A study was conducted to determine firmness of eight mango hybrids obtained from the crosses between Amrapali and Sensation and correlate it with TSS and peel thickness. The firmness was determined at top, middle and bottom positions of the fruit using $TA+Di$ Texture Analyzer. The peel firmness at middle position of the hybrids varied from about 20 to 33N on harvest day, which decreased to 5-12N with increase in storage period. On 7th day of storage, the peel firmness became almost equal from top to bottom positions indicating the even ripening of fruit. Pulp firmness was found to vary from about 5 to 20N of freshly harvested fruit, which reduced to 0.3-3.5N during storage. Peel firmness of 5N and pulp firmness of 0.3N was found as threshold points below which the fruit may not be acceptable for consumption [S.K. Jha*, S. Sethi, M. Srivastav, A.K. Dubey, R.R. Sharma, D.V.K. Samuel and A.K. Singh (Division of Post Harvest Technology, IARI, New Delhi 110012, India), Journal of Food Engineering, 2010, 97(2), 208-212].

Peach fruit quality is adversely affected by bruise damage. In order to reduce this damage, it is necessary to know the influence of fruit properties on bruise susceptibility. Two bruise prediction models were constructed for the damage susceptibility of peach fruit (measured by bruise volume) using multiple linear regression analyses. In the first model, peak contact force and three fruit properties (acoustic stiffness, fruit temperature and radius of curvature) were used as independent variables. In the second model, peak contact force was replaced by the impact energy. Peaches were subjected to dynamic loading by means of a pendulum at three levels of impact. Significant effects of acoustic stiffness, temperature and the radius of curvature and some interactions on bruising were obtained at 5% probability level with the coefficient of determination of 0.97 and 0.98 for models 1 and 2, respectively. It was concluded that lowering the temperature and increasing the radius of curvature and acoustic stiffness will reduce the bruise damage of the peach fruit [Ebrahim Ahmadi*, Hamid Reza Ghassemzadeh, Morteza Sadeghi, Mohammad Moghaddam and Saeed Zarif Neshat (Department of Agricultural Machinery Engineering, Faculty of Agriculture, Bu-Ali Sina University, Hamedan, Iran), Journal of Food Engineering, 2010, 97(1),110-117].

This study investigated the effects of three processing parameters, e.g. product surface temperature, slice thickness and processing time, on blanching and dehydration characteristics of apple slices exposed to simultaneous infrared dry-blanching and dehydration (SIRDBD) with intermittent heating. A three-factor factorial experiment design was conducted to determine the influence of processing parameters on product temperature, moisture reduction, drying rate, residual polyphenol oxidase (PPO) and peroxidase (POD) activities and surface color change. Slice thickness had a significant effect on product quality and processing characteristics, as faster inactivation of enzymes and quicker moisture reduction took place in thinner slices. A Page model performed well for describing drying behavior during the treatment, and first-order kinetics and a biphasic model fit well for PPO and POD inactivation, respectively. Surface color changes ($\Delta E$) of apple slices during prolonged heating resulted from non-enzymatic browning with an increase in $b$ value was observed. In order to achieve a 1 log reduction in POD activity, the process resulted in a reduction in moisture from 20% to 59% and in $\Delta E$ from 2.27 to 5.59. It is suggested that SIRDBD with intermittent heating could be used as an alternative to manufacture high quality blanched and partially dehydrated fruits and vegetables [Yi Zhu, Zhongli Pan*, Tara H. McHugh and Diane M. Barrett (Processed Foods Research Unit, USDA-ARS-
Changes in respiration rate and physical properties of strawberries due to osmotic dehydration and storage

The effect of osmotic dehydration on the respiration rate (R) and the mechanical and optical properties of strawberry halves were evaluated throughout six days at 10ºC. Two different dehydration levels (15 and 20ºBrix) were considered, by applying (PVOD) or not (OD) a vacuum pulse and with and without calcium addition. Dehydrated samples showed a faster drop in R than non-treated samples, thus indicating a faster development of senescence. PVOD implied a greater reduction of O₂ consumption. Calcium addition slightly reduced R. Osmotic treatments provoked a decrease in the puncture forces, especially in samples with 20ºBrix, as a consequence of the structural collapse caused by treatments. After storage, calcium addition and PVOD treatments had beneficial effects on the maintenance of the sample texture. Colour of treated strawberries was modified, mainly in the parenchyma zone, when changes in the sample porosity were greater due to the treatment (vacuum impregnation) [M.L. Castelló, P.J. Fito and A. Chiralt*(Universidad Politécnica de Valencia, Institute of Food Engineering for Development and Food Technology Department, Valencia, Spain), Journal of Food Engineering, 2010, 97(1), 64-71].

New edible coatings composed of galactomannans and collagen blends to improve the postharvest quality of fruits – Influence on fruits gas transfer rate

The objective of this work was to produce new edible coatings, based on a mixture of galactomannans from novel sources (seeds of Adenanthera pavonina and Caesalpinia pulcherrima), collagen and glycerol, and to determine their influence in gas transfer rates when they are applied on mangoes and apples. The first part of the work consisted in obtaining coating solutions with the convenient values of wettability for each fruit; such coating solutions were then characterized in terms of their permeability (to CO₂, O₂ and water vapour), mechanical properties, colour and opacity. Gas transfer rates from mangoes coated with a solution of A. pavonina galactomannan (0.5%), collagen (1.5%) and glycerol (1.5%) were compared with those of mangoes without coating: 28% less O₂ consumption and 11% less CO₂ production were observed in coated mangoes. The same procedure was performed in apples (in this case using C. pulcherrima galactomannan (0.5%), collagen (1.5%) and no glycerol); the CO₂ production and the O₂ consumption was approximately 50% lower in apples with coating than in apples without coating. The results suggest that these coatings can reduce gas transfer rates in these fruits, and can be therefore important tools to extend their shelf life [Álvaro M. Lima, Miguel A. Cerqueira, Bartolomeu W.S. Souza, Ed Carlos M. Santos, José A. Teixeira, Renato A. Moreira and António A. Vicente*(Departamento de Bioquimica e Biologia Molecular, Federal University of Ceará, Campus do Pici, CEP 60451-970 Fortaleza, CE, Brazil), Journal of Food Engineering, 2010, 97(1), 101-109].

Antioxidant activities and contents of polyphenol oxidase substrates from pericarp tissues of litchi fruit

The experiments were performed to extract and purify substrates for polyphenol oxidase (PPO) from pericarp tissue of postharvest litchi fruit. Two purified PPO substrates were identified as (-)-epicatechin and procyanidin A2. The antioxidant properties of two PPO substrates were further evaluated in the present study. Variation in the content of the major substrate (-)-epicatechin of litchi fruit during storage at 25ºC was analysed using the HPLC-UV method. The results showed that (-)-epicatechin exhibited stronger antioxidant capability than procyanidin A2, in terms of reducing power and scavenging activities of DPPH radical, hydroxyl radical and superoxide radical. Furthermore, (-)-epicatechin content in pericarp tissue tended to decrease with increasing skin browning index of litchi fruit during storage at 25ºC. Thus, these two compounds can be used as potential antioxidants in litchi waste and the fresh pericarp tissue of litchi fruit exhibited a better utilisation value [Jian Sun, Yueming Jiang*, John Shi,

NPARR 1(3), 2010-0429, Evaluation of antioxidant and anti-initiating activities of crude polyphenolic extracts from seedless and seeded Indian grapes

The extracts of crude polyphenols (seeds, pulp+skin, whole) from four different cultivars of Indian grapes were used in this study. The total polyphenolic contents of grape polyphenolic extracts (GPEs) were determined and their in vitro antioxidant and anti-initiating activities evaluated. The total polyphenolic contents, expressed in terms of gallic acid/catechin/procyanidin B3 equivalents, were found to vary significantly. Antioxidant activity of GPEs, particularly the seedless variety, was evident from significant dose-dependent inhibition of lipid peroxidation and DPPH activity. GPEs and catechin inhibited the microsomal-catalysed activity of cytochrome P450 isozymes (1A1, 1A2, 2B1) in a dose-dependent manner, by the decreased formation of resorufin. The inhibitory activity of GPEs on nitrite-mediated N-nitrosation of dimethylamine and N-methylaniline appears to correlate significantly with the total polyphenolic contents. Furthermore, six individual polyphenols present in GPEs were quantitated by HPLC, wherein procyanidin B3 was a major constituent [Asha G. Ramchandani* Raghunathan S. Chettiyar and Shrirang S. Pakhale (Maru Lab, Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Memorial Centre, Kharghar, Navi Mumbai 410 210, India), Food Chemistry, 119(1), 298-305].

NPARR 1(3), 2010-0430, Effect of frequency of copper applications on control of citrus canker and the yield of young bearing sweet orange trees

The efficacy of different copper spray intervals for control of citrus canker caused by Xanthomonas citri subsp. citri (Xcc) was investigated in 3-to-4-year-old commercial citrus groves of ‘Pera’ sweet orange in a citrus canker endemic area in southern Brazil. Three independent trials were conducted in 2004/2005, 2005/2006 and 2006/2007. The first trial was located in Ourizona, PR and the two following were established in Paranavaí, PR, in different locations. Trees were treated with copper oxychloride (1.8g/l) at intervals of 7, 14, 21, or 28 days. Control trees were sprayed with water every 28 days. Control of canker was evaluated as incidence of canker on leaves and fruit and as the amount of dropped and harvested fruit. Regardless of the spray interval, copper significantly decreased the incidence of citrus canker on leaves and harvested fruits, and reduced the number of prematurely dropped fruits and increased yield. Disease incidence on leaves of untreated trees in each season peaked at 37, 51, and 43% of infected leaves, whereas the incidence of canker on foliage of copper-treated trees was no higher than 12, 16, and 11%, respectively. For the second and third year trials, when disease incidence was comparatively higher, the shorter the spray interval, the lower the disease incidence and number of dropped fruit and the higher the yield per tree. Citrus canker incidence on the leaves was inversely related in a linear fashion to the total number of copper sprays in each trial. Coefficients of determination ($R^2$) between disease incidence and number of sprays were 0.70, 0.92 and 0.80 in the respective seasons. The financial return due to increases in yield from copper sprays was significantly related to the number of sprays and disease levels only in the third trial. Although copper sprays at a 28-day-interval was satisfactory for reduction of citrus canker incidence on leaves and fruits, a shorter spray interval was required to significantly reduce yield loss [F. Behlau, J. Belasque Jr.*, J.H. Graham and R.P. Leite Jr. (Fundecitrus, CP 391, 14901-870 Araraquara, Brazil), Crop Protection, 2010, 29(3), 300-305].

NPARR 1(3), 2010-0431, Influence of fumigation with high concentrations of ozone gas on postharvest gray mold and fungicide residues on table grapes

To control postharvest decay, table grapes are commercially fumigated with sulfur dioxide. Ozone (O$_3$) fumigation with up to 10,000µL$^1$L$^{-1}$ of ozone for up to 2h to control postharvest gray mold of table grapes caused by Botrytis cinerea was evaluated. Fumigation for 1h with 2500 or 5000µL$^1$L$^{-1}$ of ozone were equal in effectiveness. Both treatments reduced postharvest gray
mold among inoculated ‘Thompson Seedless’ grapes by approximately 50% when the grapes were examined after storage for 7d at 15°C following fumigation. In a similar experiment, ‘Redglobe’ grapes were stored for 28 d at 0.5°C following fumigation for 1h with 2500 or 5000 μLL\(^{-1}\) of ozone. Both treatments were equal in effectiveness, but inferior to fumigation with 10,000 μLL\(^{-1}\). Ozone was effective when grapes were inoculated and incubated at 15°C up to 24h before fumigation. The cluster rachis sustained minor injuries in some tests, but berries were never harmed. Ozone was applied in three combinations of time and ozone concentration (10,000 μLL\(^{-1}\) for 30min, 5000 μLL\(^{-1}\) for 1h, and 2500 μLL\(^{-1}\) for 2h) where each had a constant concentration \(\times\) time product (c×t) of 5000 μLL\(^{-1}\)xh. The effectiveness of each combination was similar. The incidence of gray mold was reduced by approximately 50% among naturally inoculated, organically grown ‘Autumn Seedless’ and ‘Black Seedless’ table grapes, and by 65% among ‘Redglobe’ table grapes, when they were fumigated with 5000 μLL\(^{-1}\) ozone for 60min in a commercial ozone chamber and stored for 6 weeks at 0.5°C. Residues of fenhexamid, cyprodinil, pyrimethanil, and pyraclostrobin were reduced by 68.5, 75.4, 83.7, and 100.0%, respectively, after a single fumigation of table grapes with 10,000 μLL\(^{-1}\) ozone for 1h. Residues of iprodione and bosalid were not significantly reduced. Ozone is unlikely to replace sulfur dioxide treatments in conventional grape production unless its efficacy is improved, but it could be an acceptable technology to use with grapes marketed under “organic” classification, where the use of SO\(_2\) is prohibited, or if SO\(_2\) use were to be discontinued [Franka Mlikota Gabler*, Joseph L. Smilanick, Monir F. Mansour and Hakan Karaca (Institute for Adriatic Crops, Put Duilova 11, 21000 Split, Croatia), Postharvest Biology and Technology, 2010, 55(2), 85-90].

NPARR 1(3), 2010-0432, **Impact device for measuring the flesh firmness of kiwifruits**

The device used in the present study consists of a conveyer belt that throws the fruit onto a flat horizontal plate connected to a load cell. The vertical distance between plate and conveyer belt (drop height) as well as the speed of the belt can be continuously adjusted. Tests were carried out by selecting three different values of drop height and speed. The Magness-Taylor (MTf) index was used as reference, destructive parameter, to describe the flesh firmness and to set-up predictive models. The digitalized time history of the force was analyzed to extract some mechanical indices (peak force, impact duration and impulse) used to predict MTf by simple or multiple regression analyses. Moreover, each point of the entire time history was processed by artificial neural network (ANN) software to predict MTf. The goodness of fit, expressed as R\(^2\), was up to 0.823 with the regression models. On the whole, the peak force was the best predictor. The ANNs did not involve a substantial increase in goodness of fit with respect to the best regression models: +8.3%, as mean, 37% as maximum. The speed or position at which the fruit impacts the plate can represent an important parameter influencing the MTf prediction. Free dropping of the fruit instead of throwing onto the plate by the conveyer did not provide a better prediction. The impact device did not cause mechanical damage to the kiwifruits [Luigi Ragni, Annachiara Berardinelli* and Adriano Guarnieri (Agricultural Economics and Engineering Department, University of Bologna, Food Science Campus, Piazza G. Goidanich, 60, 47023 Cesena (FC), Italy), Journal of Food Engineering, 2010, 96(4), 591-597].

NPARR 1(3), 2010-0433, **Mass transfer kinetics of pulsed vacuum osmotic dehydration of guavas**

The effects of vacuum pulse and solution concentration on mass transfer of osmotically dehydrated guava slices were studied. Kinetics of weight reduction (WR), water loss (WL), solid gain (SG) and water activity were obtained using sucrose solutions at 40, 50 and 60\(^{º}\)Brix and vacuum pulse of 100mbar for 0, 10 and 15min at the process beginning. Higher solution concentrations and the vacuum pulse application caused an increase on WL of osmotically dehydrated guavas and reduced the samples water activity. The SG was reduced by the increase on osmotic solution concentration and favored by vacuum application. Two different models of kinetics diffusion were tested to obtain diffusivity and to compare the accuracy of these models. The effective diffusivity estimated by
the hydrodynamic model well reproduced the effects of process variables on mass transfer kinetics and showed a better agreement to the experimental data than the diffusional model [Jefferson L.G. Corrêa*, Leila M. Pereira, Gláucia S. Vieira and Miriam D. Hubinger (Department of Food Science, Federal University of Lavras, Lavras– MG, Brazil), Journal of Food Engineering, 2010, 96(4), 498-504].

NPARR 1(3), 2010-0434, **Effect of temperature and pretreatment on water diffusion during rehydration of dehydrated mangoes**

The kinetics associated with rehydrating dehydrated mangoes was studied at three temperatures: 25, 40, and 60°C. Besides, we studied how rehydration was affected by pretreating the fruit with osmodehydration in either sucrose or glucose before it was thermally dehydrated. We show that rehydration can be interpreted by Fickian diffusion and that the effective water diffusion coefficient is larger at 40°C than at either 25 or 60°C. Consequently, during rehydration of untreated samples at 40°C, the weight gain, water gain and loss of solids attain optimal values. It was found that the rehydration kinetics of mango was not affected by osmodehydration pretreatments in sucrose. However, pretreatment in glucose significantly improved rehydration; for example, the effective diffusion coefficients of the glucose-treated samples were about twice as large as those of the untreated samples [S. Maldonado*, E. Arnau and M.A. Bertuzzi (Laboratorio IDeAR, Centro de Investigación en Tecnología de Alimentos (CITA), Facultad de Ingeniería, Universidad Nacional de Jujuy, Av. Italia y Martiarena, 4600 S.S. de Jujuy, Jujuy, Argentina), Journal of Food Engineering, 2010, 96(3), 333-341].

NPARR 1(3), 2010-0435, **Diffusivity, shrinkage and simulated drying of litchi fruit (Litchi chinensis Sonn.)**

Litchi (Litchi chinensis Sonn.) is an important commercial fruit in Thailand and Vietnam, consumed both as fresh and dried products. Also most of the export of litchi is in the form of dried whole litchi fruit. Thermo-physical properties and drying model of litchi fruit is important for optimum design of litchi dryer. This paper presents moisture diffusivity, shrinkage and finite element simulated drying of litchi fruit. The moisture diffusivities of litchi were determined by minimizing the sum of square of deviations between the predicted and experimental values of moisture content of thin layer drying under controlled conditions of air temperature and relative humidity. The components in the form of cylinder for seed and seed stalk and slab for seed coat, shell and flesh were dried in thin layers at the air temperatures of 50, 60, 70 and 80°C and relative humidity in the range of 10-25%. The mean diffusivity of flesh, seed and shell of litchi fruit increased with temperature and was expressed by the Arrhenius-type equation, but the diffusivities of seed coat and seed stalk were independent of temperature. The moisture diffusivities of seed coat and seed stalk were much lower than those of the other parts of the litchi. The shrinkage of litchi fruit has also been determined experimentally and it was expressed as a function of moisture reduction. A two-dimensional finite element model has been developed to simulate moisture diffusion in litchi fruit during drying. Shrinkage of the flesh and different component diffusivities of litchi during drying were also taken into account. The finite element model was programmed in Compaq Visual FORTRAN version 6.5. This finite element model satisfactorily predicts the moisture diffusion during drying. Moisture contents in the different components in the litchi fruit during drying were also simulated. This study provides an understanding of the transport processes in the different components of the litchi fruit [S. Janjai*, B. Mahayothee, N. Lamlert, B.K. Bala, M. Precoppe, M. Nagle and J. Müller (Solar Energy Research Laboratory, Department of Physics, Faculty of Science, Silpakorn University, Nakhon Pathom 73000, Thailand), Journal of Food Engineering, 2010, 96(2), J214-221].

NPARR 1(3), 2010-0436, **The optimisation of solid–liquid extraction of antioxidants from apple pomace by response surface methodology**

Response surface methodology using two food grade solvents, acetone and ethanol, was used to optimise antioxidant extraction from industrially generated apple pomace. Efficiency of extraction was optimised by measuring antioxidant activity, phenol con-
tent and three individual polyphenol groups. Conditions for optimal antioxidant activity as measured by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay were 56% ethanol, 80°C and 31min. Using these conditions an antioxidant value of 444 mg Trolox/100g DW was obtained. For acetone extraction the optimal conditions were 65% acetone, 25°C and 60min, resulting in an antioxidant value of 436mg Trolox/100g DW. Both ethanol and acetone would be suitable to replace methanol for a food grade and more environmental friendly solid-liquid extraction of antioxidants [Hilde Henny Wijngaard* and Nigel Brunton (Teagasc Ashtown Food Research Centre, Ashtown, Dublin 15, Ireland), Journal of Food Engineering, 2010, 96(1), 134-140].

NPARR 1(3), 2010-0437, Strengthening the texture of dried guava slice by infiltration of phenolic compounds

Phenol–pectin interaction was highlighted in plant texture maintenance during thermal processing. However, neither application nor significantly involved phenolic compounds other than ferulic acid have been reported. The aim of this study is to evaluate the contribution of this crosslink in strengthening the texture of guava slices with six phenolic compounds during processing. Results showed that samples treated with phenolics bearing a carboxyl group exhibited significantly higher hardness than control samples. Further pectin fractionation analysis and binding capacity tests in an artificial model system proved the existence of a higher ratio of hard pectin and greater binding capacity in phenolic treated samples. Sephadex G-75 purification and observation through fluorescence microscope and SEM confirmed the existence of phenol-pectin complex. Contribution of binding capacity to strengthen hardness was found highest in gallic acid treated samples, followed by those treated with ferulic acid, caffeic acid, coumaric acid, cinnamic acid or catechin. FRAP reducing power and DPPH scavenging ability showed the similar tendency. These results indicated that phenolic infiltration might improve the texture and antioxidant capacity of processed guava slices through phenol-pectin interaction [Pi-Jen Tsai*, Ying-Fang Sun and Shu-Mien Hsiao (Department of Food Science, National Pingtung University of Science and Technology, 1, Hsueh Fu Road, Nei-Pu Hsiang, 91207 Pingtung, Taiwan, ROC), Food Research International, 2010, 43(3), 825-830].

NPARR 1(3), 2010-0438, Yeast leavened banana-bread: Formulation, processing, colour and texture analysis

Banana powder (BP) was added to hard-red spring wheat (HRSW) flour intended for yeast-leavened bread formulation. Five different formulations containing 10, 15, 20, 25 and 30% BP were prepared with varying amounts of base flour, while vital gluten was maintained at 25% in all blends. Based on the added BP amounts only, the prepared bread could deliver 42.87-128.6mg potassium/30g of bread (one regular slice) and 0.33-1.00g of fibre. Although the dough water absorption was increased, due to BP addition, the dough mixing tolerance (MTI) decreased. The bread loaf volume was significantly higher than the control except for the 30% blend, where the loaf volume was similar to the control. Bread staling increased with BP levels due to the high sugar content but, this effect was limited to the first two days of storage. Blends exhibited darker colour due to the high sugar and protein, while the 25 and 30% blends had the lowest percent of freezable water. The amounts of acetic acid extractable proteins from the dry blends and the dough decreased with increase in BP. The linear rheological properties of the control, 10 and 30% blends exhibited similar viscoelastic solid behaviour, where both $G'$ and $G''$ had plateaus ($G' > G''$ ) and they were parallel to each other over three decades of the frequency. Blends showed higher moduli values than the control [Abdellatif Mohamed*, Jingyuan Xu and Mukti Singh (Cereal Products and Food Science Unit, NCAUR, Agriculture Research Service, USDA, 1815 N. University St., Peoria IL 61604, USA), Food Chemistry, 2010, 118(3), 620-626].

NPARR 1(3), 2010-0439, r:Effect of methyl jasmonate on cell wall modification of loquat fruit in relation to chilling injury after harvest

Loquat fruit were pretreated with 10µM methyl jasmonate (MeJA) for 24h at 20°C, and then stored at 1°C for 35days to investigate the effect of MeJA
treatment on cell wall modification in relation to chilling injury. Loquat fruit developed chilling injury, manifested as increased fruit firmness and internal browning, decreased extractable juice during storage. These chilling injury symptoms were significantly reduced by MeJA treatment. MeJA also markedly delayed the increases in lignin, alcohol insoluble residues, hemicellulose and cellulose. Meanwhile, the MeJA-treated fruit exhibited significantly lower activities of phenylalanine ammonia lyase, peroxidase, polyphenol oxidase and higher polygalacturonase activity than the control during storage. The levels of water- and CDTA-soluble pectins in MeJA-treated fruit were also significantly higher than that in the control. These results suggest that the reduction in chilling injury by MeJA may be due to inhibited lignin accumulation and enhanced cell wall polysaccharides solubilisation [Shifeng Cao, Yonghua Zheng*, Kaituo Wang, Huaijin Rui and Shuangshuang Tang (College of Food Science and Technology, Nanjing Agricultural University, Weigang 1, Nanjing 210095, PR China), Food Chemistry, 2010, 118(3),641-647].

**FUEL** (incl. Biogas, Biodiesel, Biomass energy, Ethanol, etc.)

*NPARR* 1(3), 2010-0440, **The effect of biodiesel and bioethanol blended diesel fuel on nanoparticles and exhaust emissions from CRDI diesel engine**

Biofuel (biodiesel, bioethanol) is considered one of the most promising alternative fuels to petrol fuels. The objective of the work is to study the characteristics of the particle size distribution, the reaction characteristics of nanoparticles on the catalyst, and the exhaust emission characteristics when a common rail direct injection (CRDI) diesel engine is run on biofuel-blended diesel fuels. In this study, the engine performance, emission characteristics, and particle size distribution of a CRDI diesel engine that was equipped with warm-up catalytic converters (WCC) or a catalyzed particulate filter (CPF) were examined in an ECE (Economic Commission Europe) R49 test and a European stationary cycle (ESC) test. The engine performance under a biofuel-blended diesel fuel was similar to that under D100 fuel, and the high fuel consumption was due to the lowered calorific value that ensued from mixing with biofuels. The use of a biodiesel–diesel blend fuel reduced the total hydrocarbon (THC) and carbon monoxide (CO) emissions but increased nitrogen oxide (NO\textsubscript{x}) emissions due to the increased oxygen content in the fuel. The smoke emission was reduced by 50% with the use of the bioethanol–diesel blend. Emission conversion efficiencies in the WCC and CPF under biofuel-blended diesel fuels were similar to those under D100 fuel. The use of biofuel-blended diesel fuel reduced the total number of particles emitted from the engine; however, the use of biodiesel–diesel blends resulted in more emissions of particles that were smaller than 50 nm, when compared with the use of D100. The use of a mixed fuel of biodiesel and bioethanol (BD15E5) was much more effective for the reduction of the particle number and particle mass, when compared to the use of BD20 fuel [Hwanam Kim and Byungchul Choi*(Automobile Research Center, Chonnam National University, Gwangju 500-757, Republic of Korea), Renewable Energy, 2010, 35(1), 157-163].

*NPARR* 1(3), 2010-0441, **Syngas from sugarcane pyrolysis: An experimental study for fuel cell applications**

The use of biomass for the production of electrical energy is a promising technological solution for those countries where there are problems with the disposal of agricultural waste and/or the production of low-cost energy. The gasification and/or pyrolysis of the biomass produce a gas rich in hydrogen that can be used in a fuel cell system to produce electrical energy with reduced environmental impact and significant energy recovery.

In this work, a study of the pyrolysis of Brazilian sugarcane bagasse was carried out. The experimental process consisted of the pyrolysis of the biomass material in a batch pyrolysis reactor. In some runs the biomass was dry, while in others it was pre-treated by the addition of water. It was noted that the water added to the biomass before the pyrolysis process resulted in a decrease in the quantity of steam added to the fuel cell feeding gas, necessary to avoid carbon deposition, and in an increase in cell power, but, at the same time, caused a decrease in the quantity of syngas produced.