



Working in Partnership

Nuffield Funded Research Project

Overview

This Nuffield-funded research project explored the antimicrobial properties of *Garcinia indica* (Kokum). This project built on preliminary work carried out by Dr Clem Maidment and Dr de Sequeira for the Cell & Micro-Biology Research Group at Bath Spa University. It indicated that extracts of Kokum are sensitive against *Staphylococcus albus* and less sensitive to *Escherichia coli*.

About the Project

Each year, The Nuffield Foundation Undergraduate Research Bursary Scheme enables students across the UK to gain first hand experience of what it would be like as a scientific researcher, by supporting them in a research project during the summer months. In 2010, the Foundation received 813 applications for these bursaries. The project submitted by Dr de Sequeira was one of 400 projects to be funded nationwide.

In Goa, India, a welcome drink known as 'Kokum' - made from a syrup formulated from local fruits - has been served to travellers for centuries. It is also used to prevent skin damage and allergies from the sun and tropical climates. In the Western world, Kokum is known as Mangosteen or Red Mango. Botanically, it is classified as *Garcinia indica* and has several culinary, pharmaceutical and industrial uses. The biological properties of *Garcinia indica* are only beginning to be discerned. The potent antioxidant properties of this compound have been used to explain most of its observed biological activities. Emerging evidence suggests that garcinol could be useful as an anti-cancer agent, and there is increasing awareness that garcinol is a pleiotropic agent capable of modulating key regulatory cell signalling pathways.

Traditionally, *Garcinia* species have been used as anti-inflammatory, anti-immunosuppressive, antiprotozoal and antimicrobial agents. Small and complex molecules have been isolated from different parts of the various species of *Garcinia*, which include xanthenes and their derivatives, exhibiting a wide range of biological and pharmacological activities such as antimicrobial, antioxidant, antitumour-promoting, cytotoxic, etc. Crude extracts, as well as partially purified compounds, from different parts of some species of *Garcinia* plants have shown potential antibacterial activities.



Dr Anil de Sequeira working with a Human Nutrition undergraduate in the specialist analytical suite

Fast Facts

- Bath Spa University's research database enables its academics to access funding information swiftly.
- Science Department's specialist facilities were exploited in a 'live' industry project.
- Human nutrition undergraduate benefits from Nuffield Research Bursary.

In this project, Minimum Inhibitory Concentrations (MIC) were determined by a standard disc diffusion method. Minimum Lethal Concentrations (MLC) for the different bacteria were determined by standard broth dilution techniques. The major organic acid in *Garcinia cambogia* (Malabar tamarind) was found to be hydroxycitric acid, present in concentrations of 16–18%. The presence of Hydroxycitric acid was determined by High Performance Liquid Chromatography (HPLC).

Benefits

The project has allowed Dr de Sequeira to build on the research that he has already undertaken. It has benefited the Year 2 BSc (Hons) Human Nutrition programme with an insight in to the role of the scientific researcher. Projects such as this have the potential to attract students to a career in scientific research - an area in which, nationally, the UK has difficulty in recruiting to.

Outcomes

Undertaking this research project has enabled the Science Department to further exploit its specialist microbiology and analytical laboratories. The Department's new state-of-the-art High-Performance Liquid Chromatography equipment was used for this project.

The project has also enabled our experienced technicians to engage with a 'live' research project.



Staff and student evaluating results from the disc assay microbiological plates

Perspective

“This project has allowed me to bring a little bit of Goa to the UK. They say home is where the heart is, and my heart is in science – so my home is my laboratory – where my vocation is trying to gain improved knowledge that will enrich our lives.”

Dr Anil de Sequeira
Subject Leader: Food and Nutrition,
Bath Spa University