 Integral utilisation of bagasse is a high priority for the diversification of the sugarcane industry. The application of a biorefinery philosophy to bagasse utilisation requires its fractionation into its main components: cellulose, hemicelluloses and lignin. The first stage in that process is the pretreatment, in which a considerable part of hemicelluloses is solubilised, and cellulose is activated towards enzymatic hydrolysis. In this work, a pretreatment method using a mixture of sulfuric and acetic acid is investigated. Two different solid-to-liquid ratios (1.5:10 and 1:10) were used in the pretreatment. Both conditions efficiently hydrolysed the hemicelluloses giving removals above 90%. The extractive components were also effectively solubilised, and lignin was only slightly affected. Cellulose degradation was below 15%, which corresponded to the low crystallinity fraction. The analysis of the morphology of pretreated bagasse confirmed the results obtained in the chemical characterization [George Jackson de Moraes Rocha*, Carlos Martin, Isaias Barbosa Soares, Ana Maria Souto Maior, Henrique Macedo Baudel and Cesar Augusto Moraes de Abreu (Laboratório Nacional de Ciência e Tecnologia do Bioetanol – CTBE, P.O. Box 6170, 13083-970 Campinas, SP, Brazil), Biomass and Bioenergy, 2011, 35(1), 663-670].

Bio-oils usually contain many types of compounds with various chemical properties. A biooil sample derived from rice husk through rapid pyrolysis was fractioned using solvent- or solidextraction techniques based on their various properties. Ultraviolet–visible spectroscopy, three-dimensional excitation–emission matrix (EEM) fluorescence spectroscopy and Fourier transform infrared spectroscopy were used to characterize their various spectral properties for further understanding the characteristics of the bio-oil. Bio-oil mostly contains many aromatic ring components, acidic polar fractions, few weak- and non-polar components. The results all show that the main compounds and functional groups in the various bio-oil fractions were different and depended on the fractionation methods. The compositions of the bio-oil fractions were also analyzed with a gas chromatography/mass spectrometry (GC/MS) method. The consistency of the results obtained from the spectrometric methods with the GC/MS method indicates that the spectrometric methods have a good potential for rapid and effective characterization of bio-oils [Rui Lu, Guo-Ping Sheng*, Yan-Yun Hu, Ping Zheng, Hong Jiang, Yong Tang and Han-Qing Yu (Department of Chemistry, University of Science and Technology of China, 96 Jinzhai Road, Hefei 230026, China), Biomass and Bioenergy, 2011, 35(1), 671-678].

As fossil fuel prices increase and environmental concerns gain prominence, the development of alternative fuels from biomass has become more important. Biodiesel produced from microalgae is becoming an attractive alternative to share the role of petroleum. Currently it appears that the production of microalgal biodiesel is not economically viable in current environment because it costs more than conventional fuels. Therefore, a new concept is introduced in this article as an option to reduce the total production cost of microalgal biodiesel. The integration of biodiesel production system with methane production via anaerobic digestion is proved in improving the economics and sustainability of overall biodiesel stages. Anaerobic digestion of microalgae produces methane and further be converted to generate electricity. The generated electricity can surrogate the consumption of energy that require in microalgal cultivation, dewatering, extraction and transesterification process. From theoretical calculations, the electricity generated from methane is able to power all of the biodiesel production stages and will substantially reduce the cost of biodiesel production (33% reduction). The carbon emissions of biodiesel production systems are also reduced by approximately 75% when utilizing biogas electricity compared to when the electricity is otherwise purchased from the Victorian grid. The
overall findings from this study indicate that the approach of digesting microalgal waste to produce biogas will make the production of biodiesel from algae more viable by reducing the overall cost of production per unit of biodiesel and hence enable biodiesel to be more competitive with existing fuels [Razif Harun*, Michael Davidson, Mark Doyle, Rajprathab Gopiraj, Michael Danquah and Gareth Forde (Bio Engineering Laboratory (BEL), Department of Chemical Engineering, Monash University, Victoria 3800, Australia), Biomass and Bioenergy, 2011, 35(1), 741-747].

**NPARR 2(1), 2011-045, Bioethanol production using genetically modified and mutant wheat and barley straws**

To improve the performance of wheat and barley straws as feedstocks for ethanol biorefining, the genetic modifications of down regulating Cinnamoyl-CoA reductase and low phytic acid mutation have been introduced into wheat and barley respectively. In this study, total 252 straw samples with different genetic background and location were collected from the field experiment based on a randomized complete block design. The fiber analysis (neutral detergent fiber, acid detergent fiber, and acid detergent lignin) indicated that there were no significant differences between modified and wild type straw lines in terms of straw compositions. However, the difference did exist among straw lines on fiber utilization. 16 straw samples were further selected to conduct diluted acid pretreatment, enzymatic hydrolysis and fermentation. The data indicated that the phytic acid mutant and transgenic straws have changed the fiber structure, which significantly influences their hydrolysibility. These results may lead to a possible solution of mutant or genetic modified plant species that is capable to increase the hydrolysibility of biomass without changing their compositions and sacrificing their agronomy performance [Zhimin Li, Yan Liu, Wei Liao, Shulin Chen* and Robert S. Zemetra (Department of Biological Systems Engineering, Washington State University, L.J. Smith 213, Pullman, WA 99163, USA), Biomass and Bioenergy, 2011, 35(1), 542-548].

**NPARR 2(1), 2011-046, Experimental investigations on combustion, performance and emissions characteristics of neat karanji biodiesel and its methanol blend in a diesel engine**

The increased focus on alternative fuels research in the recent years are mainly driven by escalating crude oil prices, stringent emission norms and the concern on clean environment. The processed form of vegetable oil (biodiesel) has emerged as a potential substitute for diesel fuel on account of its renewable source and lesser emissions. The experimental work reported here has been carried out on a turbocharged, direct injection, multi-cylinder truck diesel engine fitted with mechanical distributor type fuel injection pump using biodiesel-methanol blend and neat karanji oil derived biodiesel under constant speed and varying load conditions without altering injection timings. The results of the experimental investigation indicate that the ignition delay for biodiesel-methanol blend is slightly higher as compared to neat biodiesel and the maximum increase is limited to 1 deg. CA. The maximum rate of pressure rise follow a trend of the ignition delay variations at these operating conditions. However, the peak cylinder pressure and peak energy release rate decreases for biodiesel-methanol blend. In general, a delayed start of combustion and lower combustion duration are observed for biodiesel-methanol blend compared to neat biodiesel fuel. A maximum thermal efficiency increase of 4.2% due to 10% methanol addition in the biodiesel is seen at 80% load and 16.67 s\(^{-1}\) engine speed. The unburnt hydrocarbon and carbon monoxide emissions are slightly higher for the methanol blend compared to neat biodiesel at low load conditions whereas at higher load conditions unburnt hydrocarbon emissions are comparable for the two fuels and carbon monoxide emissions decrease significantly for the methanol blend. A significant reduction in nitric oxide and smoke emissions are observed with the biodiesel-methanol blend investigated [K. Anand, R.P. Sharma and Pramod S. Mehta*(Indian Institute of Technology Madras, Chennai–600036, India), Biomass and Bioenergy, 2011, 35(1), 533-541].

**NPARR 2(1), 2011-047, Bioethanol production potential from Brazilian biodiesel co-products**

One major problem facing the commercial production of cellulosic ethanol is the challenge of economically harvesting and transporting sufficient amounts of biomass as a feedstock at biorefinery plant
scales. Oil extraction for biodiesel production, however, yields large quantities of biomass co-products rich in cellulose, sugar and starch, which in many cases may be sufficient to produce enough ethanol to meet the alcohol demands of the transesterification process. Soybean, castor bean, Jatropha curcas, palm kernel, sunflower and cottonseed were studied to determine ethanol production potential from cellulose found in the oil extraction co-products and also their capacity to meet transesterification alcohol demands. All crops studied were capable of producing enough ethanol for biodiesel production and, in the case of cottonseed, 470% of the transesterification demand could be met with cellulosic ethanol production from oil extraction co-products. Based on Brazilian yields of the crops studied, palm biomass has the highest potential ethanol yield of 108 m$^3$/km$^2$ followed by J. curcas with 40 m$^3$/km$^2$. A total of 3.5 hm$^3$ could be produced from Brazilian soybean oil extraction co-products [Evan Michael Visser, Delly Oliveira Filho*, Marcio Arêdes Martins and Brian L. Steward (Departamento de Engenharia Agrícola, Universidade Federal de Viçosa, Campus Universitário 36570-000 Viçosa, MG, Brazil), Biomass and Bioenergy, 2011, 35(1), 489-494].

NPARR 2(1), 2011-048, An evaluation of fuelwood properties of some Aravally mountain tree and shrub species of Western India

The study analyses the fuelwood characteristics of 26 trees including shrub species from the dry deciduous forest in Aravally region, Rajasthan, Western India was carried out to explore trees with potential for fuelwood production. Fuelwood value index (FVI) based on the properties of calorific value, wood density and ash. Calorific value was ranged between 18.54 ± 0.04 and 27.44 ± 0.09 KJ g$^{-1}$ in Jatropha curcas and Wrightia tinctoria respectively. Wood density varied from 0.538 ± 0.01 to 0.966 ± 0.07 g/cm$^3$ in J. curcas and Acacia nilotica. Same way ash and moisture content was highest in J. curcas (3.38 ± 0.19%) and Sterculia urens (70.28 ± 7.52%) and lowest in Miliusa urens (0.85 ± 0.06%) and Azadirachta indica (30.7 ± 10.02%) respectively. On the basis, of the 26 species analyzed, M. tomentosa has the highest FVI, followed by Lannea coromandelica, Acacia leucophloea, Madhuca indica, A. nilotica, W. tinctoria, Butea monosperma, Zizyphus nummularia, S. urens, Boswellia serrata, A. indica, Grewia tenax, Syzygium cuminii, Tectona grandis and Dalbergia sissoo were shown to have promising fuelwood production [J.I. Nirmal Kumar*, Kanti Patel, Rita N. Kumar and Rohit Kumar Bhoi (P.G. Department of Environmental Science and Technology, Institute of Science and Technology for Advanced Studies and Research (ISTAR), Vallabh Vidyanagar 388 120, Gujarat, India), Biomass and Bioenergy, 2011, 35(1), 411-414].

NPARR 2(1), 2011-049, Influence of process parameters and biomass characteristics on the durability of pellets from the pruning residues of Olea europaea L.

The present work aims to investigate the influence of the main process parameters (pressure and temperature) and biomass characteristics (moisture content and particle size) on some mechanical properties (density and durability) of olive tree pruning residues pellets. By means of a lab scale pellet press, able to control process parameters, the biomass, ground with three different hammer mill screen sizes (1, 2 and 4 mm) and conditioned at different moisture contents (5, 10, 15 and 20% w.b.), was pelletized at various process temperatures (60, 90, 120 and 150 C) and pressures (71, 106, 141 and 176 MPa). Compressed sample dimensions and mass were measured in order to calculate pellet density, while compressive strength tests were carried out to estimate the durability of the final biofuel. The relationships between the factor settings and the responses (density, compression strength and modulus of elasticity) were examined by univariate and multivariate statistical analysis. Temperature resulted the most important variable influencing pellet mechanical properties, followed by the initial moisture content and the particle size of the raw material. In particular, high process temperature, low moisture contents and reduced particle sizes allowed obtaining good quality pellets. The effect of compression force resulted scarcely relevant [Maria Teresa Carone*, Antonio Pantaleo and Achille Pellerano (Department of Engineering and Management of the Agricultural, Livestock and Forest Systems, Faculty of Agriculture, University of Bari, Via Amendola, 165/A, 70126 Bari, Italy), Biomass and Bioenergy, 2011, 35(1), 402-410].
Japanese cedar (Cryptomeria japonica) shares around 60% of plantation forests in Japan, and there is a growing demand for thinning of the forest. However, the softwood is one of the most recalcitrant wood species for hydrothermal and thermochemical pretreatments for enzymatic saccharification. In the present paper, we applied combined pretreatments by solvolysis and cultivation with white rot fungi to develop environmentally benign pretreatment system applicable to recalcitrant softwood. Due to the recalcitrance of the softwood, enzymatic saccharification yield from ethanolysis pulp was 10.2%, based on the weight of holocellulose. To increase the sugar yield, the softwood was treated with selective white rot fungi prior to the ethanolysis. Treatment of the softwood with a biopulping fungus, Ceriporiopsis subvermispora FP-90031 and a new fungal isolate Phellinus sp. SKM2102 for 8 weeks increased the sugar yield to 35.7 and 40.8%, respectively. The best pretreatment conditions in terms of overall sugar yield including a soluble fraction were obtained by ethanolysis after the fungal treatment with Phellinus sp. SKM2102, resulting in production of 42.2 g of total reducing sugars per 100 g of the fungus-pretreated biomass. After the combined pretreatment, simultaneous saccharification and fermentation of the water-insoluble pulp fraction were carried out using Saccharomyces cerevisiae. Ethanol production from undecayed Japanese cedar wood was negligible but pretreatments with the two fungi significantly increased the ethanol production, in combination with ethanolysis. The combined pretreatment with solvolysis and Phellinus sp. SKM2102 is attractive for biorefinery of the recalcitrant softwood [Yasunori Baba, Toshiaki Tanabe, Nobuaki Shirai, Takahito Watanabe, Yoichi Honda and Takashi Watanabe*(Research Institute for Sustainable Humanosphere, Kyoto University, Gokasho, Uji, Kyoto 611-0011, Japan), Biomass and Bioenergy, 35(1), 320-324].