

# 1. EFFECT OF SMOKE CURING ON SOME FOODS IN SRI LANKA

U. SAMARAJEWA, M.C.P. WIJERATNE\*, M.C.P. RODRIGO AND  
G.D.D.P. KARUNARATNE

*Department of Food Science and Technology, Faculty of Agriculture,  
University of Peradeniya*

*and  
\*Institute of Fundamental Studies, Kandy.*

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Foods are smoke cured for drying and to impart new organoleptic properties. The smoke produced during combustion and thermal decomposition of organic substances is a colloidal suspension of vapour, liquid droplets and solid particles. Chemically, the smoke contains organic acids, carbonyls, phenols and Polycyclic Aromatic Hydrocarbons (PAH). Some of the PAH are known carcinogens. Understanding of the presence and the mechanisms of contamination of foods by PAH is important from a health point of view and in processing of food. In Sri Lanka, copra and 'Maldive fish' are prepared by smoke curing.

Eighty seven samples of coconut kernel products and twelve samples of 'Maldive fish' collected from the oil mills in the coconut triangle and markets in Kandy respectively were analyzed for PAH. The PAH from coconut samples were extracted in to hexane in Soxhlet and the 'Maldive fish' through dichloromethane using standard methods. The hexane extracts were purified by absorbing in to Sep-pak (Bond Elute LRC, Varian Inc.) cartridge and eluting with hexane-dichloromethane (3:1). Estimation of PAH were done on Shimadzu model LC-6A HPLC in reverse phase using a Chrompak Chrom Spher PAH glass cartridge, mobile phase of 30 - 100% water:acetonitrile and a fluorescent detector.

The mean total PAH concentrations observed in copra, coconut oil, copra meal and parings were  $102 \pm 184$ ,  $359 \pm 412$ ,  $68 \pm 101$  and  $109 \pm 164$  mg/kg respectively. More than 90% of the PAH detected were non-carcinogenic. Some of the sun-dried copra and desiccated coconuts did not contain PAH. The concentrations of PAH observed in Sri Lankan copra were much less than observed in copra in other countries of the region. The relatively low concentrations of PAH observed is probably associated with controlled combustion of shells practiced in 'Standard Ceylon Copra Kiln' which provides a relatively 'clean' supply of hot air. The distribution pattern of total PAH between oil and copra meal, compared to what is present in copra used to expel the oil indicate possible production of PAH during mechanical expulsion of oil in mills.

The maldive fish contained mean total PAH concentration of  $1083 \pm 1332$  mg/kg. The PAH concentrations in 'maldive fish' were 3 to 4 fold higher than what is reported in smoked salmon. However, the bulk of the PAH in 'maldive fish' were in the outer 2 mm crust which contained 60 to 90% of the PAH. The PAH in the innermost regions of the 'maldive fish' are probably either absorbed from smoke or produced due to heat. Both deposition and thermal generation of PAH appear to occur in copra and 'maldive fish'.

Preparation of regulatory limits for PAH in foods are still in an elementary stage. Germany has insisted on a regulatory limit of 25 mg/kg for total PAH and 5 mg/kg for

**Benzo[a]pyrene.** In view of the concentrations observed in this study and else where it is more appropriate at this stage to classify food containing PAH to the following categories:

very high	> 2000 mg/kg
high	251 - 2000 mg/kg
medium	26 - 250 mg/kg
low or negative	< 25 mg/kg

Such a classification will enable the industries to reduce contamination by modification of smoke curing processes while meeting the day-to-day needs of the smoke cured foods.

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