Fuel

Performance of biodiesel

During the last decade ethanol and biodiesel became the best-known liquid biofuels. As for diesel fuel renewable substitutes, fatty acid methyl esters (FAME) biodiesel, appear to be the most popular since its properties are similar to mineral diesel and can be used in conventional diesel engines without significant modifications. The substitution of conventional diesel fuels with rapeseed oil methyl esters comprises already a commercial activity in many countries.

Kalligeros and others from Greece studied exhaust emission and fuel consumption measurements from a single cylinder, stationary diesel engine. The engine was fuelled with fuel blends containing two different types of biodiesel (sunflower oil and olive oil), at proportions up to 50%. The two types of biodiesel appeared to have equal performance, and irrespective of the raw material used for their production, their addition to the marine diesel fuel improved the particulate matter, unburned hydrocarbons, nitrogen oxide and carbon monoxide emissions (Kalligeros *et al*, *Biomass Bioenergy*, 2003, **24**, 141-149).

Insecticide/Pesticide

Larvicidal and chemosterilant activity of *Argemone* against dengue fever vector

Aedes aegypti (Linn.) is an important vector of dengue fever in India. Although source reduction through proper environmental sanitation and effective exclusion of the mosquito from water stored for domestic use can keep populations of *A. aegypti* in check, the use of insecticides is often necessary in control operations. The continuous use of insecticides has however resulted in resistance to insecticides in subtropical and tropical regions of the world and accumulation of chemicals has affected the biological environment.

The use of economically feasible botanical and biodegradable extracts is considered to be an important alternative strategy for the control of mosquito vector. Some of the species from which chemicals have been tested against the larvae and adults of *A. aegypti* are: ***Tagetes minuta, T. erecta, T. patula, Melia volkensi, M. azedarach, Dictyosphaeria favulosa, Acorus calamus, Ageratum conyzoides, Annona squamosa, Bambusa arundanacea, Madhuca longifolia, Citrus medica, Caulerpa peltata, C. racemosa, C. scalpelliformis, Dictyota dichotoma, Enteromorpha clathrata, E. intestiinalis, Azadirachta indica*** **and** ***Pongamia glabra.*** Sakthivadivel and Thilagavathy examined the larvicidal and chemosterilant activity of the acetone fraction from the petroleum ether extract of ***Argemone mexicana*** **Linn.** seeds against *A. aegypti*.

Argemone mexicana

The acetone fraction of the petroleum ether extract of seeds exhibited larvicidal and growth inhibiting activity against the second instar larvae of *A. aegypti*. This activity occurred at higher concentrations (200, 100, 50 and 25 ppm). Chemosterilant activity, including reduction in blood meal utilization (27.70%), reduction in fecundity (19.00%), formation of larval-pupal intermediates, formation of pupal-adult intermediates, adult mortality and sterility of first generation eggs (100%), occurred at low concentration (10 ppm).

The study indicates that the seeds of ***A. mexicana*** possess bio-active compounds which can cause mortality at higher concentrations and sterility at a selected lower concentration of 10 ppm. These studies show the effective control of *A. aegypti* with natural compounds (Sakthivadivel & Thilagavathy, *Biores Technol*, 2003, **89**, 213-216).

Insecticide/Pesticide

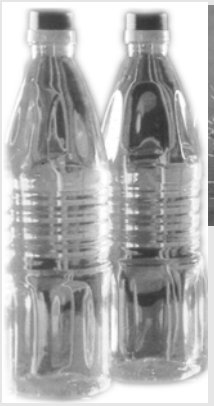
Antimalarial activity of Pelargonium

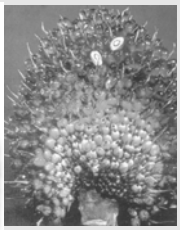
Jeyabalan and others from Coimbatore evaluated the potential of methanol extract of leaf of Mosquito plant, ***Pelargonium* 'citrosa'** against the biological, larvicidal, pupicidal, adulticidal, ovipositional deterrency, repellency and biting deterrency of *Anopheles stephensi*.

Larval mortality was dose dependent with the highest dose of 4% plant extract evoking 98% mortality. The extracts affected pupicidal and adulticidal activity and significantly decreased fecundity and longevity of *A. stephensi*. The larval, pupal and adult developments were completely inhibited by the treatment. At 4% the extracts evoked strong repellent action. They also interfered with oviposition, egg hatchability, and exhibited a growth inhibiting effect against larvae and good repellency against adults of *A. stephensi*. The leaf extract treatment significantly enhanced biting deterrency. As naturally occurring insecticides, this plant-derived material could be useful as an alternative for synthetic insecticides controlling field populations of mosquitoes (Jeyabalan *et al, Biores Technol*, 2003, **89**, 185-189).

Oil/Fats

Palm oil alleviates tumour promotion





Palm oil is a rich source of vitamin E, carotenoids, tocotrienols and tocopherols which are natural antioxidants and act as scavengers of oxygen free radicals. 12-O-Tetradecanoyl-phorbol-13-acetate (TPA) is a known oxidant that promotes tumourigenesis in mouse skin through the elaboration of oxidative stress. Kausar and others from Department of Medical Elementology and Toxicology, Hamdard University, New Delhi assessed the anti-tumour promoting potential of palm oil against TPA-mediated skin tumourigenesis in 7,12-dimethylbenz[a]anthracene-initiated Swiss albino mice. Topical application of palm oil 1 hr prior to application of TPA resulted in a significant protection against skin tumour promotion. The animals pre-treated with palm oil showed a decrease in both tumour incidence and tumour yield as compared to the TPA (alone)-treated group. Palm oil application also reduced the development of malignant tumours. Since TPA-induced epidermal ornithine decarboxylase (ODC) activity and [^{3}H]thymidine incorporation are conventionally used markers of skin tumour promotion, the scientists also assessed the effect of pre-application of palm oil on these parameters, and it was observed that the application of palm oil prior to the application of TPA alleviated both these TPA-induced markers of tumour promotion. The effect of pre-application of palm oil on TPA-mediated depletion in the non-enzymatic and enzymatic molecules was also assessed and it was observed that palm oil application prior to TPA application resulted in the recovery of TPA mediated depletion in the levels of these molecules viz. glutathione, glutathione peroxidase, glutathione reductase, glutathione-S-transferase and catalase. Similarly, palm oil also exhibited a protective effect against Fe^{2+}-ascorbate-induced lipid peroxidation in the epidermal microsomes.

The studies suggest that palm oil may be an effective anti-tumour promoter, and delay cutaneous tumour induction and development. The results also suggest that palm oil is an effective suppressor of malignant tumour growth in murine skin and that it acts by inhibiting cutaneous oxidative stress (Kausar *et al, Cancer Letters*, 2003, **192**, 151-160).