Effect of edible coatings on water and vitamin C loss of apricots and green peppers

Edible coatings applied on fresh foods to reduce the moisture transfer, the oxidation and the respiration are important to prolong the shelf-life of such foods. The measurements of permeabilities of stand-alone films of various compositions to water vapour, oxygen and carbon dioxide help the selection of coating formulation to be applied on foods. Researchers at Akdeniz University, Anatalya, Turkey conducted studies to examine the effects of cellulose-based edible coatings on water and vitamin C losses of some fresh foods. Fresh apricots and green peppers were selected as the fresh foods for this study. Edible coatings of varying composition were applied on fresh apricots (*Prunus armeniaca* Linn. = *Armeniaca vulgaris* Lam.) and green peppers (*Capsicum annuum* Linn.). The water and vitamin C losses of these coated fresh foods were followed and compared with those of uncoated ones. The main components of the coating were methyl cellulose (MC) and polyethylene glycol (PEG). Stearic acid (SA) and ascorbic acid (AA) or citric acid (CA) were added to the coating formulation to control the barrier properties toward water and oxygen. It was found that coatings of any composition studied lower the water loss rate of fresh apricots and green peppers. Coating formulation of MC–PEG–SA was the most effective in reducing the water loss. Inclusion of AA or CA in the coating formulation as antioxidants lowered the vitamin C loss [Ayranci Erol and Tunc Sibel, The effect of edible coatings on water and vitamin C loss of apricots (*Armeniaca vulgaris* Lam.) and green peppers (*Capsicum annuum* L.), *Food Chem*, 2004, 87 (3), 339-342].

Heat-induced gelation of *Colocynthis citrullus* Linn. seeds

Current world effort has been targeted at developing new oilseed crops which could be used for food, medicinal and industrial purposes. *Egusi* (*Colocynthis citrullus* Linn.) belongs to family *Cucurbitaceae* and produces bitter-flavoured melon-type fruits. Partially defatted *egusi* seed meal is made into patties that serve as a meat substitute. The undefatted meal is used in several dietary preparations that vary with the food habits of the people. For instance, *egusi* seeds are used as a major thickening and gelling ingredient in most southeastern Nigerian dishes. Whole *egusi* seeds are dry-roasted and consumed as a snack. *Egusi* kernels contain approximately 28.4% protein (60% in defatted flour), 52.0% oil, 3.6% ash, 2.7% fibre and 8.2% carbohydrate. Its oil contains 63% linoleic acid, 16% oleic acid and small amounts of linolenic acid. Such oil composition resembles that of safflower oil and is very beneficial in human nutrition.

Despite the use of whole *egusi* seeds as a food ingredient for generations, there is no report on its gelling ability. Hence, researchers at Departments of Food Science and Human Nutritional Sciences, University of Manitoba, Winnipeg, MB, Canada conducted studies to evaluate the potentials of *egusi* seeds as a structure enhancer in food systems. Gelation and thermal characteristics of *egusi* seeds were examined by dynamic rheological testing and differential scanning calorimetry. Rheological data of gels, prepared at varied protein concentrations (3, 6, 10 and 20%, w/v) in 0.15 M NaCl, indicated that 6% (w/v) *egusi* protein was sufficiently high to produce properly-crosslinked networks (\(G' = 8724\) Pa). Gels prepared at 10% (w/v) protein in 0.15 M NaCl (\(G' = 22,530\) Pa) were superior to gels treated with 0.5 M NaCl (\(G' =8385\) Pa). Structural stability of *egusi* meal increased as salt level increased. Elastic gels developed above the denaturation temperature (\(T_d = 93.7^\circ\)C) in the heating phase and continued during cooling, indicating that *egusi* seeds can be used as a gelling food ingredient.

Results of this study have demonstrated that whole *egusi* seeds can be used as a structuring ingredient in food systems, and this functionality can be modified by interactions with ingredients such as NaCl which is a typical food component. *Egusi* seed proteins may be the most important intrinsic factor that determines the gelation pattern of the meal; therefore, isolation of *egusi* seed proteins is currently under investigation [Uruakpa FO and Aluko RE, Heat-induced gelation of whole egusi (*Colocynthis citrullus* L.) seeds, *Food Chem*, 2004, 87(3), 349-354].
Development of partially defatted soy flour and dhal

Soybean, being a rich source of protein and fat, seems to be the right substitute for solving the problem of protein-energy malnutrition. Soybean has been used as a food for a long time, but only in this century, it has been subjected to a variety of processing technologies. It is a fairly new crop for Indian consumers and few resources have been directed toward enhancing utilization of soybean in the daily diets of people in the country. Soybeans can be processed into various products, namely, oil, flour, protein concentrates and isolates and other fermented products. There has been a considerable interest in defatted soybeans, due to their high protein value and increased shelf-life, resulting from minimization of oil rancidity. Since the literature regarding defatting of soy dhal is limited, the present study was undertaken by researchers at Department of Foods and Nutrition, CCS Haryana Agricultural University, Hisar, India.

Defatted soy flour is a common form in which soybeans can be incorporated in various indigenous food preparations. The procedure for defatting soy dhal and flour has been standardized in the present investigation. Soy flour was soaked in petroleum ether and chloroform:methanol (1:15) for 12 hours. For extraction of fat from soy dhal, hexane and petroleum ether (1:15) were used. In addition, soy dhal was subjected to processing treatments such as pressing, steaming and soaking. The decrease in fat content was significantly \((P<0.05)\) higher when soy flour was treated with petroleum ether. Soaking soy dhal in hexane (24 hours) followed by shaking for 4 hours resulted in maximum reduction in fat content of soy dhal. Processing treatments significantly decreased the fat content by 27.52-47.39% compared to the control.

Overall, pressing and steaming, followed by soaking soy dhal in hexane and petroleum ether, significantly decreased the fat content by 25.21-47.39%. Thus, it may be concluded that defatted soy flour, produced by the above method, may be used as dietary protein supplement in various products. Soy flour can be defatted by 77%, however, soy dhal can be maximally defatted by 9% using different organic solvents. Processing treatments, especially steaming, pressing and soaking in hexane and petroleum ether, seemed beneficial for maximum extraction of fat from soy dhal. Further, there is a need to study whether such defatted soy dhal can be used for development of products having consumer acceptability [Khetarpaul Neelam, Grewal Raj Bala, Goyal Rajni and Garg Renu, Development of partially defatted soy flour and dhal, Food Chem, 2004, 87 (3), 355-359].

High dietary fiber powder from lemon juice by-products

Citrus juice industries produce an important quantity of by-products, which are mainly used for animal feeds, however, because of their high fiber content they can be used as a good source of dietary fiber.

Lemon \([Citrus limon \,(Linn.)\,\,Burm.f.\,\,cv\,\,‘Fino’\,]\) juice industry by-products were used to obtain high dietary fiber powder. The effect of processing variables (direct drying and washing previous to drying) on functional properties, fiber content and type, microbial quality and physicochemical properties of the fiber were evaluated by researchers of Spain. The obtained fiber powder had good functional, microbial quality and favorable physicochemical characteristics to be used in food formulations. Processing conditions affected fiber composition and properties. Water holding capacity was enhanced by washing and slightly decreased by the reduction in fiber particle size. Oil holding capacity was not affected by those factors. Acid detergent and neutral detergent fibers were highest in powder from washed lemon residue (23.73 and 32.91%, respectively). Washing prevented fiber browning during drying as reflected in colour parameters. Washing water rinsed green components. Drying was responsible for the decrease of bacterial populations (approx. 90% reduction in microbial counts). Thus, high dietary fiber lemon powder obtained from lemon by-products has good functional and microbial quality, as well as favourable physicochemical characteristics to be used in food formulations (as meat, dairy and bakery products) [Lario Y, Sendra E, García-Pérez J, Fuentes C, Sayas- Barberá E, Fernández-López J and Pérez-Alvarez JA, Preparation of high dietary fiber powder from lemon juice by-products, Innov Food Sci Emerg Technol, 2004, 5 (1), 113-117].