

## Kandiah Memorial Award for Basic Chemistry - 2008

Ms N R Amarasinghe of the Institute of Fundamental Studies, Kandy has been awarded the Kandiah Memorial Award for Basic Chemistry in recognition of her research on 'Chemistry, Bioactivity and Chemotaxonomic Significance of the Fruit Constituents of *Artocarpus altilis* and *Flacourtia indica*'.



The research was carried out under the supervision of Prof. Lalith Jayasinghe of the Institute of Fundamental Studies. She has published her work in International Journals and has made several presentations at conferences based on this work.

Ms. N. Amarasinghe graduated in 2003 from the University of Peradeniya with a B.Sc. Special Degree in Chemistry with upper division honors and obtained her M.Phil degree in 2007 from the Post Graduate Institute of Science, University of Peradeniya. Presently she is working as a lecturer (probationary) at the Uva Wellassa University (in the Faculty of Science and Technology) Badulla, Sri Lanka.

### Abstract of the Kandiah Memorial Award for Basic Chemistry

#### Chemistry, bioactivity and chemotaxonomic significance of the fruit constituents of *Artocarpus altilis* and *Flacourtia indica*

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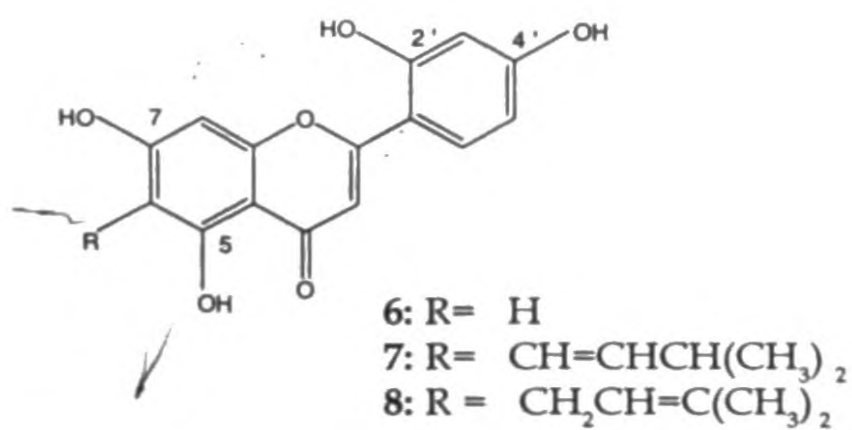
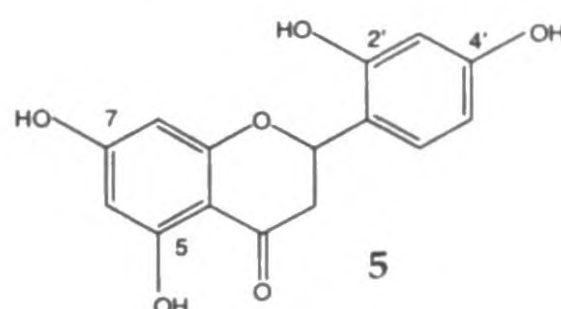
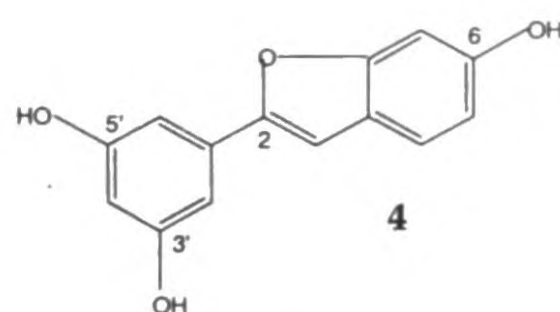
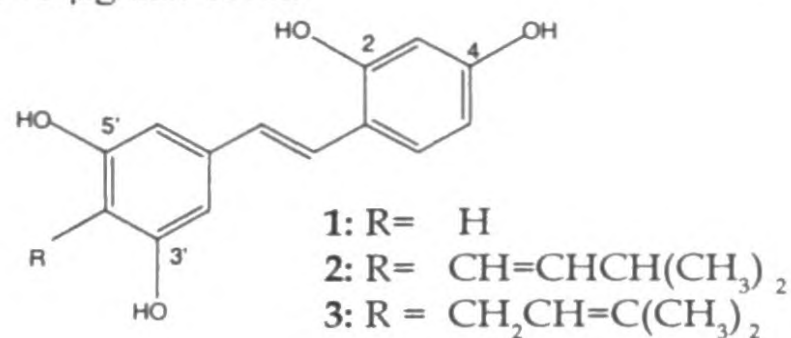
As a part of the studies on search for biologically active compounds from edible fruits of Sri Lanka, the present investigation was carried out on the fruits of *Artocarpus altilis* (Par.) Fosb. of the family Moraceae and *Flacourtia indica* (Burm. F.) of the family Flacourtiaceae.

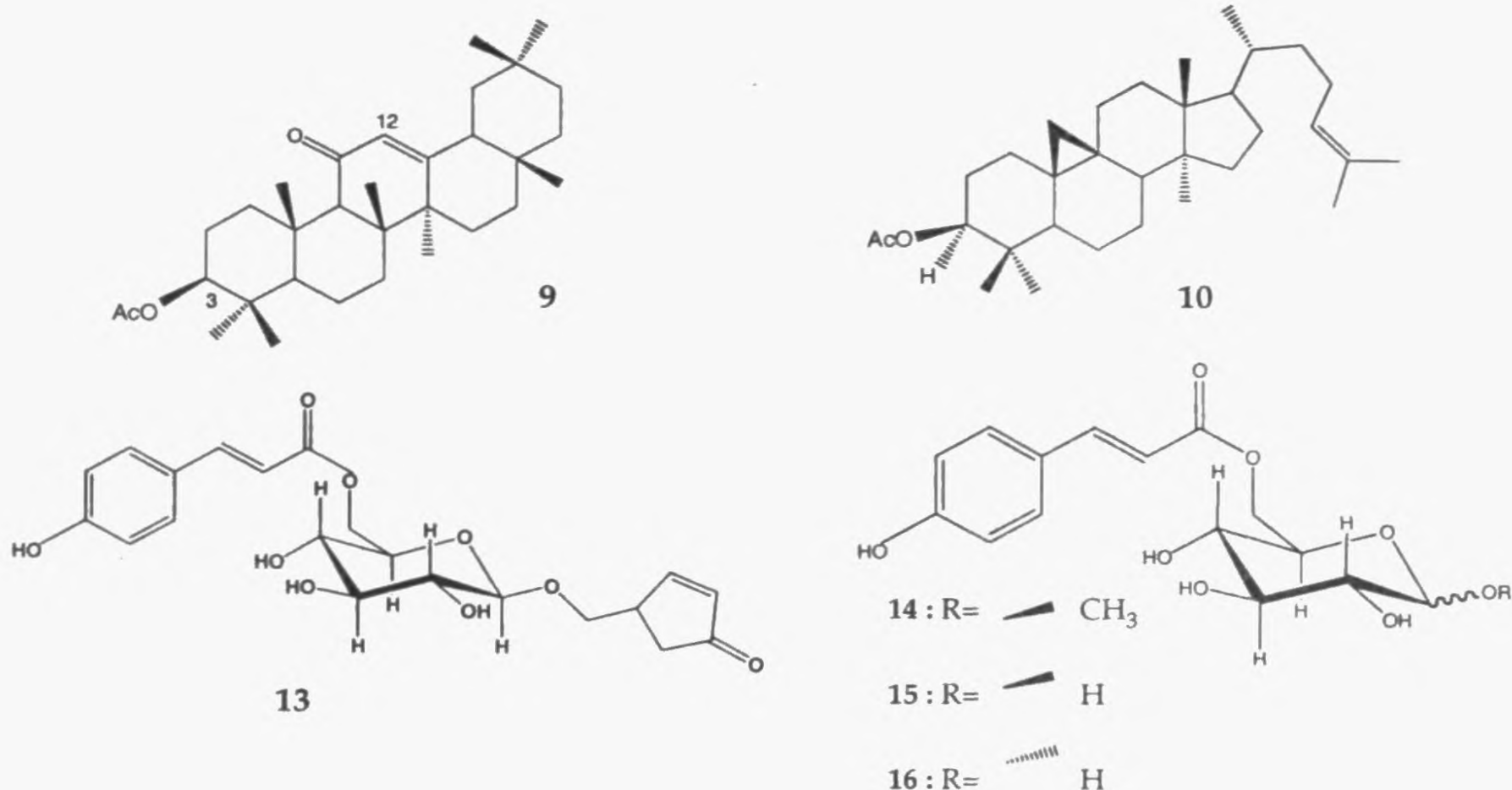
Both *A. altilis* and *F. indica* are moderate size trees growing in Sri Lanka. Fruits of both plants are edible and very popular among Sri Lankans. The fruit of *A. altilis* is known as breadfruit and it is cooked as a starchy staple, while fruit of *F. indica* is eaten raw. Both these plants possess medicinal properties. Various parts of *A. altilis* are used in folk medicine to treat skin and fungal diseases, liver cirrhosis, hypertension, diabetes, diarrhea, stomach ache etc. The whole plant of *F. indica* is used for medicinal purposes, especially the fruit for internal haemorrhages, jaundice and enlarged spleen.

Chemical investigation of the fruits of *A. altilis* furnished twelve compounds 1-12, identified as (*E*)-2,3',4,5'-stilbenetetrrol (1), 4'-[3-methyl-1(*E*)-butenyl]-(*E*)-2,3',4,5'-stilbenetetrrol (2), (3-methyl-2-butenyl)-(*E*)-2,3',4,5'-stilbenetetrrol (3) 3',5',6-trihydroxy-2-phenylbenzofuran (4), 2',4',5,7-tetrahydroxyflavanone (5), 2',4',5,7-tetrahydroxyflavone (6), 2',4',5,7-tetrahydroxy-6-[3-methyl-1(*E*)-butenyl]flavone (7), 2',4',5,7-tetrahydroxy-6-(3-methyl-2-butenyl)flavone (8), 3 $\beta$ -acetoxyolean-12-en-11-one (9), cycloartenyl acetate (10), sitosterol (11) and sitosterol  $\beta$ -D-glucopyranoside (12).

Antifungal activity of isolates was tested against seven plant pathogenic fungi (*Alternaria* sp., *Aspergillus* sp., *Colletotrichum* sp., *Cladosporium cladosporioides*, *Fusarium* sp., *Geotrichum* sp. and *Rhizctonia* sp.). Compounds 1-4 exhibited significant antifungal activity against *C. cladosporioides* by TLC bioautography method with MIC values at 20, 10, 10

and 15  $\mu$ g/spot respectively. Compounds 2- 4 were significantly active against all the above fungi at less than 75  $\mu$ g/disc level.





Compounds **1-4** showed strong antioxidant activity against DPPH (2,2'-diphenyl-1-picrylhydrazyl) radical scavenging assay with  $IC_{50}$  values of 3.5, 10, 4 and 2 ppm respectively ( $IC_{50}$  value of positive control, ascorbic acid 4 ppm). Compound **4** showed cytotoxicity against *Artemia salina* with  $LC_{50}$  at 25 ppm and phytotoxicity against *Lactuca sativa* (100% shoot growth inhibition at 250 ppm).

The present study reported the isolation of stilbenes (**1-3**), arylbenzofuran (**4**), flavanone (**5**), flavones (**6-8**), triterpenes (**9** and **10**) and sterols (**11** and **12**) from the fruits of *A. altilis*. This is the first report of compounds **2**, **6**, **9** and **12** from *A. altilis* and **1-10** and **12** from its fruits. Some of these compounds have shown a distinctive occurrence among genus *Artocarpus* and a literature survey revealed that compounds **1-8** can be used as taxonomic markers for the family Moraceae, especially, the genus *Artocarpus*.

Chemical investigation of the fruit juice of *F. indica* furnished a new natural product, 4-oxo-2-cyclopentenylmethyl 6-*O*-(*E*)-*p*-coumaroyl- $\beta$ -D-glucopyranoside (**13**) named Flacourside, together with three known compounds, methyl 6-*O*-(*E*)-*p*-coumaroylglucopyranoside (**14**),  $\alpha$  and  $\beta$  anomers of 6-*O*-(*E*)-*p*-coumaroylglucopyranoside (**15**, **16**). Flacourside is the first natural product with the 4-oxo-2-cyclopentenemethanol unit. Compounds **13** can be used as a taxonomic marker for the family Flacourtiaceae as a literature survey revealed that the terminal cyclopentene rings are characteristic of family Flacourtiaceae.

The results of this piece of research led to two publications in internationally reputed journals *Food Chemistry* and *Biochemical Systematics and Ecology*; listed in Science Citation Index and four communications at national conferences.

## Kandiah Memorial Award for Applied Chemistry - 2008



Dr K K G M P B Herath of the State Pharmaceutical Manufacturing Corporation has been awarded the Kandiah Memorial Award for Applied Chemistry in recognition of his research on 'Formulation of extended release theophylline tablets – experimental, modelling and bioequivalence studies'.

Dr. Kamal Parakrama Bandara Herath, graduated with a B.A in 1991 from Wartburg College, Waverly, IA, USA and completed a M.Sc. in Organic Chemistry, from Iowa State University, USA in 1994. He obtained his Ph.D in 2006 from the University of Peradeniya working under the supervision of Prof. A Abeysekera and Dr. Anil K E Goonethilleke.

Currently he is the Operation Manager (Quality Assurance and Research) at Astron Ltd. He also conducts visiting lectures at the University of Colombo.