

Conversion of waste edible oil to biodiesel fuel

The industrial-scale production of biodiesel fuel from waste edible oils is performed by a chemical process using alkaline catalysts. Waste oils, however, contain small amounts of water and free fatty acids (FFA) in addition to oxidized compounds, such as aldehydes, epoxides, and polymers. Accordingly, fatty acid alkaline salts (soaps) are generated as by-products. The soaps are removed by washing with water, which also removes glycerol, methanol, and catalyst. Hence, disposal of the resulting alkaline wash-water creates other environmental concerns. The enzymatic methanolysis of triacylglycerols (TAG) does not generate any waste materials. Enzymatic production of biodiesel fuel from waste oils therefore is strongly desirable. Watanabe and others from Japan investigated the conversion of waste edible oil to biodiesel fuel in a fixed-bed bioreactor. Three-step methanolysis of waste oil was conducted using three columns packed with 3g of immobilized *Candida antarctica* lipase. Transmethylation (95%) of vegetable oil to its corresponding methyl esters (ME) was achieved by a stepwise process using immobilized *C. antarctica* lipase. The stepwise addition of methanol prevented the inactivation of the lipase, which allowed its continued usability. It has also been observed that the contaminants in the waste oil have little or no effect on the efficiency of stepwise methanolysis and the reusability of the immobilized biocatalyst [Watanabe *et al*, *J Amer Oil Chem Soc*, 2001, 78(7), 703-707].

Insecticide/Molluscicide

Molluscicidal activity of *Annona* species



Annona squamosa

Schistosomiasis is an endemic parasitic disease, prevalent in the tropical and subtropical regions of the world, and is second only to malaria. It is caused by the presence of the worm *Schistosoma mansoni* in the liver of the affected person, the fresh-water mollusk *Biomphalaria glabrata* acting as intermediate host. Santos and Sant'Ana evaluated the molluscicidal activity of extracts of *Annona crassiflora* M., *A. glabra* Linn., *A. muricata* Linn., *A. pisonis* M., *A. salmani* DC., and *A. squamosa* Vell.

The results indicated that all the investigated species possess molluscicidal activity against *B. glabrata*. From the twenty-one screened extracts, fifteen showed activity against the adult snail and four toward snail egg masses [Santos & Sant'Ana, *Phytomedicine*, 2001, 8(2), 115-120].

Annona glabra



Annona muricata





Antifeedant activity of *Ventilago*

The plant, *Ventilago madaraspata* Gaertn, Hindi- *Pitti* is used in traditional medicine as stomachic, tonic and stimulant. Mixed with sesame oil, it is used for external application in the treatment of skin disorders. Krishnakumari and others from SPIC Science Foundation, Chennai studied the insect antifeedant activity of the quinones isolated from the plant.

Amongst the quinones tested, ventiloquinone A was the most effective antifeedant against the beetles, *Henosepilachna vigintioctopunctata* and *Spodoptera litura* [Krishnakumari *et al*, *Fitoterapia*, 2001, 72(6), 671-675].

Nutraceutical

Nutritious protein isolate from Pea

Pea is an important grain legume, as both human food and animal feed. A valuable part of the pea is the protein fraction, which can be extracted and further purified into a protein isolate. However, peas, as other legumes, contain a variety of antinutritional and antiphenological factors, which negatively influence the quality of their proteins. High-quality pea-protein isolates with improved nutritional and physiological properties can beneficially replace other protein sources, for example soy protein, in several applications. The oligosaccharides are considered to cause flatulence in man and animals, whereas phytate is a recognized inhibitor of iron and zinc absorption in man, and phytate has also been shown to decrease the protein availability in peas.

Fredrikson and others developed a process for pea-protein isolate production, resulting in low content of phytate and oligosaccharides. Oligosaccharides were removed from the protein fraction through ultrafiltration. Ultrafiltration of 50- and 100-kD molecular weight cutoffs was tested, and both effectively separated the oligosaccharides from the protein. Phytate degradation was achieved by incubation of the pea-protein solution by addition of exogenous phytase enzyme. An almost complete degradation of inositol hexa-, penta-, tetra-, and triphosphates was reached using an incubation time of one hour. The reduced content of oligosaccharides and inositol phosphates is likely to result in reduced flatulence and improved mineral bioavailability.



These qualities of the pea-protein isolate make it a suitable protein source for infant formula production.

The concentration of oligosaccharides decreased from 77.3 mg/g in starting material to 11.7 mg/g in the finished pea-protein isolate for 50 kD molecular weight cutoffs. The percentage of protein increased from 25% in seeds to 92% in the pea-protein isolate [Fredrikson *et al*, *J Agric Food Chem*, 2001, 49(3), 1208-1212].

Bottled Sugarcane juice

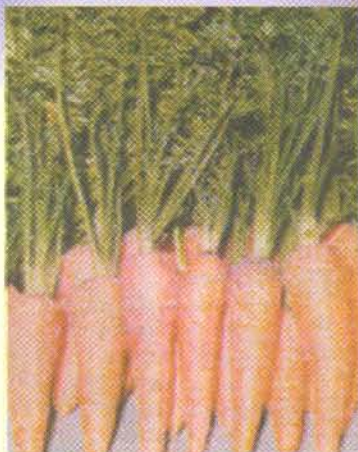
A simple method of bottling sugarcane juice has been developed by the Sugarcane Breeding Institute, Kanpur. The juice availability in season can now be increased. The bottled juice did not deteriorate for at least six to eight weeks with its taste also not being affected [*Plant Hort Tech*, 2000, 1(6), 14].

Eat carotenoid **rich fruits** and **vegetables** to stay healthy



Dietary choices, together with exercise and a healthy weight, can prevent cancer cases, such as lung, colon and rectal cancers, and breast cancers. It has been projected that if people were to eat plant based diets rich in a variety of vegetables (broccoli, carrots, arugula, pumpkins, sweet potatoes, squash, tomatoes, watercress) and fruits (apricots, cantaloupes, mangoes, papayas, peaches and persimmons, legumes) and minimally processed starchy staple foods each day, the overall cancer rates could decline by as much as 20%.

In the article on carotenoids and gene regulation it has been stated that life style rather than genetics is the major



contributing factor to cancer risk in Western Societies. Vitamin A and its metabolites have been shown to be active cancer-preventive agents in trials with animals and humans. Consumption of lycopene, a straight-chain hydrocarbon, has also been shown to lead to a decreased risk of both prostate cancer and cervical cancer.

Carotenoids, the basic source of yellow, orange, and red plant pigments, are widely distributed in nature. They are present in all living organisms, from bacteria and algae to higher plants, in both nonphotosynthetic and photosynthetic tissues. These natural pigments are not produced by animals but are supplied

from plant kingdom. Basu and others at Northeast Consultant Resources, Ohio, USA reviewed the use of carotenoid food among the population and their impact on chronic diseases. Carotenoids are present in most commonly consumed vegetables and fruits. The most studied carotenoids are α -carotene, β -carotene, lycopene, lutein, zeaxanthin, and cryptoxanthin. Carotenoid-rich foods may promote immunocompetence as judged from the enhanced ability of T-lymphocytes to proliferate in test subjects when they ate the test vegetables. Additionally, lutein, zeaxanthin, and lycopene may provide protection from oxidative assaults. High intake of vegetables also has been associated with reduced risk of degenerative diseases, such as epithelial cancers, cardiovascular diseases and age-related macular degeneration [Basu *et al*, *J Amer Oil Chem Soc*, 2001, **78**(7), 665-675].

