

SOLAR DETOXIFICATION AND PRODUCTION  
OF AFLATOXIN B1 IN COCONUT OIL

By

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## ABSTRACT

Coconut oil expelled from domestically cured "copra" in three baby expellers were examined for their free fatty acid and aflatoxin B1 levels. The free fatty acid values ranged from 0.33% to 19.25% and the model value was between 0.5%-1% (n = 100). The mean aflatoxin B1 level was 186  $\mu\text{g}/\text{kg}$  (n=115). In 79% of the samples free fatty acid contents were higher than the permitted limit for edible coconut and the aflatoxin B1 levels were considerably higher than that reported earlier from commercial mills. No correlation was observed between free fatty acid level and aflatoxin B1.

On centrifugation of aflatoxin contaminated coconut oil at 9000 G less than 25% of the aflatoxin B1 was observed in the sediment which weighed 30% of total crude oil, leaving more than 75% of aflatoxin B1 in the soluble form in oil.

A pilot plant already designed for the exposure of coconut oil to solar radiation was tested for its performance and the efficiency of degradation of coconut oil. At aflatoxin B1 concentrations between 166-1250  $\mu\text{g}/\text{kg}$ , 75% degradation of aflatoxin B1 leaving no new fluorescent product was observed with 87  $\text{cal}/\text{cm}^2$  (6 min) exposure at a moving layer thickness of 1.6 mm. total degradation occurred on repeated exposure for 8 to 36 min.

On bio-assay of the extract of solar irradiated aflatoxin B1, by feeding to day old ducklings, the weight gain of the birds, mortality pattern and histological changes in the liver tissues

showed that the birds of this group were similar to those of the two control groups fed with non-toxic oil after solar irradiation and the vehicle (propylene glycol) indicating biological safety of the solar irradiated oil and confirming chemical estimation on thin layer chromatograms where total degradation of aflatoxin B1 was observed.

On examining the effect of solvents, chloroform, ethyl acetate and coconut oil with different types of radiations, ultraviolet, solar and light from fluorescent lamp, total degradation of aflatoxin B1 leaving no residual aflatoxin or new fluorescent degradation products were observed only with the combination of solar radiation and coconut oil. With other combinations of solvents and radiation types, upto 4 new degradation products designated as P, Q, R and S were observed. Chemical treatment with acid and alkali also produced some of these products.

The presence of moisture in oil, appeared to be essential for solar degradation to occur in coconut oil.

In broth experiments attempts were made to grow Aspergillus parasiticus NRRL 2999 on media containing coconut oil or its hydrolysed products, as sole source of carbon, and the broths were examined for the presence of aflatoxin B1. Glycerol and lauric acid supported good growth of the fungi and also production of aflatoxin B1. The grated coconut and copra serve as a good medium for aflatoxin accumulation perhaps due to availability of glycerol and lauric acid produced by enzymatic hydrolysis of fats.