

**MOLECULAR STUDIES ON THE
ANTIOXIDANT AND ANTICANCER
PROPERTIES OF THE FLOWERS OF
Caesalpinia pulcherrima, SWARTZ.**

By

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for the Degree of
Doctor of Philosophy in Biochemistry**

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CERTIFICATE

This is to certify that the thesis entitled "**Molecular studies on the antioxidant and anticancer properties of the flowers of *Caesalpinia pulcherrima*, Swartz.**" submitted to Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for the award of the degree of **Doctor of Philosophy in Biochemistry**, is a record of original work done by **S.T.Yamuna**, during the period of her study in the Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, under my supervision and guidance and the thesis has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or similar title to any candidate of any University.

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Signature of the Guide

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12/2/14

Signature of the Dean

DECLARATION

I hereby declare that the matter embodied in this thesis is the result of investigations carried out by me in the Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, under the supervision and guidance of **Dr.P.R.Padma**, Professor, Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore and that it has not been submitted for the award of any Degree / Diploma / Associateship / Fellowship etc., of any other University or Institute.

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LIST OF ABBREVIATIONS

$^1\text{O}_2\bullet$	Singlet oxygen
ABTS	2,2'-azino-bis-3-ethyl benzthiazoline-6-sulphonic acid
ADP	Adenine Dinucleotide Phosphate
ANOVA	Analysis of Variance
AO/EtBr	Acridine orange/Ethidium bromide
ATP	Adenosine triphosphate
Bax	Bcl-2-associated X protein
Bcl-2	B-cell CLL/lymphoma 2
BSA	Bovine Serum Albumin
CAT	Catalase
CCl_4	Carbon tetrachloride
CPO	<i>Caesalpinia pulcherrima</i> Orange flower
CPP	<i>Caesalpinia pulcherrima</i> Pink flower
CPY	<i>Caesalpinia pulcherrima</i> yellow flower
DAPI	4'-6-diamidino-2-phenylindole
DMEM	Dulbecco's Modified Eagle's Medium
DMSO	Dimethyl sulfoxide
DPA	Diphenylamine
DPPH	2,2-diphenyl-2-picryl hydrazyl hydrate
DTT	Dithiothreitol
EDTA	Ethylene diamine tetraacetic acid
ELISA	Enzyme-Linked Immunosorbent Assay
EtBr	Ethidium bromide
FACS	Fluorescence Activated Cell Sorting
FBS	Fetal Bovine Serum
FITC	Fluorescein isothiocyanate
FRAP	Ferric reducing ability of plasma
FT-IR	Fourier Transform Infra Red Chromatography
g	g-force or relative centrifugal force
G0 phase	Gap 0 phase
G1 phase	Gap 1 phase
G2 phase	Gap 2 phase
GC-MS	Gas Chromatography – Mass Spectroscopy
GPx	Glutathione peroxidase
GR	Glutathione reductase
GSH	Reduced glutathione
GSSH	Oxidised glutathione
GST	Glutathione S-transferase
H_2O_2	Hydrogen peroxide
HBSS	Hanks Balanced Salt Solution
HPLC	High performance liquid chromatography
HPTLC	High performance thin layer chromatography
IDV	Integrated Density Values

IU	International units
KB	Human oral carcinoma cells
LDH	Lactate dehydrogenase
LPO	Lipid peroxidation
Lymphosep	Lymphocyte separation medium
M phase	Mitosis phase
MDA	Malondialdehyde
MTT	3-(4,5-dimethyl-thiazol-2-yl)-2,5-diphenyltetrazolium bromide
NADH	Nicotinamide Adenine Dinucleotide reduced
NADPH	Nicotinamide Adenine Dinucleotide Phosphate reduced
NMR	Nuclear magnetic resonance
NO	Nitric oxide
NO ₂	Nitrogen dioxide
O ₂ ^{•-}	Superoxide anion radical
OH [•]	Hydroxyl radical
PAGE	Polyacrylamide Gel Electrophoresis
PBL	Peripheral blood lymphocytes
PBS	Phosphate buffered saline
PHAP	Phytohaemagglutinin-P
PI	Propidium iodide
RCF	Relative centrifugal force
R _f	Retention factor
RNS	Reactive Nitrogen Species
ROS	Reactive Oxygen Species
RP- HPLC	Reverse Phase High Performance Liquid Chromatography
Rpm	Revolutions per minute
RPMI 1640	Roswell Park Memorial Institute medium 1640
R _t	Retention time
S phase	Synthesis phase
SCG	Single Cell Gel
SD	Standard deviation
SDS	Sodium Dodecyl Sulphate
SOD	Superoxide dismutase
SRB	Sulphorhodamine B
Sub-G0 phase	Sub-Gap 0 phase
TBARS	Thiobarbituric acid reactive substances
TLC	Thin layer chromatography
TP53	Tumor protein p53
U	Units of enzyme
UV	Ultra violet rays