RUBBER/GUM

NPARR 4(1), 2013-077 Gum Cordia: A novel edible coating to increase the shelf life of Chilgoza (Pinus gerardiana)

Cordia myxa is a deciduous tree, which grows nearly all over the Indo-Pak subcontinent. The ripe fruits contain an anionic polysaccharide having good adhering property. Chilgoza (Pinus gerardiana), specie of genus Pinus (pine nuts) grows in Pakistan, Afghanistan and India. It is a rich source of unsaturated fatty acids but the un-shelled nuts are highly susceptible to rancidity. An effort was made to investigate the efficacy of gum Cordia in comparison with carboxy methyl cellulose (CMC) as edible coating to retard this oxidation. Gum Cordia and CMC with and without natural antioxidants were used in this study. Methanolic extract of C. myxa and alpha tocopherol were selected as antioxidants. Chemical and sensory analyses were performed on coated and uncoated pine nuts stored at 35°C for 112 days. Significant differences (P < 0.05) between coated and uncoated samples were observed. Samples coated with gum Cordia containing the extract of C. myxa exhibited highest (ca. 95%) increase in shelf life followed by CMC and the C. myxa extract (ca. 60%), gum Cordia (ca. 25%), and CMC (ca. 15%); based on peroxide value (20 meq.O₂ kg⁻¹). However, samples treated with alpha tocopherol did not improve the oxidative stability [Haq, M.A.*, Alam, M.J., and Hasnain, A. (Department of Food Science and Technology, University of Karachi, University Road, Karachi 75270, Pakistan), LWT - Food Science and Technology, 2013, 50(1), 306-311].

NPARR 4(1), 2013-078 Influence of modified natural rubber and structure of carbon black on properties of natural rubber compounds

Carbon black-filled natural rubber composites were prepared using various types of natural rubber: unmodified natural rubber, epoxidized natural rubber with two levels of epoxy groups at 25 and 50 mol % [epoxidized natural rubber (ENR)-25 and ENR-50], and maleated natural rubber. Two types of carbon black (HAF and ECF) with different structure and surface area were used. The functional groups present in natural rubber and carbon black were characterized by FTIR and ¹H-NMR. Furthermore, cure characteristics, mechanical, morphological, and electrical properties of composites and gum rubber compounds were investigated. It was found that the presence of polar functional groups in rubber molecules and the different structures of carbon black significantly affected the cure characteristics and mechanical properties. This is attributed to physical and chemical interactions between carbon black surfaces and rubber molecules. It was also found that natural rubber filled with ECF showed the highest Young's modulus and hardness, which is due to the high-surface area and structure of the ECF causing an increase in the degree of entanglement between rubber chains and carbon black particles. Frequency dependency of the dielectric constant, loss tangent, and AC conductivity was also investigated. An increase in dielectric constant, loss tangent, and AC conductivity was observed in the ENR/ECF composites. High-carbon black loading level caused network formation of these conductive particles, increasing the AC conductivity of the composites [Salaeh, S.*, and Nakason, C. (Department of Rubber Technology and Polymer Science, Faculty of Science and Technology, Prince of Songkla University, Pattani 94000, Thailand), Polymer Composites, 2012, 33(4), 489-500].

NPARR 4(1), 2013-079 Grafting modification of Sesbania gum and sizing performance

In this study, the natural polymeric sesbania gum was modified and used as a new size for the sizing of polyester/cotton yarn (T/C yarn). Oxidative degradation of sesbania gum was carried out by using sodium
hypochlorite (NaClO), resulting in chain segment with relative smaller molecular weight, then short-chain vinyl acetate was grafted onto the polymer chain of sesbania gum. The modified sesbania gum was used for sizing T/C yarn. The viscosity, thermostability of modified sesbania gum, and the breaking strength, index of hairiness, wear-resisting property of sized yarn was characterized and discussed [Liu, H.*, Qi, R., Gao, L., Xue, M. and Shen, D. (College of Textile, Henan Institute of Engineering, Zhengzhou, Henan 450007, China), Advanced Materials Research, 2012, 424-425, 1211-1214].

**NPARR 4(1), 2013-080 Evaluation of Moringa oleifera gum as tablet disintegrant**

Plant products serve as an alternative to synthetic products because of local accessibility, eco-friendly nature and lower price compared to imported synthetic products. Natural gums and mucilage have been widely explored as pharmaceutical excipients. Tablet disintegration has received considerable attention as an essential step in obtaining fast drug release. The present study was undertaken to separate or isolate gum from raw gum of Moringa oleifera Linn. and explored its use as disintegrant by formulating tablets of Aceclofenac. The study of binder, suspending agent and film forming agent property of seeds and gum powder of Moringa oleifera has already being studied. Hardness of the tablets was found to be in the range of 4.0 - 4.5 kg/cm² for all formulations. The wetting time decreased with the increase in concentration of gum in formulation. The disintegration time of tablet formulation prepared from gum (4%w/w, 5%w/w, 10%w/w, 15%w/w and 20% w/w) was found lesser as concentration of gum increases. The in-vitro dissolution profile exhibited maximum drug release from all the formulations. The results of weight variation, hardness, friability and dissolution profile of the formulations prepared with isolated gum from Moringa oleifera are comparable good. The result of disintegration shows that the isolated gum can be effectively used as disintegrant in tablet formulation [Patel, B.V.* and Chobey, N (Sri Satya Sai College of Pharmacy, Sehore, Bhopal, M.P, India), International Journal of Pharmacy and Pharmaceutical Sciences, 2012, 4(suppl.1), 210-214].

**NPARR 4(1), 2013-081 A review study on chemical composition and molecular structure of newly plant gum exudates and seed gums (Review)**

A large number of plants can produce the complex polysaccharides commercially known as 'plant-based gums'. Several studies on various plant-based gums (mainly plant gum exudates and seed sums) have resulted in the identification of valuable natural sources of complex carbohydrate polymers that promote the desired quality, stability, texture and appearance. The plant gum exudates and seed gums are the complex polysaccharides/carbohydrate polymers commonly used as a dietary fiber, thickening agent, foaming agent, film, emulsifier, stabilizer and drug delivery agent. The physical and functional properties of plant-based gums depend on their chemical compositions and molecular structures. Recently, there is a substantial interest to elucidate the relationship between the chemical composition, molecular structure and physical characteristics and functional properties of plant gum exudates and seed gums. The present study also summarized the molecular structure, chemical composition and functional properties of various types of plant gum exudates [Mirhosseini, H.* and Amid, B.T. (Department of Food Technology, Faculty of Food Science and Technology, University Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia), Food Research International, 2012, 46 (1), 387-398].

**NPARR 4(1), 2013-082 Preformulation studies on grewia gum as a formulation excipient**

Grewia gum is a naturally occurring polysaccharide which has potential as a pharmaceutical excipient. Differential scanning calorimetry and Fourier transform infrared
(FT-IR) spectroscopy techniques were used to examine the thermal and molecular behaviours, respectively, of mixtures of grewia gum with cimetidine, ibuprofen or standard excipients, to assess potential interactions. No disappearance or broadening of the melting endotherm was seen with cimetidine or ibuprofen. Similarly, there was no interaction between grewia gum and the standard excipients tested. The results obtained using thermal analyses were supported by FT-IR analysis of the material mixtures. Grewia gum is an inert natural polymer which can be used alone or in combination with other excipients in the formulation of pharmaceutical dosage forms [Nep, E.I.* and Conway, B.R. (Life and Health Sciences, Aston University, Aston Triangle, Birmingham B4 7ET, United Kingdom), *Journal of Thermal Analysis and Calorimetry*, 2012, **108**(1), 197-205].

NPARR 4(1), 2013-083 Preliminary evaluation of *Borassus flabellifer* fruit mucilage as tablet binder

The objective of present investigation was to evaluate mucilage of *Borassus flabellifer* as a binder for pharmaceutical dosage forms. Natural gums are economic, easily available and found useful as tablet binder. No significant work has been reported on *Borassus flabellifer* mucilage to use it as a tablet binder. Mucilage extracted from *Borassus flabellifer* was subjected to toxicity studies for its safety and preformulation studies for its suitability as a binding agent. Tablets were prepared with *Borassus flabellifer* mucilage and evaluated for tablet characteristics. Wet granulation technique was used for the preparation of paracetamol granules. The binder concentrations used in the formulation were 2, 4, 6, 8 & 10 % w/w. The prepared granules were evaluated for percentage of fines, average particle size, total porosity, compressibility index and flow properties. The tablets were prepared and evaluated for content uniformity, hardness, friability, disintegration time and in vitro dissolution profiles. The tablets had good physicochemical properties, and the drug release was more than 90% within 90 min. The tablets prepared by using 10% mucilage as binder exhibited more hardness than by using 2, 4, 6 and 8% concentration. At 8% concentration it has given similar disintegration time and dissolution profile in comparison to starch at 10 % w/v. Hence, *Borassus flabellifer* mucilage at 8% w/v concentrations can be considered as ideal concentrations for preparation of tablets [Ravi, K.*, Rajarajeshwari, N. and Narayana Swamy V.B. (Shri Jagdish Prasad Jhabarmal Tibrewala University, Rajasthan, India), *International Journal of Pharmaceutical Sciences*, 2012, **1**, 1883-1894].