old, well educated and earning an above average income. She is married with children, or pregnant, but is not very knowledgeable about certification. The organic vegetable buyer associates organic vegetables with better health, quality and safety. This paper recommends more control at the point of sale and better consumer education about the benefits of organic vegetables.

Keywords: /Consumer Profile/ /Organic Vegetables/ /Certification/

FOOD SAFETY

Baines, R. N., J.N. Baines. 2013. Private **food safety** and quality standards: facilitating or frustrating fresh produce growers? *Acta Hort.* 1006: 85 – 92.

Abstract

Global private food safety and quality standards have undergone some major overhauls over the past two decades with an increasing emphasis on harmonisation. The Global Food Safety Initiative (GFSI) benchmarking process is an efficient model to measure compliance which contributes to harmonising future food safety standards. While GFSI attempts to harmonise retail standards are commendable and elegant in principle, in practice, retailers continue to support their own standards. It is difficult to see retailers giving up on their own standards and the control they currently exert as chain captains. Although there are advantages in harmonising the standards and reducing certification costs, there is a need to ensure inspection costs are competitive. There is also the risk that too much harmonisation will result in private standards losing their individuality and uniqueness. Amidst the struggle for private standard dominance, alternative approaches to risk management are emerging in a similar way to how insurance risks are calculated for business. As such, certification of standards could disappear in favour of a more general risk and insurance model. This risk based approach could also lead to the effective implementation of co-regulation, where both public and private sector compliances are addressed together. This paper reviews the public-private food standards trend over the past 20 years, considers the implications and future trends in cultivating fresh produce, especially for smallholder farmers, and explores the possibility of co-regulatory coordination between public private sectors and the potential of a risk-based insurance model for food and farming.

Keywords: /Food Safety/ /Quality/ /Standards/

Cadilhon, J.J., E. Galvez-Nogales. 2013. Quality and safety management systems in fresh produce wholesale markets in Asia and Latin America. *Acta Hort.* 1006: 103 – 110.

Abstract

FAO has conducted surveys of wholesale markets in semi-industrialized countries in Asia and Latin America to identify the management systems in place to monitor or safeguard the quality and safety (Q+S) of fresh produce. To collect the information, a questionnaire was translated into local languages and mailed to market managers. The data from 115 markets revealed that wholesale markets in both Asia and Latin America were involved to various extents in Q&S management. Q&S awareness of buyers in the market was positively correlated with each one of the following elements: sellers' awareness of quality, sellers' awareness of safety and Q&S information activities to retailers. Regional differences in these systems were identified: Latin American markets report more protocols on microbial contamination whereas Asian markets report more tests for pesticide residues. Asian buyers sourcing in traditional wholesale markets are more aware of Q&S issues than those in Latin America. These results provide justification to continue efforts to raise the awareness of market stakeholders on Q&S because raised awareness has a positive impact on improving Q&S of the produce sold.

Keywords: /Food Safety/ /Fruits/ /Vegetables/ /Marketing

FRESH CUT

Birmpa, Angeliki, Vasiliki Sfika, Apostolos Vantarakis. 2013. Ultraviolet light and ultrasound as non-thermal treatments for the inactivation of microorganisms in **fresh ready-to-eat** foods. Int'l. J. Food Microbiol. 167: 96 – 102.

Abstract

The effects of two non thermal disinfection processes, Ultraviolet light (UV 254 nm) and Ultrasound (US) on the inactivation of bacteria and color in two freshly cut produce (lettuce and strawberry) were investigated. The main scope of this work was to study the efficacy of UV and US on the decontamination of inoculated lettuce and strawberries with a cocktail of four bacteria, Escherichia coli, Listeria innocua, Salmonella Enteritidis and Staphylococcus aureus. Treatment of lettuce with UV reduced significantly the population of E. coli, L. innocua, S. Enteritidis and S. aureus by 1.75, 1.27, 1.39 and 1.21 log CFU/g, respectively. Furthermore, more than a 2-log CFU/g reduction of E. coli and S. Enteritidis was achieved with US. In strawberries, UV treatment reduced bacteria only by 1–1.4 log CFU/g. The maximum reductions of microorganisms, observed in strawberries after treatment with US, were 3.04, 2.41, 5.52 and 6.12 log CFU/g for E. coli, S. aureus, S. Enteritidis and L. innocua, respectively. Treatment with UV and US, for time periods (up to 45 min) did not significantly ($p > 0.05$) change the color of lettuce or strawberry. Treatment with UV and US reduced the numbers of selected inoculated bacteria on lettuce and strawberries, which could be good alternatives to other traditional and commonly used technologies such as chlorine and hydrogen peroxide solutions for fresh produce industry. These results suggest that UV and US might be promising, non-thermal and environmental friendly disinfection technologies for freshly cut produce.

Keywords: /Fresh Cut/ /Vegetables / /Fruits/ /Microbial Quality/

Oliveira, M., et.al. 2013. Effectiveness of a bacteriophage in reducing Listeria monocytogenes on **fresh cut** fruits and fruit juices. Food Microbiol. 38 : 137- 142.

Abstract

Listeria monocytogenes is a serious foodborne pathogen and new strategies to control it in food are needed. Among them, bacteriophages hold attributes that appear to be attractive. The objective of this study was to investigate the efficacy of the bacteriophage Listex P100 to control L. monocytogenes growth on melon, pear and apple products (juices and slices) stored at 10 °C. L. monocytogenes grew well in untreated fruit slices. In juices, the pathogen grew in untreated melon, survived in untreated pear and decreased in untreated apple. Phage treatment was more effective on melon followed by pear, but no effect on apple products was observed. Reductions of about 1.50 and 1.00 log cfu plug⁻¹ for melon and pear slices were found, respectively. In juices, higher reductions were obtained in melon (8.00 log cfu mL⁻¹) followed by pear (2.10 log cfu mL⁻¹) after 8 days of storage. L. monocytogenes in apple juice was unaffected by phage treatment in which the phage decreased to almost undetectable numbers. These results highlight that Listex P100 could avoid pathogen growth on fresh-cut and in fruit juices with high pH during storage at 10 °C. The combination with other technologies may be required to improve the phage application on high acidity fruits.

Keywords: /Fresh-Cut/ /Fruits/ /Vegetables /

FRESH PRODUCE

Kusumawaty, Y. et.al. 2013. Fresh fruit and vegetable purchasing patterns among traditional and modern retail stores in Riau, Indonesia. *Acta Hort.* 1006: 193 – 202.

Abstract

This research explores consumers' purchase patterns for fresh fruit and vegetables among traditional wet markets and modern retailers. Focus group interviews were conducted in Riau Province, Sumatra, Indonesia, to identify the preferred retail outlet, time and frequency of purchase, and the factors that attract consumers to purchase fresh produce from wet markets and modern retailers. Consumers preferred the wet markets due to their superior functional advantages (freshness, variety, price, unpacked produce) and social advantages (personal relationships and the desire to support small-scale traders), while modern retailers offer greater convenience and a better shopping environment (one-stop shopping, practical packaging, convenience and environment).

Keywords: /Fresh Produce/ /Fruits/ /Vegetables/

HORTICULTURAL COMMODITIES

Irianto, B. 2013. Traditional versus modern markets in Indonesia: a case study for horticultural produce marketing in Kota Batu traditional market, East Java Province. *Acta Hort.* 1006: 165 – 170.

Abstract

The rapid development of modern retail markets in Indonesia has been observed after the dissemination of Presidential Decree No. 96/2000 on foreign investment. Although traditional markets outnumber the modern markets and the majority of consumers in Indonesia still prefer traditional markets, the number of modern markets is increasing in rural areas. Based on previous studies and the literature, this paper discusses the impact of modern markets on traditional markets, especially for fresh fruit and vegetables, and what measures are necessary to benefit the majority of consumers. With more than 238 million people, Indonesia is a good market for both national and international retailers. Along with the development of modern markets, such as minimarkets, supermarkets and hypermarkets, many problems have arisen which are putting small traditional retailers in a difficult position. The solution is in the hands of government through regulation of market allocation or placement; determining how many modern markets are permitted in a certain area; the distance from existing traditional markets; market rehabilitation. Despite the competition, the traditional markets have several advantages which enable them to compete. There is also a belief that the quality of the fresh produce in traditional markets is safer than that in modern markets. This paper looks at the case of a well-known traditional market which offers fresh and good quality horticultural commodities in the tourist city of Kota Batu in East Java.

Keywords: /Horticultural Commodities/ /Marketing/

HORTICULTURAL MARKETING

Shepherd, A.W., H. Bammann, A.M. McGregor. 2013. Promoting sustainable horticultural value chains in the South Pacific Islands – a review. *Acta Hort.* 1006: 325 – 334.

Abstract

The South Pacific Islands have a long history of short-term but ultimately unsustainable successes with horticultural export development. Reasons for this lack of sustainability include the islands' location, poor transport linkages and high costs, poor scale economies, natural disasters, plant disease and the quarantine requirements of major markets. Despite significant donor support, horticultural exports from the region remain at disappointing levels. This paper considers the factors necessary to address the many constraints to export development but also stresses that increased farmer income, as well as returns to donor investment, may be best achieved by emphasizing domestic market development. Following a brief review of the Pacific Islands agricultural economy, the paper considers past experiences with exports, including bananas from Fiji, Samoa, Tonga and the Cook Islands; squash from Tonga; kava from Fiji, and vanilla from Papua New Guinea. It then attempts to draw lessons from these experiences, to identify areas where improvements are necessary to avoid repetitions.

Keywords: /Horticultural Marketing/ /Horticultural Exports/

MARKETING

Ebarle, E. J. N. 2013. A comparative analysis of **marketing** margins of fruit and vegetables in Mindanao, the Philippines. *Acta Hort.* 1006: 143 – 148.

Abstract

This study integrates several previous studies on marketing margin analyses for fruit and vegetables in the Southern Philippines. The paper aims to determine the general efficiency of fresh produce marketing systems in Mindanao and to identify which actor(s) in the marketing chain benefit the most. Marketing margins entail an analysis of price transmission and net margins at the farm, wholesale and retail levels. A comparative analysis was undertaken using figures that were already available from existing studies that had been conducted by Agribusiness economics students at the University of the Philippines Mindanao. Nine different commodities were considered in this study: calamansi, Cardaba banana, durian, mango, Solo papaya, tomato, carrot, lettuce and potato. Results showed positive net margins where farmers received the most benefits and incurred the least cost. Prices were transmitted efficiently at each node, implying that buying price was the key factor in determining the selling price.

Keywords: /Marketing/ /Fruits/ /Vegetables/

Lamban, R.J.G., et.al. 2013. **Marketing** benefits derived from clustering: the case of vegetable clusters in Mindanao. *Acta Hort.* 1006: 203 – 208.

Abstract

One of the most limiting constraints for improving the profitability of smallholder vegetable farmers is poor marketing. With the lack of knowledge and inability to negotiate with downstream buyers, farmers have little option other than to sell their products to the traditional market. To facilitate access to technical information, credit and institutional markets, smallholder farmers are forming collaborative marketing groups. Clustering is one form of collaborative marketing in which smallholder farmers are organized into small groups within a defined territory or geographic area. Using the CRS Eight Step Plan for Agro-enterprise Development, 29 clusters were formed in three provinces in the Southern Philippines. This study explores the various marketing benefits smallholder farmers have achieved after joining the cluster. After interviewing 61 vegetable farmers from 10 clusters using a structured questionnaire, results show that upon joining the cluster, farmers became more aware of their buyer's preference for product quality and gained knowledge on how to properly handle and package their produce. Cluster farmers increased their income from vegetable farming by selling a greater product variety, a larger volume and gaining access to high value markets.

Keywords: /Marketing/ /Quality/ /Transport/

MINIMALLY PROCESSED

Concepcion, S.B. 2013. Consumer demand for minimally processed vegetables in Davao City, Philippines. Acta Hort. 1006: 125 – 132.

Abstract

In the Philippines, more and more retailers are selling pre-cut, ready-to-cook vegetables. Initially done in an attempt to salvage usable portions of unsold vegetables, pre-cut vegetables are becoming more available in both traditional wet markets and supermarkets, with varying combinations of ingredients for traditional Filipino dishes. A survey among 300 consumers in Davao City, from three income classes, was conducted to determine their buying habits and market reaction to the purchase of pre-cut vegetables. It was ascertained that price-sensitive consumers purchase ready-to-cook vegetables because they are cheaper and more convenient alternatives to buying whole vegetables. The phenomenon poses risks for consumers' health as well as opportunities for retailers to respond safely to the emerging need for convenience.

Keywords: /Minimally Processed/ /Vegetables/

POSTHARVEST DISEASES

Liu, Jia, et.al. 2013. Review: utilization of antagonistic yeasts to manage postharvest fungal diseases of fruit. Int'l. J. Food Microbiol. 167: 153 – 160.

Abstract

Significant losses in harvested fruit can be directly attributable to decay fungi. Some of these pathogenic fungi are also the source of mycotoxins that are harmful to humans. Biological control of postharvest decay of fruits, vegetables and grains using antagonistic yeasts has been explored as one of several promising alternatives to chemical fungicides, the use of which is facing increasingly more stringent regulation. Yeast species have been isolated over the past two decades from a variety of sources, including fruit surfaces, the phyllosphere, soil and sea water, and their potential as postharvest

biocontrol agents has been investigated. Several mechanisms have been proposed as responsible for their antagonistic activity, including competition for nutrients and space, parasitism of the pathogen, secretion of antifungal compounds, induction of host resistance, biofilm formation, and most recently, the involvement of reactive oxygen species (ROS) in defense response. It has been recognized that a biocontrol system is composed of a three-way interaction between the host (commodity), the pathogen and the yeast, all of which are affected by environmental factors. Efficacy and consistent performance in controlling postharvest diseases are the hurdles that must be overcome if the use of yeast biocontrol agents and other alternatives are to be widely used commercially. Therefore, attempts have been made to combine alternative treatments in order to improve their overall performance. The current review provides a brief overview of the topic of the use of yeasts as postharvest biocontrol agents and includes information on the sources from which yeast antagonists have been isolated, their mode of action, and abiotic stress resistance in yeast as it relates to biocontrol performance. Areas in need of future research are also highlighted.

Keywords: /Postharvest Diseases/ /Stress tolerance/

SUPPLY CHAIN

Jeeva, A.S. 2013. Procurement flexibility in horticultural supply chains. Acta Hort. 1006: 171 – 176.

Abstract

Today's horticultural supply chains are faced with intense pressure regarding food safety, food integrity, supply risk, quality and trust. Competitive pressures increase with increasing consumer demand as well as increased competition. As part of sustaining the supply chain from its source, a conceptual framework of procurement flexibility is suggested. As procurement occurs at every entity along a supply chain, this framework can be used for streamlining and optimisation. Strategic procurement flexibility becomes critical when the internal and external business environments change rapidly. This concept of strategic procurement flexibility enables the rapid modification of sourcing and transport operations, which are critical for perishable products. This concept is reviewed through the literature and matched with current issues of food safety, integrity, supply risk, quality and trust to develop a sustainable and flexible horticultural procurement model. This model is expected to provide competitive advantage in operational flexibility for perishable horticultural products.

Keywords: /Supply Chain/ /Quality/ /Horticultural Operations/

Le, B. N. and P.J. Batt. 2013. Farmer-buyer relationships in the cut flower supply chain in Da Lat, Vietnam. Acta Hort. 1006: 209 – 216.

Abstract

An effective and efficient supply chain requires farmers, traders, wholesalers and retailers to develop and maintain close relationships with their trading partners. The relationship constructs: satisfaction, trust, commitment, communication, coordination and power were utilised in an examination of the exchange relationships between cut flower growers and their downstream trading partners in the cut flower industry in Da Lat, Viet Nam. In the absence of any significant relationship specific investments, farmers were free to choose their preferred trading partner. Contrary to much of

the literature, coercive market power was seldom exercised. Enduring long-term relationships were primarily built upon trust through established and satisfying personal relationships.

Keywords: /Supply chain/ /Cutflower/

Nugroho, T.W., E. Li, R. Stringer and J. Bruwer . 2013. Impact of the modernization of vegetable supply chains on traditional wet markets in East Java, Indonesia: a transaction cost approach. Acta Hort. 1006. 285 – 290.

Abstract

This study analyses the impact of the modernisation of vegetable supply chains on the profit level of retailers in traditional wet markets in Indonesia, focusing on the transaction costs of the retailers in their transactions with suppliers. Data were collected from 797 traditional market retailers, in seven regions, in the Province of East Java, Indonesia. The analysis compared the transaction costs and socio-economic variables in the current market with the pervading market conditions in 2005. The impact of the different variables on profit levels were analysed using multi-group structural equation modelling. Before 2005, information cost had a significant influence on the profit level of retailers; however, in the current market, negotiation costs play a more important role. The results highlight the importance of improving the ability of retailers to negotiate with suppliers through strengthening the retailers association.

Keywords: /Supply Chain/ /Vegetable/

VALUE CHAIN

Adhikari, R. P., R. Collins and X. Sun. 2013. Relationship management in a value chain Involving “Bottom of the Pyramid” participants: a case study from Nepal. Acta Hort. 1006: 41 – 48.

Abstract

This paper explores relationships within value chains in developing countries, suggesting that a greater understanding of the social, economic and behavioural dimensions can be used to manage collaborative relationships. Relationship management is frequently described as the management of dyadic business relationships between organisations. However, the management of different dimensions of relationships at the same time among chain actors who may or may not be organised has received little attention. Findings in this paper are based on a case study of tomato value chains in Nepal. Results suggest that in a developing country, actors in value chains differ vastly in terms of organisational characteristics. Upstream, farmers are small, poor and unorganised, while downstream, supermarkets are typically larger, formally organised business entities. Actors in between them share characteristics from either end. For the majority of actors in agrifood value chains within a developing country, business relationships are personal and usually managed by the household head who is typically socially attached to other actors. For them, a relationship within a value chain is not only an economic phenomenon, but also has behavioural and social dimensions. For more formally organised actors such as supermarkets, employees who establish relationships with other actors in the chain have no social obligations to others. Evidence from this study suggests that a lack of understanding of these relationship dimensions leads to short term rather than long term relationships. This paper demonstrates that actors who better understand the nature and characteristics of their business

partners and are able to act across various relational dimensions simultaneously, have been able to establish more effective longer term business relationships.

Keywords: /Value chain/ /Tomato/

FRUITS

BANANA

Artes, L.A., M.V. Maunahan and P.A. Nuevo. 2013. An analysis of the supply chain for bulk-loaded **bananas** (*Musa* sp.) from Mindanao to Luzon. Acta Hort. 1006: 71 – 78.

Abstract

The postharvest handling system, commodity flow and key players in the supply chain for bulk-loaded bananas from the southern Philippines (Mindanao) to the domestic market in Luzon was documented and assessed through a formal survey, rapid appraisal and key informant interviews. Mixed varieties of local bananas were handled in bulk from collection in the production areas, loaded into non-ventilated container vans for inter-island shipment and then transferred to non-refrigerated vehicles for distribution to various markets. An assessment of the postharvest system revealed that fruit may be handled as many as 10 times before shipment and up to 20 times before it reached the final consumer. Some 5-8 layers in the commodity flow and 10 key players are identified in one supply chain. The shipper and consignee are the key players in the supply chain for they handle the biggest volume of bananas. The greatest risk occurred during sea transport for 2 days because of high transit temperatures and the bulk-loading practice. This can result in over ripening since a week has already elapsed since harvesting. To reduce the risk and to have a stable supply of bananas from Mindanao, the following are recommended: packing sheds or collection centres in the production areas; packing the fruit in containers during transport; use of appropriate vehicles; provision of shaded loading and unloading areas; as well as precooling and cold storage facilities in the port areas.

Keywords: /Banana/ /Handling system/ /Non-Refrigerated/ /Transport/ /Ripening

Garming, H. et.al. 2013. **Banana** value chains in Central America – options for smallholders on domestic and regional markets. Acta Hort. 331 – 338.

Abstract

The dessert banana sector in Central America is divided into two main production and marketing systems, with large-scale producers of Cavendish (AAA) bananas supplying export markets, and smallholders producing mainly 'Gros Michel' (AAA) interplanted in coffee plantations for local and national markets. This study presents an overview of banana value chains for smallholders in Nicaragua and Honduras, analyzing profits for farmers and options for upgrading. The 'Gros Michel' value chains in Nicaragua and Honduras differ primarily in that Nicaraguan value chains concentrate on national markets, while Honduran trade includes regional value chains to Guatemala and El Salvador. Two main types of national value chains were identified in Nicaragua: (i) a local chain, where farmers transport small amounts of bananas and sell them directly to wholesalers in the district capital where they are sold locally, and (ii) a longer chain with intermediaries buying at farm gate, followed by bulking, transport, ripening businesses, wholesalers, retailers directed to consumers in the country's capital.

Although in the longer chain, the share of the final price received by the farmers is lower, farmer profits are slightly higher due to a higher consumer price and lower farmer investments in transport. In Honduras, farmers usually sell at the farm gate. Depending on farm accessibility, bananas are sold to intermediaries or directly to traders who export them to Guatemala or El Salvador, with only 25% of the production sold on national markets. Several options for upgrading were identified in both countries. Process upgrading for improved fruit quality and efficient organization of transport is a basic option for all sites. Upgrading through improved coordination with traditional buyers and intermediaries who expressed their willingness to deal directly with farmers and pay higher prices for higher quality fruits might be feasible in the short term. In the longer term, options include contracts with supermarkets, possibly combined with branding of the bananas based on consumer preferences for traditionally produced 'Gros Michel'. In general, transport is a major limitation for receiving higher prices due to remoteness of the farms in coffee-growing highland areas. For the more formal contract-based market chains, requirements of minimum quantities and timing of supply imply that substantial investments in farmer organization will be necessary.

Keywords: /Banana/ /Market Chains/

Saraiva, L.A. et. al. 2013. Effect of black leaf streak disease on banana fruit quality. Acta Hort. 1006: 339 – 344.

Abstract

During fruit development, banana accumulates starch, which is then degraded during ripening. This degradation provides precursors for sucrose and volatile compounds, responsible for sweetness and the characteristic aroma of the fruit. Starch metabolism may be influenced by the phytosanitary status of the plant. Black leaf streak disease (BLS), caused by the pathogenic fungus *Mycosphaerella fijiensis*, is one of the most important diseases of banana. BLS causes yield loss and has a strong effect on postharvest fruit quality. The aim of this study was to evaluate differences between the starch and sugars contents of fruits from a BLS-infested plot and a fungicide-treated (control) plot. Starch and sugar contents were determined in fruits at two different physiological ages, i.e., early and late fruit harvest. Results show that BLS may affect starch metabolism in a way similar to the advance of physiological age.

Keywords: /Banana/ /Postharvest/ /Fruit Quality/

van der Waal, J.W. H. and J.R.J. Moss. 2013. Just green bananas: towards full sustainability of the export banana trade. Acta Hort. 986: 287 – 300.

Abstract

Bananas are an important food item for European and American consumers. It is generally the best-selling fruit item in the typical European supermarket. In recent years, concerns about food safety and sustainability issues have increased greatly. Although apparently high on the agenda of the public and policy makers, sustainability does not appear in the top three buying motives of consumers. People in their role as citizens may find sustainability important, but as consumers they set a higher value on rice, quality and appearance. Retailers offer sustainable product categories, like organic and Fairtrade bananas, but these labels have only captured a small percentage of the market. A breakthrough for Fairtrade only occurs when retailers replace their offering by Fairtrade at the same price as conventional

bananas. The retail industry has a key responsibility in guiding the mainstream consumer towards sustainable choices; consumers on their own cannot drive this agenda. Sustainability should encompass the broad range of bananas, and not just some high-price, niche categories. There is a shift in approach of sustainability in terms of immediate local impacts of a banana crop (e.g., farm pesticide, farm labor) to global impacts (e.g., on world climate and water resources). The industry has introduced voluntary business-to-business standards such as SA8000, business-to consumer standards, such as Fairtrade, organic and Rainforest Alliance, or environmental management systems, notably ISO 14001. These standards were not designed for bananas, but derived from other commodities, have different focuses and are not based on the involvement of multiple stakeholders of the banana value chain. The question is how adequate these standards are to measure and improve sustainability specifically for the banana chain. These standards are farm based, but sustainability should go beyond the farm and include the supply chain. Efficient water and energy use and greenhouse gas emissions along the chain can be estimated using life-cycle approaches with standardized protocols. The World Banana Forum is a process to discuss and exchange best practices, but does not aim yet to develop a sustainable banana standard, though it has the potential to become the nucleus for a process dedicated to banana sustainability. There is a need for a comprehensive mainstream “green banana” standard; this will avoid the confusion of multiple standards and could become a benchmark for sustainability for all export bananas. The article concludes with proposing a research agenda towards full sustainability of the export banana trade, including in standards and certifications, disease management, organic farming principles and integrated farming, climate change and energy use, and economics and marketing.

Keywords: /Banana/ /Marketing/ /Standards/ /Standards/

BERRY FRUIT

Maunula, Leena, et.al. 2013. Tracing enteric viruses in the European **berry fruit** supply chain. *Int'l. J. Food Microbiol.* 167: 177 – 185.

Abstract

In recent years, numerous food borne outbreaks due to consumption of berry fruit contaminated by human enteric viruses have been reported. This European multinational study investigated possible contamination routes by monitoring the entire food chain for a panel of human and animal enteric viruses. A total of 785 samples were collected throughout the food production chain of four European countries (Czech Republic, Finland, Poland and Serbia) during two growing seasons. Samples were taken during the production phase, the processing phase, and at point-of-sale. Samples included irrigation water, animal faeces, food handlers' hand swabs, swabs from toilets on farms, from conveyor belts at processing plants, and of raspberries or strawberries at points-of-sale; all were subjected to virus analysis. The samples were analysed by real-time (reverse transcription, RT)-PCR, primarily for human adenoviruses (hAdV) to demonstrate that a route of contamination existed from infected persons to the food supply chain. The analyses also included testing for the presence of selected human (norovirus, NoV GI, NoV GII and hepatitis A virus, HAV), animal (porcine adenovirus, pAdV and bovine polyomavirus, bPyV) and zoonotic (hepatitis E virus, HEV) viruses. At berry production, hAdV was found in 9.5%, 5.8% and 9.1% of samples of irrigation water, food handlers' hands and toilets, respectively. At the processing plants, hAdV was detected in one (2.0%) swab from a food handler's hand. At point-of-sale, the prevalence of hAdV in fresh raspberries, frozen raspberries and fresh strawberries, was 0.7%, 3.2% and 2.0%, respectively. Of the human pathogenic viruses, NoV GII was detected in two (3.6%) water samples at berry production, but no HAV was detected in any of the samples. HEV-contaminated frozen

raspberries were found once (2.6%). Animal faecal contamination was evidenced by positive pAdV and bPyV assay results. At berry production, one water sample contained both viruses, and at point-of-sale 5.7% and 1.3% of fresh and frozen berries tested positive for pAdV. At berry production hAdV was found both in irrigation water and on food handler's hands, which indicated that these may be important vehicles by which human pathogenic viruses enter the berry fruit chain. Moreover, both zoonotic and animal enteric viruses could be detected on the end products. This study gives insight into viral sources and transmission routes and emphasizes the necessity for thorough compliance with good agricultural and hygienic practice at the farms to help protect the public from viral infections.

Keywords: /Berry Fruit/ / Foodborne Viruses/

BILBERRY

Katja Karppinen, Katja, et.al. 2013. Changes in the abscisic acid levels and related gene expression during fruit development and ripening in **bilberry** (*Vaccinium myrtillus* L.). *Phytochem.* 95: 127 – 134.

Abstract

Abscisic acid (ABA) is a natural plant hormone playing an important role in many physiological processes including fruit ripening and is also recently found to be potential for biomedical applications. This study was aimed to measure ABA levels and its biosynthesis in bilberry (*Vaccinium myrtillus* L.), which is one of the best sources of anthocyanins. Five ABA biosynthetic genes were isolated from bilberry and their expression profiles were studied in bilberry tissues, particularly during berry development. The level of ABA highly increased at the onset of bilberry fruit ripening, at the stage when expression of anthocyanin biosynthetic genes, chalcone synthase (VmCHS) and anthocyanidin synthase (VmANS), also increased. In fully ripe berries and leaves, ABA levels were lower but none was detected in bilberry stem or rhizome. The expression of 9-cis-epoxycarotenoid dioxygenase (VmNCED1) and putative neoxanthin synthase (VmNSY) was high in berry tissues and their expression increased markedly at the onset of berry ripening along with the accumulation of ABA. In contrast, the expression of zeaxanthin epoxidase (VmZEP), short-chain dehydrogenase/reductase (VmSDR/ABA2) and aldehyde oxidase (VmAO) were most highly associated with leaf tissues with no obvious relation to ABA content during berry development. The obtained results indicate that the ABA biosynthesis may play an important role in the regulation of ripening of non-climacteric bilberry fruits through transcriptional regulation of key ABA biosynthetic genes.

Keywords: /Bilberry/ /Ripening/

CALAMANSI

Agravante, J.U., et.al. 2013. Postharvest losses in the supply chain of **calamansi** (*Citrofortunella microcarpa*) and loss reduction with modified atmosphere packaging. *Acta Hort.* 1006: 49 – 56.

Abstract

During the off-season, calamansi is sourced from Mindanao for the Metro Manila market. To reduce postharvest losses, a multi-disciplinary team sought to determine the effectiveness of modified atmosphere packaging (MAP), coupled with the curing of the fruit prior to shipment. Of the 9,422 kg of fruit harvested, only 0.6% was classified as unmarketable, but at the retail level, 13% were considered

unmarketable. Postharvest disease, mainly due to *Penicillium digitatum*, was the primary cause of loss at the retail level (86%). Other losses were attributed to plugging (6%), yellowing (4%) and browning (4%). Packaging cured calamansi in 20 kg crates with a polyethylene bag (0.038 mm thick with 160 diffusion holes) increased the amount of marketable fruit from 68% (no curing, no MAP) to 95% (cured, with MAP). Furthermore, MAP of cured calamansi reduced moisture loss during transport from 5% to 0%.

Keywords: /Calamansi/ /Calamondin/ /Philippine Lime/ /Transport/ /Handling/ /Curing/ /Quality/

DRAGON FRUIT

Kammapana, L., et.al. 2013. SEM studies on the morphology of 'white pulp' **dragon fruit**. Acta Hort. 1006: 85 – 90.

Abstract

Dragon fruit (*Hylocereus undatus*) is one of the new focuses for the next source of nutritional composition in Thailand. It is a good source of dietary fiber, β - carotene, magnesium, calcium, potassium mucilage, and total phenol. However, dragon fruit rapidly loses visual quality due to chlorophyll degradation of the bract or scales. Thus, the study of yellowing in the bract of dragon fruit is very important in solving the problem of loss due to yellowing. To understand the cause of bract yellowing, morphology of the fruit peel and bract were studied. At different stages of fruit development (10, 20, 30, and 40 d after anthesis), both peel and bract were sampled and observed with Scanning Electron Microscopy (SEM) at 100 \times . Both were evaluated for density of the stomata. The results showed that the bract of dragon fruit at all stages of fruit development showed significantly higher density of stomata than that of the fruit peel, by about 3-4 times. As a result, water transpired via the stomata located on the bract faster than the fruit peel. Thus, bract of dragon fruit showed rapid loss of visual quality and became unacceptable. Moreover, differences in the morphology of the fruit tissue could be related to changes at the physiological level in dragon fruit at different stages of fruit development.

Keywords: /Dragon Fruit/ /Morphology/

DURIAN

R.G. Abad, R. G. and K.J.T. Cruz. 2013. Incidence of *Phytophthora* fruit rot on four **durian** cultivars in Davao City, Philippines. Acta Hort. 1006: 35 – 40.

Abstract

A two-year study was conducted on a farm in Davao City to investigate the incidence of *Phytophthora* fruit rot on four commercial durian (*Durio zibethinus* Murr.) cultivars previously laboratory tested for their reaction to the disease using isolates of the pathogen, *Phytophthora palmivora* Butler. In Year 1, disease incidence was highest on cultivars 'Alcon Fancy' and 'Arancillo' at 10.7% and 9.9%, respectively. Lower levels of infection were observed for cultivar 'Puyat' (0.5%) and no infection was recorded for cultivar 'Seri Kembangan'. The same trend was obtained in Year 2, further confirming previous laboratory infection test results. The incidence of infection for 'Alcon Fancy' was 47.3%, followed by 'Arancillo' (25.9%), 'Puyat' (12.6%) and 'Seri Kembangan' (2.1%). In monetary terms, the Year 1 total of 545 infected fruit was equivalent to a potential income loss of PhP 27,250. In Year 2, the total of 1,233 infected fruit translated into a potential income loss of PhP 49,320. 'Alcon Fancy', with the

highest level of infection, contributed PhP 21,873, followed by 'Arancillo' (PhP 15,967), 'Puyat' (PhP 11,925) and 'Seri Kembangan' (PhP 1,295). Results of the study suggest that more disease management interventions are necessary for the more susceptible, but commercially preferred cultivars. Several fruit nursery operators in Davao City indicated that propagating 'Alcon Fancy' and 'Arancillo' seedlings is no longer profitable since knowledgeable farmers do not plant them anymore, citing high susceptibility to *Phytophthora* as the primary reason.

Keywords: /Durian/ /Diseases/

KIWIFRUIT

Latochaa, Piotr, et.al. 2013. Changes in postharvest physicochemical and sensory characteristics of hardy **kiwifruit** (*Actinidia arguta* and its hybrid) after cold storage under normal versus controlled atmosphere. *Postharvest Biol. & Technol.* 88: 21 – 33.

Abstract

Changes in sensory and physicochemical characteristics of fruit of *Actinidia arguta* and its hybrid after cold storage (1°C and 85%RH) in air (AS) versus controlled atmosphere (CA) with low oxygen concentration (1.5%O₂+ 1.5%CO₂) were examined over a period of four and eight weeks. The investigation was carried out on two cultivars, 'Ananasnaya' (*A. arguta*) and 'Bingo' (*Actinidia purpurea* × *A. arguta*) harvested at two stages of maturity (6.5–8% and 8–9.5% soluble solids, respectively). During long-term storage the strongest changes in fruit characteristics were in fruit firmness and acidity. Air storage was an adequate method of refrigerated storage of fruit over a short period of 4 weeks. Application of CA can be very useful for storing hardy kiwifruit over a longer, 8 week period. The sensory characteristics of fruit stored in CA and then ripened during simulated shelf-life were similar to those of vine ripe fruit. The most significant negative change in the sensory characteristics of fruit after long-term cold storage was the increase in the intensity of their bitter taste.

Keywords: /Kiwifruit/ /Cold Storage/

MANGO

Aguinaldo, R.T., et.al. 2013. Price spread analysis of **mango** in Southern Mindanao, Philippines. *Acta Hort.* 1006: 57 – 62.

Abstract

A price spread is the difference in the value of a product at two levels in the marketing chain. It reflects the margins and costs incurred at each node in the marketing chain. This study seeks to examine the behaviour of price spreads across the Southern Mindanao mango supply chain, identify the factors affecting price spreads, and examine the shares received at each node in the chain. Results show that farm prices are generally decreasing faster relative to wholesale and retail prices. The share of farm gate price to retail price is also decreasing over time. Results show that retailers accumulate the highest share. This reflects the high costs incurred at the retail level, which are attributed to the high wastage rate. An analysis of price spreads show that farmers receive the least benefit among the actors in the chain.

Keywords: /Mango/

Yasunaga, E. et.al. 20013. Comparison of postharvest quality changes of export mango fruit from different harvest sites in Thailand. Acta Hort. 1006: 423 – 428.

Abstract

In this study, we aim to clarify the effects of the postharvest environment of mango fruit (*Mangifera indica* L. 'Namdok Mai') on its physiological characteristics during distribution from Thailand to Japan. Fruit was harvested from different orchards in Thailand: Phrao, Phitsanulok and Mae Teang. The fruit quality at harvest was found to be different between the orchards. Although the hardness scores were slightly different between the orchards, the total sugar content at harvest for fruit produced in Phrao was significantly higher than the fruit produced in Phitsanulok and Mae Teang. Conversely, the content of L-AsA at harvest was the highest for fruit from Mae Teang, followed by Phrao and Phitsanulok. Three fruit quality indicators: hardness score, total sugar content and TSS, showed similar responses irrespective of harvest sites. The results confirm that different production and distribution management practices can influence the quality of mango fruit and thus impact on the price the fruit receives in both domestic and international markets.

Keywords: /Mango/ /Quality/ /Export/ /Postharvest/

Yuniarti and P. Santoso. 2013. Improving postharvest handling of 'Arumanis' mango in East Java, Indonesia. Acta Hort. 1006: 429 – 434.

Abstract

The aim of the research was to: (1) map the distribution pattern for 'Arumanis' mango from producers to consumers; (2) develop a strategy for improving mango marketing in East Java; and (3) find alternative methods to improve postharvest handling practices for 'Arumanis' mango. Results show that there were seven channels for marketing 'Arumanis' mango. Improving postharvest handling practices improved both the quality and competitiveness of 'Arumanis' mango in the market.

Keywords: /Mango/ /Supply Chains/ /Marketing/

PAPAYA

Gisela P.M. Barreto, Gisela P.M., et.al. 2013. Influence of ethylene on carotenoid biosynthesis during papaya postharvesting. J. Food Comp. & Anal. 24: 620–624.

Abstract

The carotenoid composition was evaluated during ripening of papaya cv. 'Golden' under untreated (control) conditions and treated with ethylene and 1-methylcyclopropene (1-MCP). At the end of the experiments, the total carotenoid content in the control group (2194.4 mg/100 g) was twice as high as that found in ethylene (1018.1 mg/100 g) and 1-MCP (654.5 mg/100 g) gas-treated samples. Separation of 21 carotenoids by HPLC connected to photodiode array and mass spectrometry detectors showed that no minor carotenoids seemed to be particularly favoured by the treatments. Lycopene was the major carotenoid in all untreated and gas-treated samples, ranging from 461.5 to 1321.6 mg/100 g at

the end of the experiments. According to the proposed biosynthetic pathway, lycopene is the central compound, since it is the most abundant carotenoid indicating a high stimulation of its upstream steps during ripening, and it is the source for the synthesis of other derivative compounds, such as b-cryptoxanthin. The influence of both gas treatments on the carotenoid biosynthetic pathway was considered.

Keywords: /Papaya/ /Ethylene/ /1-MCP/ /Postharvest/

Pino, George A. 2013. Odour-active compounds in papaya fruit cv. Red Maradol. Food Chem. 146: 120–126.

Abstract

Application of solid-phase microextraction and simultaneous distillation–extraction combined with GC–FID, GC–MS, aroma extract dilution analysis, and odour activity value were used to analyse volatile compounds from papaya fruit cv. Red Maradol and to estimate the most odour-active compounds. The analyses led to the identification of 137 compounds; 118 of them were positively identified. Twenty-five odorants were considered as odour-active compounds and contribute to the typical papaya aroma, from which ethyl butanoate, benzyl isothiocyanate, 1-hexen-3-one, (E)-b-ionone, and methyl benzoate were the most odour-active compounds.

Keywords: /Papaya/ /*Carica Papaya*/

PEACH

Li, Xuan, et.al. 2014. Effects of infrared radiation heating on peeling performance and quality attributes of clingstone peaches. LWT – Food Sci. & Technol. 55: 34 – 42.

Abstract

Salinity and wastewater disposal problems associated with the conventional wet-lye method for peeling clingstone peaches result in considerable negative environment impacts. The efficacy of using infrared (IR) heating as an alternative method for peach peel removal was investigated to eliminate the use of water and chemicals. Peaches sorted into three size categories were double-sided heated under IR with three emitter gaps for a range of heating times from 90 s to 180 s. Wet-lye peeling was used as a control. Results showed that 180 s IR heating for medium sized peaches under an emitter gap of 90 mm yielded 84 mm²/100 mm² peelability and 90 g/100 g peeling yield, produced peeled products with comparable firmness and color to wet-lye peeled peaches. Surface temperature increased rapidly (> 00 °C) during IR heating whereas the flesh temperature at 16 mm beneath skin remained relatively low (<45 °C). Thermal expansion of cell walls and collapse of cellular layers adjacent to skins were found in IR heated peaches and differed from the micro-structural changes observed in lye heated samples, indicating their mechanistic difference. Promoting uniform and rapid surface heating is essential to further develop IR heating as a non-chemical method for peach peeling.

Keywords: /Peach/ /Temperature/

PEAR

Whitaker, B.D. 2013. Genetic and biochemical bases of superficial scald storage disorder in apple and pear fruits. Acta Hort 1006: 47 – 60.

Abstract

Superficial scald is a physiological storage disorder affecting apple and pear fruits. The disorder develops during cold storage and intensifies after removal to market temperatures. Scald symptoms result from necrosis of a few hypodermal cell layers and manifest as brown or black patches on the fruit skin. Susceptibility to scald varies greatly by cultivar, and is also influenced by preharvest factors such as growing climate and maturity, and postharvest factors including storage atmosphere, ventilation, and temperature. Despite many years of investigation, the biochemical mechanisms underlying scald are still in question. The disorder is thought to be a type of chilling injury induced by oxidative stress. A long-standing hypothesis holds that oxidation products of the sesquiterpene α -farnesene are directly involved via generation of free radicals. Variation in the antioxidant defense mechanisms required to scavenge radicals and combat oxidative stress is postulated to also play a key role in susceptibility or resistance to scald. A marked rise in α -farnesene synthesis typically occurs shortly after scald-susceptible fruit are placed in storage and oxidation of the α -farnesene to conjugated trienols (CTols) proceeds rapidly after about 6-8 weeks, particularly in air storage. High level accumulation of CTols during storage is usually correlated with the incidence and severity of scald. Further evidence supporting a link between α -farnesene oxidation and induction of scald was the finding that prestorage treatment of apples or pears with 1- methylcyclopropene (1-MCP), a blocker of ethylene action, drastically reduced α -farnesene synthesis and scald development. Silencing genes that control α -farnesene biosynthesis or conversion to CTols should prove or disprove a major role of α -farnesene oxidation in the induction of scald. The primary target for gene knockout is *AFS1* encoding α -farnesene synthase, which catalyzes the final step in α -farnesene biosynthesis. Enzymatic production of CTols is as yet hypothetical, but possibly a glutathione peroxidase or glutathione S-transferase catalyzes reduction of farnesyl hydroperoxides to the corresponding alcohols. In addition, the precise mechanisms whereby 1-MCP, diphenylamine, UV-visible light irradiation, initial low oxygen stress, and intermittent warming ameliorate or prevent scald are currently being investigated using biochemical, functional genomics, and metabolomics approaches.

Keywords: /Pear/ /Chilling Injury/ /Ethylene/ /Superficial Scald/

PINEAPPLE

Azarakhsha, Nima, et.al. 2013. Lemongrass essential oil incorporated into alginate-based edible coating for shelf-life extension and quality retention of fresh-cut pineapple. Postharvest Biol. & Technol. 88: 1 – 7.

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, physicochemical properties, and microbiological and sensory quality of fresh-cut pineapple during 16 days of storage ($10 \pm 1^\circ\text{C}$, $65 \pm 10\%$ 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.

Keywords: /Pineapple/ /Fresh-Cut/ /Edible Coating/

Raimbault, Astrid-Kim. 2013. A novel aspartic acid protease gene from **pineapple** fruit (*Ananas comosus*): cloning, characterization and relation to postharvest chilling stress resistance. *J. Plant Physiol.* 1536– 1540.

Abstract

A full-length cDNA encoding a putative aspartic acid protease (AcAP1) was isolated for the first time from the flesh of pineapple (*Ananas comosus*) fruit. The deduced sequence of AcAP1 showed all the common features of a typical plant aspartic protease phytepsin precursor. Analysis of AcAP1 gene expression under postharvest chilling treatment in two pineapple varieties differing in their resistance to blackheart development revealed opposite trends. The resistant variety showed an up-regulation of AcAP1 pre-cursor gene expression whereas the susceptible showed a down-regulation in response to postharvest chilling treatment. The same trend was observed regarding specific AP enzyme activity in both varieties. Taken together our results support the involvement of AcAP1 in postharvest chilling stress resistance in pineapple fruits.

Keywords: /Pineapple/ /Blackheart/ / Postharvest/ /Chilling Treatment/

Zhang, Bao-Yu, et.al. 2014. Effect of initial headspace oxygen level on growth and volatile metabolite production by the specific spoilage microorganisms of fresh-cut **pineapple**. *LWT- Food Sci. & Technol.*

Abstract

The effect of initial headspace (IH) O₂ level on the shelf-life of fresh-cut pineapple was evaluated in this study. The results showed that although the IH O₂ level had a minor effect on the growth of *Candida argentea*, *Candida sake* and *Meyerozyma caribbica* on pineapple agar, the quantities of the volatile organic metabolites produced by these yeasts was generally smaller the lower the IH O₂ level. The only exception was the production of ethyl acetate by *C. argentea*, which was higher at low IH O₂ levels. In triangle tests performed with trained panellists, pineapple cubes packaged in an IH of 5% O₂ were determined to be significantly different ($P < 0.05$) to those packaged in 21% O₂ from day 5 of storage. Preference was shown for the pineapple cubes packaged in an IH of 5% O₂. The results imply that packaging in an IH O₂ level of 5% could be used to extend the shelf-life of fresh-cut pineapple.

Keywords: /Pineapple/ / Modified Atmosphere Packaging/

PLUM

Cristina Mihalache Arion, Cristina M., et.al. 2013. Antioxidant potential of different **plum** cultivars during storage. *Food Chem.* 146: 485 – 491.

Abstract

Plums, the most commonly consumed fruits from Romania, are fruits rich in bioactive compounds, such as antioxidants. This research work was carried out to investigate the antioxidant potential of twelve plum cultivars, fresh and stored during 10 days at 4 °C by using different methods (DPPH, ORAC and erythrocyte resistance to haemolysis). The contents of total phenolic compounds and total anthocyanins were also determined by specific spectrometric methods. Significant differences between fresh and stored plum cultivars ($p < 0.05$) were found. Storage at 4 °C resulted in an increase in antioxidant potential and anthocyanins content of the autumn plum varieties. Autumn plum varieties also showed a higher antioxidant capacity than summer varieties, as assessed by the ORAC and the haemolysis resistance assays. Our results suggest that, even after storage, plums could be a good source of antioxidants, which may provide health-promoting effects for humans.

Keywords: /Plum/ /Storage/

WATERMELON

Danyluk , Michelle D., Loretta M. Friedricha, Donald W. Schaffner. 2013. Modelling the growth of *Listeria monocytogenes* on cut cantaloupe, honeydew and watermelon. *Food Microbiol.* 38: 52 – 55.

Abstract

A recent outbreak linked to whole cantaloupes underscores the importance of understanding growth kinetics of *Listeria monocytogenes* in cut melons at different temperatures. Whole cantaloupe, watermelon, and honeydew purchased from a local supermarket were cut into 10 ± 1 g cubes. A four-strain cocktail of *L. monocytogenes* from food related outbreaks was used to inoculate fruit, resulting in $\sim 10^3$ CFU/10 g. Samples were stored at 4, 10, 15, 20, or 25 °C and *L. monocytogenes* were enumerated at appropriate time intervals. The square root model was used to describe *L. monocytogenes* growth rate as a function of temperature. The model was compared to prior models for *Salmonella* and *Escherichia coli* O157:H7 growth on cut melon, as well as models for *L. monocytogenes* on cantaloupe and *L. monocytogenes* ComBase models. The current model predicts faster growth of *L. monocytogenes* vs. *Salmonella* and *E. coli* O157:H7 at temperatures below 20 °C, and agrees with estimates from ComBase Predictor, and a corrected published model for *L. monocytogenes* on cut cantaloupe. The model predicts $w4$ log CFU increase following 15 days at 5 °C, and ~ 1 log CFU increase following 6 days at 4 °C. The model can also be used in subsequent quantitative microbial risk assessments.

Keywords: /Watermelon/ /Cantaloupe/ /Melon/ /Fresh-Cut/

VEGETABLES

BABY SPINACH

Giacomo Cocettaa, et.al. 2014. Effect of cutting on ascorbic acid oxidation and recycling in fresh-cut baby spinach (*Spinacia oleracea* L.) leaves. *Postharvest Biol. & Technol.*: 8 – 16.

ABSTRACT

Fresh-cut spinach during processing undergoes several mechanical procedures such as cutting, which may induce stress responses. These stresses may trigger the accumulation of harmful reactive oxygen species (ROS). Plants respond through a wide range of mechanisms and ascorbic acid (AsA) has an important role. The combined effect of cutting, temperature and storage time on AsA recycling route in spinach fresh-cut leaves was studied. AsA, gene expression and activities of the enzymes involved in the AsA oxidation and recycling were considered. Spinach leaves were cut in six pieces and stored at 4°C or 20°C. AsA content and enzymes activities were measured over six days of storage, while gene expression analyses were performed in a time-point experiment within 24 h after cutting. Results showed that AsA decreased after cutting (from 19.41 mg/100 g FW to 15 mg/100 g FW) and generally was higher in samples stored at 4°C. After six days, AsA was 10 mg/100 g in control and 5 mg/100 g FW in cut leaves. The expression of genes and activities of the enzymes involved in the AsA oxidation and recycling route were, for some enzymes, in accordance with AsA levels. The APX (EC 1.11.1.11) activity after cutting increased up to 290 nmol AsA mg⁻¹prot min⁻¹ compared to the control with 190 nmol AsA mg⁻¹prot min⁻¹. AsA reduction is firstly affected by temperature and aggravated by cutting procedures. AsA represents a valuable postharvest quality indicator of freshness in spinach leaves.

Keywords: /Baby Spinach/ /Fresh-Cut/ /Storage/

CABBAGE

Thammawong, M. et.al. 2013. Expression of physical wound stress-responsive genes in *Arabidopsis thaliana* and cabbage (*Brassica oleracea* var. *capitata* L.). Acta Hort. 989: 73 – 78.

Abstract

Mechanical disruption of the cell wall results in stress signaling, cellular response, and metabolism changes in plant cells. However, the molecular mechanisms in relation to mechanical/physical stress of fresh produce are still unclear. In this study, we have utilized mechanical wounding as the stress stimulus to study the expression of candidate stress-responsive genes in *Arabidopsis thaliana* leaf (*AtERF#018*, *CML38*, *ACS6*, *PAL1*) and in cabbage (*Brassica oleracea* 'Early Ball') head leaf (*BoCam1*, *BoCam2*). In *Arabidopsis* leaf, the expression of *AtERF#018* was rapidly induced within 5 min. after the wounding treatment. The increase in the *CML38* and *ACS6* expression levels were observed at 15 min. Although a significant increase of the expression was observed at 60 min. after the wounding treatment, the expression of *PAL1* remained low during the investigation period. For cabbage, the predominant increases in *BoCam1* expression levels in head leaf disks were observed at 30 and 60 min. after treatment. In contrast, the expression level of *BoCam2* was detected at low level and the significant increase in expression of *BoCam2* was found at 120 to 240 min. after the wounding treatment. Expression levels of candidate stress-responsive genes were correlated with the time after stress induction for both *Arabidopsis* and cabbage. Overall, applying a mechanical wounding stimulus clearly affected the expression of stress-responsive genes. The rapid response of these genes may consequently affect the cellular response and metabolism changes in *Arabidopsis* and in cabbage.

Keywords: /Cabbage/ /Wounding Treatment/

CAULIFLOWER

Lijuan Zhana, 2014. Light exposure reduced browning enzyme activity and accumulated total phenols in cauliflower heads during cool storage.

Abstract

Effects of continuous light exposure ($24 \mu\text{mol m}^{-2}\text{s}^{-1}$) on browning enzyme activity and total phenol (TP) content in fresh cauliflower heads were investigated during 7 d storage at 7°C using darkness as the control. Results showed that light exposure inhibited polyphenol oxidase activity (PPO) by 26% and peroxidase (POD) by 16%, as well as lowering the browning index (BI) by 33%, compared to darkness, at the end of storage. Light exposure also induced 43%, 35%, and 20% increases in phenylalanine ammonia-lyase (PAL) activity at 1, 3, and 5 d storage, respectively, thus accumulating 41% more de novo TP content than in darkness after 7 d storage. In addition, vitamin C content deteriorated during storage under both light and dark conditions, with light exposure preserving vitamin C content 30% more than in darkness. However, light exposure accelerated fresh weight loss, with the largest value of 1.8% at the end of storage.

Keywords: /Cauliflower/ /Storage/

ONIONS

Maity, T.K. and A.B. Sharangi. 2013. Supply chain management of onion in India: status, issues and Acta Hort. 1006: 239 – 244.

Abstract

India is one of the leading producers of vegetables and spices in the world. Among the few crops that are used as both vegetables and spices, onion is important. It is utilized throughout the world in various food preparations. Despite the strong demand, India performs very poorly in the global market for both fresh and processed products. Much of the reason for the poor performance is attributed to poor supply chains. In 2009, India exported 18.73 million tonnes of onions. The major value-added products are dehydrated flakes, granules and powder, and pastes. This paper focuses on the nature of the supply chains prevailing in India, perceptions of value addition and target customers.

Keywords: /Onions/ /Supply Chain/ /Export/

SHALLOTS

Arsanti, I. W. et. al. 2013. Supply chains of shallots (*Allium ascalonicum* L.) in Central Java, Indonesia. Acta Hort. 1006: 63 – 70.

Abstract

In Indonesia, horticultural commodities provide a promising prospect for economic development. One of the important horticultural commodities is shallot (*Allium ascalonicum* L.). There is a high demand for shallot in Indonesia, with as much as 14% of the demand being met by imports. On the other hand, possibilities exist to export this commodity. However, the industry in Indonesia suffers from low production, fluctuating prices in the domestic market, an underdeveloped marketing system, various export barriers and increasing competition from imported shallots. To overcome these problems, the Government of Indonesia has been conducting the Horticulture Agribusiness Development Program in Supply Chain Management. This study is an attempt, in part, to evaluate the

distribution channels for shallots cultivated in the main shallot producing centre in Brebes, Central Java. The results suggest that there are four main distribution channels for shallots. The form of the distribution channel influences the price, the profitability, costs and the marketing margin. Farmers tend to be price takers, selling shallots to local collector agents (85%), traditional wholesalers (5%) and local retail markets (10%).

Keywords: /Shallot/

TOMATO

Ordookhani, K., et.al. 2013. Effect of plant growth promoting *Rhizobacteria* and *Mycorrhiza* on tomato fruit quality. Acta Hort. 989: 91 – 96.

Abstract

Tomato is the second most cultivated vegetable in the world, after potato. The tomato fruit is consumed in diverse ways, including raw, as an ingredient in many dishes and sauces, and in drinks. The fruit is rich in lycopene, which may have beneficial health effects. On the other hand, plant growth promoting rhizobacteria (PGPR) and *Mycorrhiza* can increase plant growth in several ways. Experiment was set in a factorial design based on Random Complete Block Design, with PGPR (*Pseudomonas putida* strain 41, *Azotobacter chroococcum* strain 5 and *Azospirillum lipoferum* strain OF) and mycorrhiza treatments. Vitamin C, Total Dissolved Solid (TSS), pH, P, K, Ca were measured in tomato fruit. All factors in inoculated treatments increased compared to controls. An antagonistic effect was found on the application of *Pseudomonas* with *Azotobacter* or *Azospirillum* while a synergistic effect was found between usage of *Azotobacter* and *Azospirillum* together. On the other hand when AMF was added to all treatments, quality factors increased.

Keywords: /Tomato/

Van de Perre, Evelien, et.al. 2013. Screening of moulds and mycotoxins in tomatoes, bell peppers, onions, soft red fruits and derived tomato products. Food Control. 37: 165 – 170.

ABSTRACT

International standards and European legislation are available for well established mycotoxins such as aflatoxins (AF), ochratoxin A (OTA) and trichothecenes in a variety of dried plant products. However, information of mycotoxins in fresh fruit and vegetable produce and derived products is limited. A semi quantitative screening method was developed to screen for six mycotoxins (alternariol (AOH), alternariol monomethyl ether (AME), OTA and fumonisin B1, B2 and B3 (FB)) relevant in different matrices (tomatoes, bell peppers, onions and soft red fruits). On tomatoes, onions and soft red fruits, *Alternaria* spp. and their associated mycotoxins were detected. Derived tomato products were also screened and six out of 173 samples and four out of 173 samples were positive for AOH and AME, respectively. Moreover, 11/11 derived tomato products, containing AOH or AME, were positive for tenuazonic acid (TeA) as well. A dietary exposure assessment was performed for TeA with Belgian consumption data, and the obtained mean value (4230 ng/kg bw/day) was higher than the threshold of toxicological concern (TTC) value of 1500 ng/kg bw/day set by EFSA. This study demonstrates the necessity for further mycotoxin research in the fresh produce chain in order to guarantee the safety and health of the consumers.

Keywords: /Tomato/ /Mycotoxin/ /Fruit/ /Vegetable/ /Mould/ /Alternaria

HERBS AND SPICES

Ornamental Pepper

Cavatte¹, R.P.Q., et.al. 2013. Influence of temperature and 1-methylcyclopropene on post production display life of **ornamental pepper** (*Capsicum annuum* L.). Acta Hort. 1002: 359 – 364.

Abstract

Potted ornamental peppers are very popular among Brazilian's consumers; however, there are only a few works regarding the use of adapted cultivars to be grown in small pots and the environmental factors affecting their post-production display life. In a previous work it was established that the cultivar 'BGH 1039', held at the Federal University of Viçosa, Brazil, is adapted to be sold as an ornamental plant, but it is sensitive to the action of ethylene, causing yellowing and abscission of leaves and drop of fruits, even when exposed to relatively low levels of ethylene. This experiment had the goal to evaluate the effects of 1-methylcyclopropene (1-MCP) on plants kept under low irradiance or in darkness at high temperature of 35°C for 48 hours, simulating the prevailing shipping conditions in Brazil. Control plants kept in the dark had significant drop in the chlorophyll and carotenoid contents at the end of the 48 hours of heat stress. But, no significant decrease of the pigments was detected when the plants were kept in the light. Fumigation with 1 µl L⁻¹ 1-MCP overcame the effect of the dark in inducing the chlorophyll and carotenoid degradation, and significantly increased content of the pigments when stored in the low irradiance light condition. Storage in the dark at 35°C for 48 hours induced abscission of 79.7% of the leaves, but only 9.4% of leaf abscission was observed when 1-MCP was applied. Storing the plants under light and heat stress induced leaf abscission of 16.2%, but the leaf drop was completely inhibited when the plants were treated with 1-MCP. Regardless the light regime and pre-treatment with 1-MCP, all plants had significant increase of the peroxidase and catalase activities after 48 hours at 35°C.

Keywords: /Ornamental Pepper/ Ethylene/

ORNAMENTALS

FLORIST GREENS

Mabini, N.Q. and V. Z. Acedo. 2013. Vase life of selected florist **greens** in different holding solutions with commercial preservatives. Acta Hort . 989: 79 – 82.

Abstract

Florist greens enhance the beauty of flower arrangements and should have decorative appeal and vase life that match that of the cut flowers. Flower preservatives are commonly used to extend the vase life of cut flowers but their effects on cut foliage are less known. This study compared the efficacy of two commercial preservatives, Eurofleur and Cocogro, in prolonging the vase life of cut foliage of *Microsorium punctatum* 'Gradiceps', *Davalia* sp. and *Dracaena sanderiana*. Two concentrations of Eurofleur (5 and 10 mg.L⁻¹) and Cocogro (10 and 15 mg.P⁻¹) were tested as holding solutions and

compared to tap water as control during ambient storage (23-33°C, 65-88% RH). Responses to preservative treatments varied with cut foliage. In *M. punctatum* 'Gradiceps', the two preservatives had no effect on senescent changes. Eurofleur even promoted senescence, resulting in a shorter vase life (4.2-4.9 weeks) than that of the control and Cocogro treatments (6.2- 8.9 weeks). In *Davalia sp.*, 5 g.L-1 Eurofleur inhibited senescence and improved the vase life by about 5 d more than that of the control and Cocogro treatments (13.3- 14.0 d). In *D. sanderiana*, the two preservatives had no remarkable effect as the cut foliage from all treatments remained visually desirable at the end of the 32-d holding period.

Keywords: /Florist Greens/ /Cut Foliage/ /Vase Life/ /Chemical Preservatives/

FLOWER BULBS

Miller, W.B., et.al. 2013. Respiration of **flower bulbs**: influence of cultivar, temperature, wounding, bulb size and ethylene. Acta Hort. 1002: 365 – 372.

Abstract

The literature on flower bulb respiration is relatively slim. We have conducted a series of experiments to characterize bulb respiration rates of a range of tulip, narcissus and hyacinth cultivars, and under different environmental conditions. Measurements were made in October-December, using bulbs imported from The Netherlands that were held ventilated at 17°C until use. As expected, resting respiration rates (CO₂ production) varied significantly by cultivar, ranging from 10-18, 9-15 and 12-35 ml/kg/h for hyacinth, narcissus and tulip bulbs, respectively. In bulbs of two tulip cultivars, respiration increased dramatically as temperature increased from 4 to 30°C. Following 2 weeks exposure to 10 µl/L ethylene (Oct.-Nov.), respiration was initially greater (52%, averaged over 14 cultivars) compared with non-ethylene treated tulip bulb. In the 6-8 days following treatment, respiration of ethylene-treated bulbs decreased to that of control bulbs, but not in all cultivars. In 'Bright Parrot', ethylene exposed bulbs maintained 44% greater respiration for at least 16 days after ethylene treatment ended. When 'Foxtrot' tulip bulbs were wounded by dropping them 3 times onto a solid surface from 85 cm, respiration doubled within 2-3 hours, and remained elevated (2 to 2.5-fold higher) until the experiment was concluded after 24 days. Respiration rate was not significantly different between smaller and larger (26.3 vs. 36.5 g per bulb) 'Foxtrot' bulbs collected from the same lot.

Keywords: /Flower Bulb/ /Temperature/ /Ethylene

GLADIOLUS

Saeed, Tariq, et.al. 2013. Zinc augments the growth and floral attributes of **gladiolus**, and alleviates oxidative stress in cut flowers. Scientia Hort. 164: 124 – 129.

Abstract

Zinc being an activator of certain enzymes, regulates antioxidant activity; therefore, it could enhance the shelf life of cut flowers. This study on zinc (Zn) nutrition of gladiolus was conducted for two years (2010–2011) in the greenhouse. Graded levels of zinc, viz., 0, 2, 4, 6, 8 and 10 mg Zn kg⁻¹ were applied in soil media. Results in both the years revealed significant positive response to zinc application on growth and vase life attributes of gladiolus. Zinc at 6 mg kg⁻¹ rendered the highest impact for increasing the leaf area, spike length, flower size, fresh and dry biomass weight. Less number of days to

flowering and higher count of florets per spike was recorded with 8 mg Zn kg⁻¹. Chlorophyll and protein contents were highest at 6 mg Zn kg⁻¹; whereas, Zn contents were highest with 10 mg Zn kg⁻¹. Vase quality parameters like percent florets opened, vase life and fresh weight change were greater with 8 mg Zn kg⁻¹, and the least membrane leakage was also ensured at this rate. Antioxidant enzymes, viz., SOD, CAT, POD and free radical scavenging activities in cut flowers remained at the highest with 6 mg Zn kg⁻¹. This study concludes that Zn applied at 6–8 mg kg⁻¹ imparts greater beneficial effects on growth, production, vase life quality, and antioxidative activities in gladiolus cut flower, and further higher application rates render non significant improvement.

Keywords: /Gladiolus/ /Cut Flowers/

TULIP

Van Dam, M.F.N., et.al. 2013. Controlling tulip stem nematodes in **tulip** bulbs by a hot water treatment. Acta Hort. 1002. 327 – 332.

Abstract

A hot water treatment (HWT) protocol is needed to control tulip stem nematode (TSN) in tulip bulbs. A HWT above approximately 45°C in tulips is assumed to be harmful to the bulbs. Experience with HWT to destroy stem nematodes in daffodils shows that the required temperature for this is 4 hours at 47°C. The primary goal of this research was to determine the temperature tolerance of tulip bulbs, preferably in the range of 4 hours at 47°C. This was done by testing a number of combinations of pre-treatment temperature (PTT), HWT temperature and HWT duration. Bulbs that had been subjected to these treatments were planted in the field and the loss of bulbs and reduction in yield were monitored. A second goal of this research was to determine the combination of HWT duration and temperature at which TSN was totally eradicated. Trials were done with diseased (TSN) bulbs. The numbers of surviving nematodes were determined by using a 'fog chamber' technique. Two years of trials showed that tulip bulbs require high PTT's in order to survive HWT at higher temperatures. For example a HWT of 4 hours at 47°C preceded by pre-treatment of 1 week at 27, 30 or 33°C resulted in an average yield of 39, 64 and 92% (compared to the control treatment) respectively. The higher the PTT, the better the bulbs could tolerate the HWT. In the diseased bulbs we found total eradication of TSN at 4 hours 47°C, after a pre-treatment of 1 week at 30°C. Tulip bulbs were surprisingly tolerant of HWT at temperatures of 46 and 47°C, provided that bulbs receive a pre-treatment and HWT straight after lifting. Pre-treatment at 33°C gave the best result until now.

Keywords: /Tulip/ /Hot Water Treatment/