A pentapeptide prepared from rice bran demonstrated growth inhibition on human lung, liver, breast, and colon cancer cell lines. The objectives of this study were to evaluate the human prostate cancer growth inhibition by the pentapeptide and its 6-mo storage stability by incorporating spray-dried orange juice, and determining sensory acceptability. The pentapeptide showed inhibition of human prostate cancer cells by 45% at 460 \( \mu \text{g/mL} \) concentration. When incorporated in spray-dried orange juice, and reconstituted with water and tested, there was an approximately 10% degradation of the peptide at 620 \( \mu \text{g/mL} \) concentration under refrigerated conditions over a 6 mo storage period, whereas at ambient temperature the degradation was 30%. Larger degradation was observed when 240 or 460 \( \mu \text{g/mL} \) pentapeptide was used. Overall, consumer panelists liked sensory aspect of the reconstituted pentapeptide incorporated orange juice beverage. Also consumer panelists liked the color and mouthfeel attributes, their hedonic impression of flavor attribute was slightly low due to unpalatable bitter note caused by the presence of the peptide. Incorporation of the pentapeptide in spray-dried orange juice has the potential to serve as a functional food ingredient that can offer health benefits to consumers. It is possible that the structural instability can be minimized by encapsulation [A. M. Graves*, N. Hettiaraechchy, S. Rayaprolu, R. Li, R. Horax, H. S. Seo (Simmons Foods Inc, 601 N Hico St., Siloam Springs, AR, United States) * Journal of Food Science, 2016, 81(4), H1010-H1015].

Genetic architecture of apple fruit quality traits following storage and implications for genetic improvement

Accurate prediction of genetic potential and response to selection in breeding requires knowledge of genetic parameters for important selection traits. Data from breeding trials can be used to obtain estimates of these parameters so that predictions are directly relevant to the improvement program. Here, a factor allocation diagram was developed to describe the sampling design used to assess the quality of fresh and post-storage (2 months) fruit from advanced selection trial in an apple breeding program from which models for analyses were developed. Genetic variation was the largest source of variation for the fruit size, red colour type, proportion of red skin colour and lenticels, and instrumentally assessed fruit diameter, mass, puncture force and titratable acidity. In contrast, residual variation was the largest for fruit shape, juiciness, sweetness, aromatic flavour, eating and overall quality, and instrumental crispness. Genetic effects for traits were generally stable over fixed effects, except for a significant interaction with storage duration for firmness. Genetic correlations among traits were generally weak except between fruit mass (and diameter) and sensory size (0.98), titratable acidity and sensory acidity (0.97), puncture force and sensory firmness (0.96-0.90), crispness and juiciness (0.87), sweetness and aromatic flavour (0.84) and instrumental and sensory crispness (0.75). Predictions of the performance for seven commercial cultivars are presented. This study suggests that the Washington State apple production area can be treated as a single target environment and sufficient diversity exists to generate new elite cultivars. In addition, options for evaluating the efficiency of apple breeding are discussed [C. M. Hardner*, K. Evans, C. Brien, F. Bliss, C. Peace (Univ Queensland, Queensland Alliance Agr & Food Innovat, St Lucia, Qld 4072, Australia) * Tree Genetics & Genomes, 2016, 12(2), DOI: 10.1007/s11295-016-0977-z].

Temperature-dependent regulation of sugar metabolism in wild-type and low-invertase transgenic chipping potatoes during and after cooling for low-temperature storage

Regulation of sugar metabolism in potato tubers stored at low temperatures has significant
ramifications for producers and consumers of potato chips and French fries. Low-temperature storage reduces losses due to sprouting and disease but induces undesirable accumulation of the reducing sugars glucose and fructose. These sugars react with free amino acids during frying to produce dark-colored and bitter tasting products that have elevated levels of acrylamide, a suspected human carcinogen. Elevated amounts of tuber glucose and fructose are produced when vacuolar acid invertase (VInv) hydrolyses sucrose derived from starch degradation. In this study, wild-type tubers and tubers in which VInv expression was reduced by RNA interference were used to study the temperature-dependent regulation of sugar accumulation and expression of carbohydrate metabolism genes during and after the cooling of tubers to 9 or 3 degrees C. It was found that transcriptional control of genes central to carbohydrate metabolism occurred in three overlapping phases. First, early in cooling, slight increases in VInv and beta-amylase expression occurred. Second, at lower temperatures, large decreases in AGPase and GBSS expression were observed. Finally, when tubers reached 3-5 degrees C, large increases in beta-amylase expression were observed, coinciding with large increases in sucrose in all genotypes and large increases in glucose and fructose in tubers with high VInv expression. Suppression of VInv expression did not alter the expression of beta-amylase,AGPase, GBSS, or other genes, indicating that there was little or no feedback from reducing sugars to transcriptional control of carbohydrate metabolism. Invertase activity of WT tubers stored at 9 degrees C was comparable to that of WT tubers stored at 3 degrees C, but reducing sugars were markedly higher at the lower temperature. Taken together, these data support a model in which reducing sugar accumulation is controlled both by temperature-regulated changes in sucrose accumulation, resulting from increased starch degradation by beta-amylase and decreased starch resynthesis by AGPase and GBSS, and by differences in VInv activity that persist throughout storage [A. E. W. Bradford, J. S. Busse, P. C. Bethke* (Univ Wisconsin, Dept Hort, 1575 Linden Dr, Madison, WI 53706 USA) Postharvest Biology And Technology, 2016, 115, 60-71].

NPARR, 7(3), 2016-323 Food security through increasing technical efficiency and reducing postharvest losses of rice production systems in Bangladesh

Rice accounts for nearly 70 % of calories consumed in Bangladesh. Therefore, any effort to improve food security in the country must find ways to increase availability of rice. This paper investigates two of these ways: increasing technical efficiency of rice production and reducing post-harvest losses. Technical efficiency was measured from Cobb-Douglas and translog production functions for the rice production seasons Aus (spring), Aman (summer) and Boro (winter). Efficiency estimates ranged from 73 to 83 %, suggesting that the potential exists for substantial increases in rice production while continuing to use current technologies and inputs. Variables influencing technical efficiency were farm size, level of farmers’ education, farmers’ experience in production, microcredit, training and extension. Post-harvest losses between farmer and retailer were estimated at 10–12 %, suggesting potentially an additional source of rice without changes in production. Reduction of postharvest losses were significantly related to the availability of extension services [S. Majumder, B. K. Bala*, F. M. Arshad, M. A. Haque, M. A. Hossain (Institute of Agricultural and Food Policy Studies, Universiti Putra Malaysia, 43400 UPM, Malaysia) Food Security, 2016, DOI: 10.1007/s12571-016-0558-x].

NPARR, 7(3), 2016-324 Effects of postharvest onion curing parameters on bulb rot caused by Pantoea agglomerans, Pantoea ananatis and Pantoea allii in storage

Crop loss of onion bulbs during storage carries an exceptionally high economic impact because a large portion of the production
expenses has been expended before storage. Because of this, it is important to define practices that can reduce onion bulb losses caused by storage rots. This study investigates the impact of various curing parameters on disease development resulting from infection by Pantoea agglomerans, *P. ananatis* and *P. allii* on onion bulb cultivars Vaquero and Redwing, during storage. Overall, both the incidence and mean rot severity were similar amongst the bulbs under comparable conditions regardless of the species of Pantoea inoculated, although a significant difference was detected between the two onion bulb cultivars. In addition, a significant reduction of storage rot was observed when curing temperatures were 35 degrees C. At temperatures >35 degrees C, a shorter curing duration (2days vs 14days) decreased the severity of bulb rot due to Pantoea. This increased understanding of the inter-relationships between the parameters used for curing, and the incidence and severity of bulb rot caused by Pantoea helps provide guidance towards using the curing process as a means to reduce the level of damage resulting from post-harvest storage rot [C. V. Armstrong, J. K. S. Dung, J. L. Humann, B. K. Schroeder* (Washington State Univ, Pullman, WA 99164 USA) Plant Pathology, 2016, 65(4), 536-544].

**NPARR, 7(3), 2016-325** Differential effects of regular and controlled atmosphere storage on the quality of three cultivars of pomegranate (*Punica granatum* L.)

The goal of this study was to examine the effects of regular air (RA) and controlled atmosphere (CA: 2 kPa O₂(+), 5 kPa CO₂) at 7 degrees C, on the quality of husks and aril juice of three pomegranate cultivars (PG100-1, EVE, PG116-17), during 5 months' cold storage. Although the three cultivars differed in their keeping quality in RA, they were similar in their response to CA, with regard to reduction of husk scald and decay. Differences were found in several of the juice parameters examined during storage, implying that each cultivar may require a specific storage protocol to maintain their taste and nutritional quality. However, some similarities were detected: the levels of punicalagin, the major phenolic of the husk decreased as did the contents of glucose, fructose and malic acid in the juice. These changes imply a possible alteration in the aril taste during storage. Basically, CA was a better storage regime than RA, with regard to apparent fruit quality. However, RA was the better condition for maintaining the anthocyanin level in the arils and in preventing the occurrence of off-flavors [I. Matityahu, P. Marciano, D. Holland, R. B. Arie, R. Amir* (Migal Galilee Technol Ctr, Lab Plant Sci, POB 831, IL-11016 Kiryat Shmona, Israel) Postharvest Biology and Technology, 2016, 115, 132-141].