Oleo gum resin of *Ferula assa-foetida* L. ameliorates peripheral neuropathy in mice

According to the Chinese, European, Iranian and Indian traditional medicines, oleo gum resin of *Ferula assa-foetida* (asafoetida) has therapeutic effects on different kinds of diseases. Some of these effects are related to the diseases of nervous system such as hysteresis and convulsion. In recent studies, some anti-epileptic and neuroprotective roles were also considered for it and its possible role on treatment of peripheral neuropathy has been examined. *In vitro* studies were carried out to identify the response of isolated sciatic nerves to different concentrations of oleo gum resin of asafoetida solved in Lock's solution. Then, in vivo studies were conducted to evaluate its effect on amelioration of peripheral neuropathy in mice. Peripheral neuropathy was induced by intraperitoneal injection of high doses of pyridoxine in adult Balb/c male mice. Tail flick tests were performed to identify the incidence of neuropathy in animals. After 10 days treatment with asafoetida, the efficiency of treatment was assessed by behavioral, electrophysiological and histological studies. *In vitro* experiments confirmed that incubating the nerves in aqueous extract of oleo gum resin of asafoetida increased the amplitude and decreased the latent period of nerve compound action potential (CAP). Nerve conduction velocity (NCV) and amplitude of CAP also improved in asafoetida treated animals. Histological and behavioral studies showed that asafoetida was able to facilitate the healing process in peripheral nerves. *In vitro* experiments showed that asafoetida is a nerve stimulant and its administration in neuropathic mice exerted neuroprotecting effects through stimulating axonal regeneration and remyelination and decrement of lymphocyte infiltration. [Farshad Homayouni Moghadam*, Maryam Dehghan, Ehsan Zarepur, Reyhaneh Dehlavi, Fatemeh Ghaseminia, Shima Ehsani, Golnaz Mohammadzadeh and Kazem Barzegar (Department of Physiology, School of Medicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran) *Journal of Ethnopharmacology*, 2014, 154(1), 183-189].

Highly efficient callus-mediated genetic transformation of *Parthenium argentatum* Gray, an alternate source of latex and rubber

Transformation efficiency and regeneration of *Parthenium argentatum* Gray (guayule) from leaf discs is problematical due to genotype-specific regeneration efficiency, browning and tissue culture growth response after *Agrobacterium* infection of leaf explants. To address this issue, we have developed a callus transformation system using lustrous green nodular callus, termed highly regenerating callus (HRC), which is immensely prolific at shoot regeneration. *Agrobacterium tumefaciens* strain EHA105 harboring the binary vector pCAMBIA2300 was used to transform the HRC. Primary transformation events and transgenic plants recovered were identified by PCR. Transgene integration and translation of *nptII* into transgenic plants was confirmed with Southern and western blot analysis. The plant transformation frequency from callus tissues was about 48%. This alternative method is fast and free of undesirable browning and it should facilitate a rapid improvement of guayule germplasm via genetic engineering, which has been slow compared to some other industrial crops. [Satpal Turan, Katrina Cornish, and Shashi Kumar (Departments of Horticulture and Crop Science, and Food, Agricultural and Biological Engineering, The Ohio State University, 1680 Madison Avenue, Wooster, OH 44691-4096, USA), *Industrial Crops and Products*, 2014, 62, 212-218].

Technical Review on Crumb Rubber Drying Process and the Potential of Advanced Drying Technique

Intensive thermal energy and extensive drying period are required in rubber drying
process due to its low conductivity and dielectric properties. Thus, selection of advanced drying techniques of crumbs rubber is essential for the sake of efficiency and energy conservation. The integration of advanced dryers ranging from electromagnetic heater, fluidized bed dryer, heat pump and the vacuum environment were discussed in details in paper. In summary, cost and energy efficient dryer is the aim of this research work and it is important that this technology offers a robust and reliable solution to the rubber processing industry [Thing Chai Tham*, Ching Lik Hii, Sze Pheng Ong, Nyuk Ling Chin, Luqman Chuah Abdullah and Chung Lim Law (Department of Chemical and Environmental Engineering, The University of Nottingham, Malaysia Campus, Jalan Broga, 43500 Semenyih, Selangor, Malaysia), Agriculture and Agricultural Science Procedia, 2014, 2, 26-36]

**NPARR, 6(1 & 2), 2015-72 Evaluation of hemostatic activity of latex from three Euphorbiaceae species**

Latices from several plant species of *Euphorbiaceae* family have been traditionally applied over fresh cuts to stop bleeding and subsequently applied over wounds to enhance healing process. The latex arrested bleeding from fresh wounds by reducing bleeding and whole blood coagulation time which are important indices of hemostatic activity. It has been accepted that hemostatic activity is due to the proteolytic fraction of plant latices. Thus, the present study aimed to assess the clot inducing properties of three *Euphorbiaceae* plants viz., *Euphorbia nivulia* Buch.-Ham., *Pedilanthus tithymaloides* (L.) Poit and *Synadenium grantii* Hook f. In the present study, various proteolytic activities namely protease, gelatinase, milk clotting and whole blood clotting assay of the enzyme fraction of latices of *Euphorbia nivulia, Pedilanthus tithymaloides* and *Synadenium grantii* have been investigated. The inhibition profile of protease specific inhibitors was assessed. Also, the effects of protein fractions were studied using bleeding/clotting time test of fresh experimentally-induced wounds in mice.

*Euphorbia nivulia* latex protease has noticeable blood clotting activity followed by *Pedilanthus tithymaloides* and *Synadenium grantii*. Stem latex protease of *Pedilanthus tithymaloides* exhibits superior procoagulant activity in different mammal's blood samples viz., *Capra hircus, Bubalus bubalis, Ovibos moschatus* and *Bos indicus*. Blood sample of ox was the most sensitive to latex protease than other mammal's blood. Concomitantly, the plant latex protease could significantly reduce whole blood clotting time of human and mice blood samples.

The protease fraction of latices of *Euphorbia nivulia, Pedilanthus tithymaloides* and *Synadenium grantii* possesses phytoconstituents capable of arresting wound bleeding, and accelerating whole blood coagulation process. It suggests good potentiality for use of latex proteases in wound management. Also, the finding of this study showed that the protease enzyme of *Pedilanthus tithymaloides* has the most potent hemostatic agent [Shamkant B. Badgujar (Department of Biochemistry, National Institute for Research in Reproductive Health (ICMR), Jehangir Merwanji Street, Parel, Mumbai 400012, Maharashtra, India), Journal of Ethnopharmacology, 2014, 151 (1), 733-739].

**NPARR, 6(1 & 2), 2015-73 Determining the optimal harvest cycle for copaíba (Copaifera spp.) oleoresin production**

Copaíba oleoresin is a medicinal product obtained from several species of Copaifera trees (*Copaifera* spp.), and it is used for its healing and anti-inflammatory properties. Oleoresin is extracted via holes drilled into the trunks of copaíba trees, which are then plugged and periodically harvested in repeated cycles. To date, the optimal harvesting cycle and the factors
that influence oleoresin production are unknown. Therefore, the main objective of this study was to analyze various harvesting schedules to determine the optimal cycle in an attempt to obtain maximum oleoresin production or the maximum net present value associated with production. The study took place in Paragominas, Pará (Brazil), and based on the resulting data, a set of alternatives for 1- to 5-year cycles with a planning horizon of 10 years was created. The data were analyzed within two different contexts: a deterministic one and another scenario that assumed that certain variables exhibit non-deterministic behavior for which a Monte Carlo simulation was used. Based on the available data, three scenarios were proposed that differed according to the hypotheses employed to estimate production for years when no measurements are available. The results show that, regardless of the various contexts and scenarios, the optimal harvesting cycle for copaíba oleoresin is three years, which is consistent with some previously published recommendations. Finally, the opportunity cost of not choosing the optimal cycle does not seem to be very high [Carine Klauberg, Edson Vidal, Luiz C.E. Rodriguez and Luis Diaz-Balteiro* (Department of Forestry Economics and Management, Technical University of Madrid, Avenida Complutense s/n, 28040 Madrid, Spain), Agricultural Systems, 2014, 131, 116-122].

NPARR, 6(1 & 2), 2015-74 Chitosan as an adhesive

Chitosan is a well-known polysaccharide abundantly published during the last decades. This heteropolymer, composed of 2-acetamido-2-deoxy-d-glucopyranose and 2-amino-2-deoxy-d-glucopyranose, is obtained after alkaline deacetylation of chitin from crustaceans, fungi and other non-vegetable organisms. Soluble only at acidic pH, it is the unique polycationic polysaccharide extracted from bioresources. This characteristic gives to it original and specific properties finding some applications in several industrial fields but especially in the biomedical one because of its biocompatibility and its non-toxicity. Besides these traditional applications other ones begin actually to appear in the literature. They focus on the development of chitosan-based adhesives, binders or films. This review synthetizes the state of the art on this domain, but also deals with the assessment of chitosan environmental impact [Narimane Mati-Baouche, Pierre-Henri Elchinger, Hélène de Baynast, Guillaume Pierre, Cédric Delattre and Philippe Michaud* (Clermont Université, Université Blaise Pascal, Institut Pascal UMR CNRS 6602, 24 avenue des Landais, BP-206, 63174 Aubière Cedex, France), European Polymer Journal, 2014, 60, 198-212].