Editorial: Harnessing postharvest technology for development

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In a recent interview by the senior editor of a university magazine, the interviewer posed several questions to me but two of them struck me afterwards. 'You are a chartered engineer basically. What are the factors that led you to take up postharvest technology research?' and 'How would you explain the importance of postharvest technology to students of agriculture and the general public?' My answer to the first question was somewhat straightforward because tracing my research career development seemed quite a logical response. I recounted my years as an undergraduate agricultural engineering student majoring in power and machinery at the University of Nigeria, Nsukka, before proceeding to Massey University in New Zealand for my PhD studies, and explained how the opportunity to work in a strong postharvest research group at Massey opened up wonderful new opportunities for me in tertiary education, research and international agricultural development.

Explaining the importance of my research discipline and practice to such a diverse audience was a bit more challenging. I recalled the take home message that I have given to students during every first lesson in my postharvest course during the past 15 years: *the role of postharvest technology is to make every harvest count – by reducing losses, maintaining quality and safety, and adding value to food and other biological products.* But how does one explain this to the general public, the men and women in the street, the business person, and the government official, all grappling with the current triple-helix issues of food, fuel and financial security? To the general public, good postharvest management means value for money spent on food, especially the highly perishables such as fruit and vegetables because they look and taste good, are safe, nutritious and pleasurable to eat. It also means that food products store well without losing desired quality attributes. These benefits of postharvest technology may be better appreciated by the general public when we demonstrate that for many food products, up to 80% of the retail price may be attributed to postharvest operations involved in getting them to the consumer. By reducing losses, more food becomes available, thereby contributing to food security at individual, household and national levels. By using appropriate and cost-effective postharvest technology, farmers and business people can access new markets and retain existing ones because they can meet quality standards and are able to differentiate their products in the already crowded global market. Reducing losses therefore means more profits.

To students in general, a course in postharvest technology enables them to acquire news skills that can be applied in agrifood, fisheries, feed and fibre business and related industries such as quality management, packaging, logistics and supply chain management. Student will be able to understand why and how fresh foods spoil and how to prevent such losses. Because postharvest technology is a fusion of engineering, biology and agriculture, students get the benefits of engineering and basic scientific approaches to the development and application of knowledge. A course in postharvest technology therefore enables students to develop analytical and design skills and critical systems thinking that would enable them to become life-long learners.

My interview with the magazine editor reminded me about the need to make our research endeavours relevant to the problems facing society at large, whether in finding new, cost-effective and profitable business propositions or finding solutions to some of the pressing developmental challenges facing humanity as custodians of our fragile ecosystem and planet. In line with *IJPTI's* mission as a peer-reviewed scientific forum for the dissemination of innovative research findings and industry best practices on postharvest management of food, feed and fibre, the articles contained in this issue demonstrate some of the recent advances and future challenges facing the global postharvest sector.

The article by Chukwu on the physicochemical properties of Acha (*Digitaria exilis* and *Digitaria iburua*) demonstrated that Acha starch has properties similar to commercial maize starch, thereby highlighting its potential as valuable raw material in food processing and other bioprocess industries. Similar study by Amin and Arshad on proximate composition and pasting properties of Durian (*Durio zibethinus*) seed flour concluded that the product has great potential in food industry due to its high dietary fibre content and suitability to be used as dough as well as thickening agent. From another perspective, waste minimisation and exploitation of under-utilised biological materials make both economic and environmental sense as demonstrated in the paper by Khan and Yusup on solvent extraction and characterisation of rubber seed oil. By analysing the physicochemical and thermodynamic properties including density, viscosity, calorific value, refractive index and acid value, the authors showed that rubber seed oil has qualifying properties for industrial application as biofuel and manufacturing of resin and soap.

Drying is an essential but energy intensive postharvest operation in the production, preservation and delivery of safe and good quality rice and other grains and cereals. The study by Rao et al. showed that the combination of mixing, tempering, multistep drying and control of grain temperature enhanced paddy milling quality while reducing the drying time and specific energy requirement. The paper by Raposo et al. on the application of controlled atmosphere (CA) storage for the preservation of *Salicornia Ramosissima* is another contribution towards the commercial exploitation of the nutritional value of under-utilised plant foods. Based on analysis of the vitamin C and chlorophyll contents, microbiological safety and sensory analysis, the authors concluded that CA storage, especially in 3% oxygen and 10% carbon dioxide preserved the shoots of *Salicornia ramosissima*.

Despite continuing advances in coolchain management and control of postharvest pests, diseases and disorders using a wide spectrum of chemical and physical treatments, the emergence of new pathological problems represent continuing challenges in the postharvest industry. Tripathi and Shukla investigated the application of essential oils for postharvest control of stem end rot of mango fruits during storage and found that

geranium, mint, palmarosa, and thyme oils exhibited fungitoxic activity against *Botryodiplodia theobromae*. Despite the success of their experimental studies, the authors recommended further long-term trials before the essential oils could be used as commercial botanical fumigants.

The paper by Jarimopas et al. exemplifies a novel research approach to the development of a new retail packaging, combining knowledge of the physical and mechanical properties of the product (sweet tamarind pods) with product resistance to postharvest damage inside packaging. The authors showed that cost of a new type of retail packaging was equivalent to the cost of plastic bags and about half that of paperboard boxes, highlighting considerable opportunities for a new cost-effective packaging. With global continuing interest in traceability of food chains, Manikas and Manos present a review of on the requirements of a successful traceability support system, including the identification of factors affecting the effectiveness of agrifood supply chain traceability.

Put together, the articles published in this issue of *IJPTI* represent another example of how postharvest technology can be harnessed for development – ranging from the characterisation of food and raw material properties for industrial processing applications, to the development of novel preservation techniques using natural products (essential oils) and controlled atmosphere, design of new packaging to reduce losses, improvement of drying operations for better product quality and energy conservation, and food traceability systems. *IJPTI* is now inviting in-depth review articles and industry case studies to contribute to our growing knowledge in these and other exciting aspects of postharvest technology and innovation research.